



## 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



**464 ULPMark-CP**

True energy cost of deep-sleep modes



**125 ULPMark-PP**

Common peripherals' energy impact on deep-sleep



**54 ULPMark-CM**

Active power, using CoreMark as the workload



**137000 SecureMark-TLS**

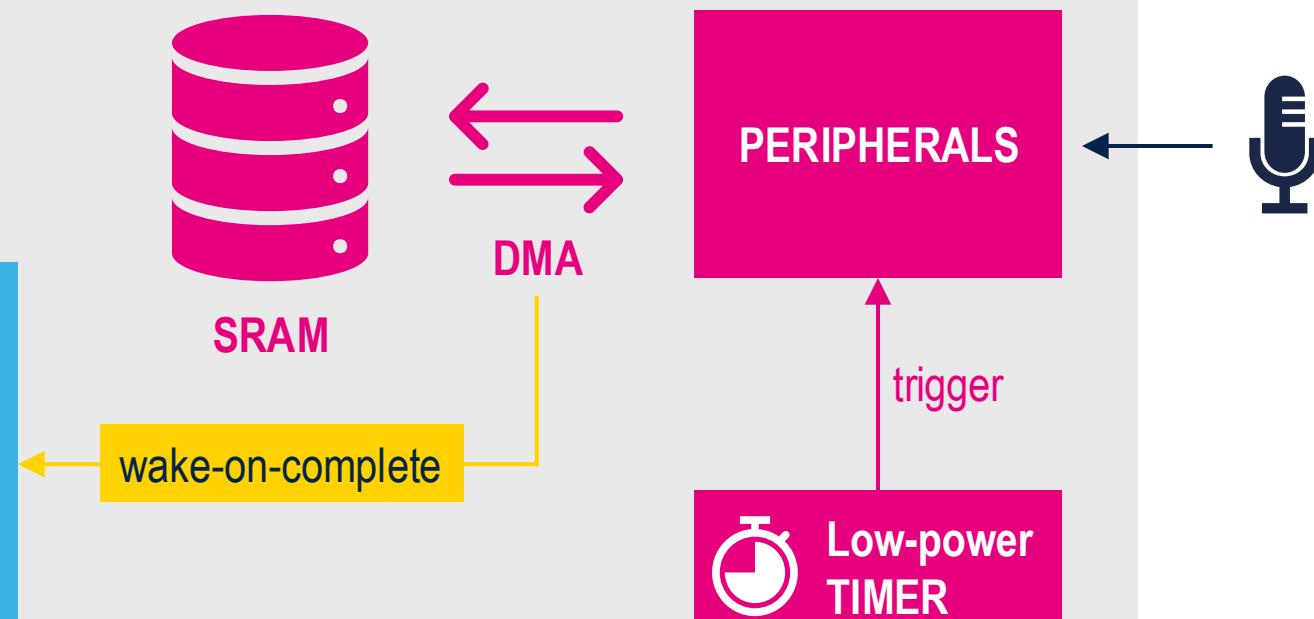
Efficiency of cryptographic processing solutions



# 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:

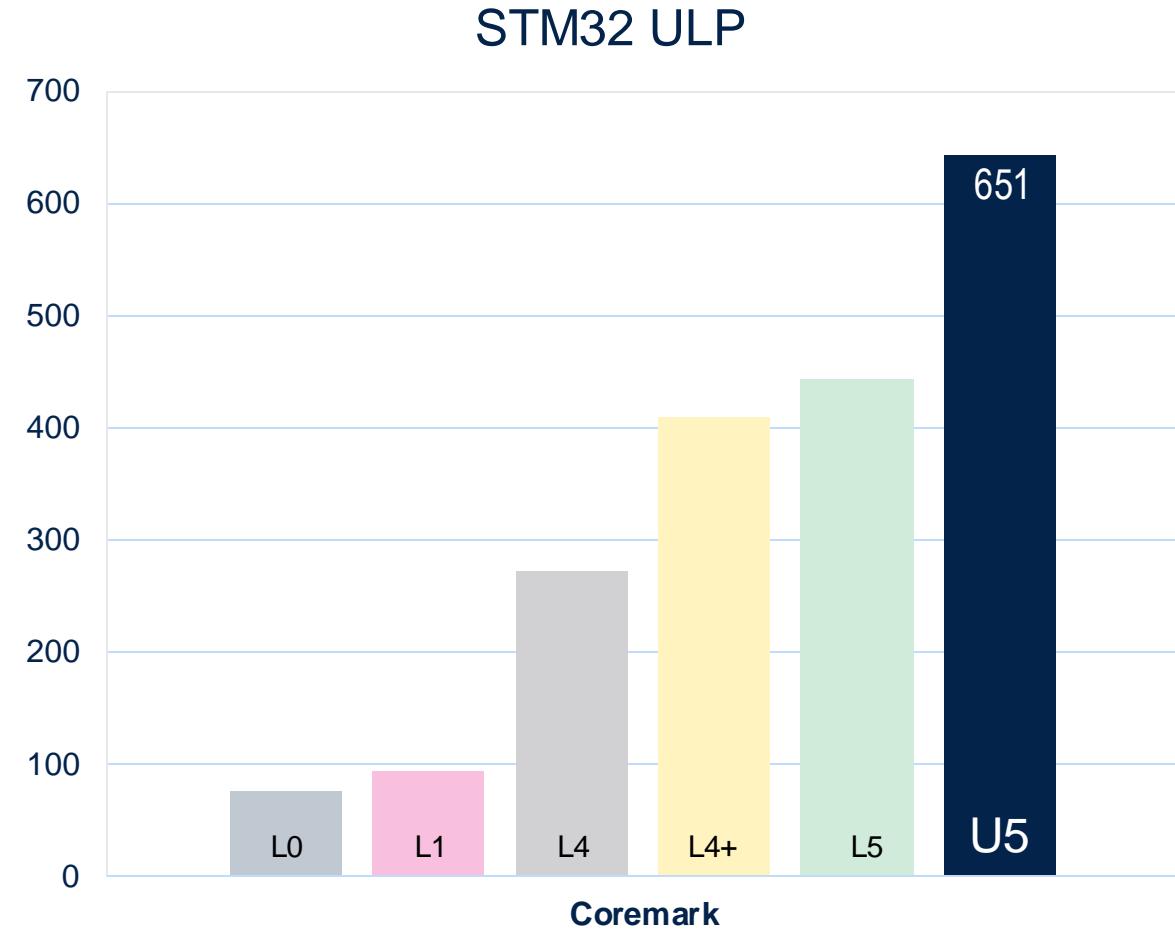




# Inparalleled performance for an ultra-low-power MCU

## STM32U5

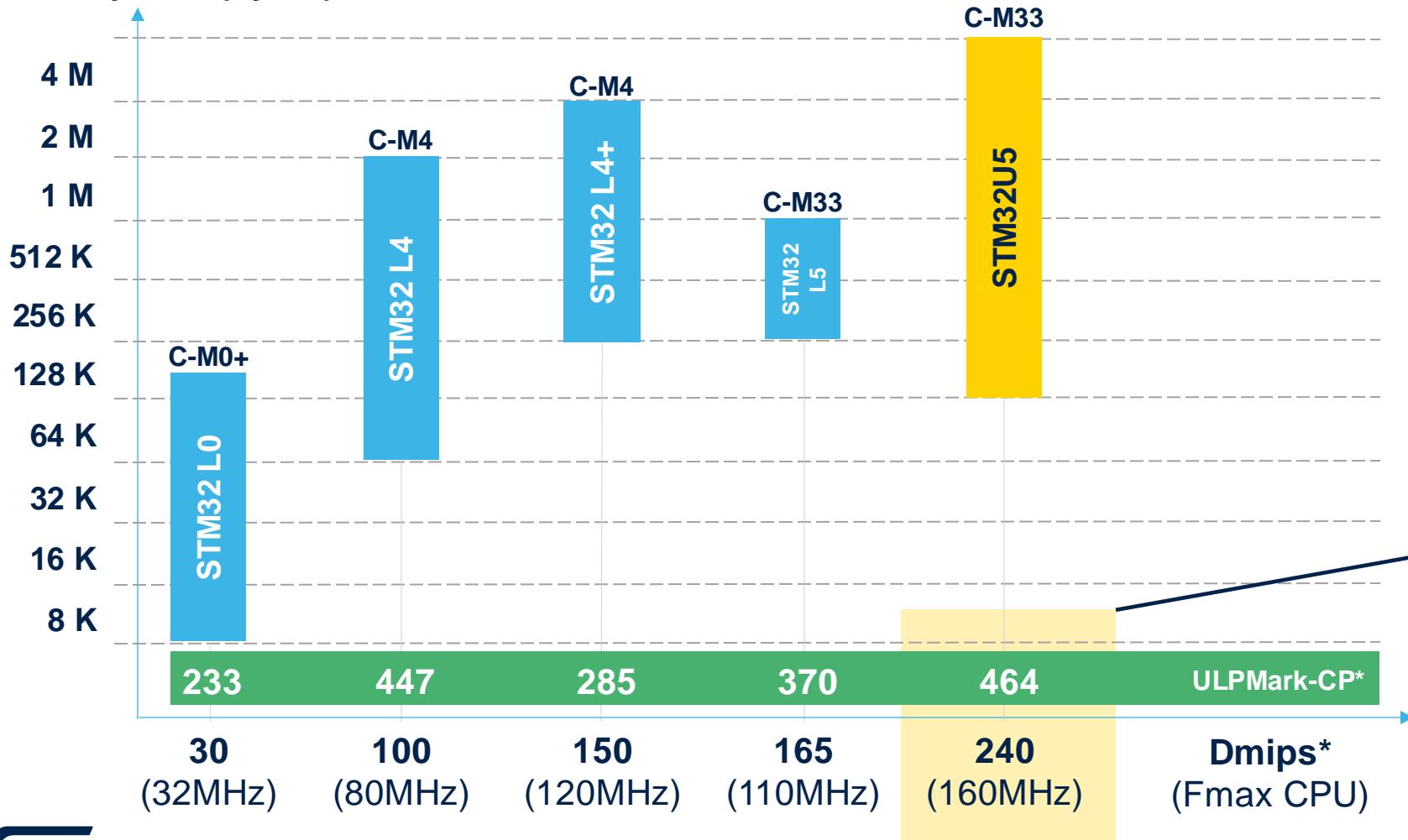
- Arm® Cortex®-M33 at **160 MHz**, **240 DMIPS** or **651 Coremark**
- Mathematics accelerators: **FMAC** and **Cordic**
- Cache for execution and **data** for internal and external memory (ART Accelerator)





# STM32U5, the flagship of STM32 ULP series

Memory size (bytes)



\*the higher the better



# Enhanced security

## Extensive functionalities to protect your assets

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



# STM32U5 portfolio brings you many design options

	STM32U535/545	STM32U575/585	STM32U595/5A5	STM32U599/U5A9	STM32U5F9/U5G9
<b>Flash size</b>	128 to 512 Kbytes	1 to 2 Mbytes	2 to 4 Mbytes	2 to 4 Mbytes	2 to 4 Mbytes
<b>RAM size</b>	274 Kbytes	786 Kbytes	2.5 Mbytes	2.5 Mbytes	3 Mbytes
<b>USB</b>	Full Speed	Full Speed + Power Delivery controller	High Speed + Power Delivery controller	High Speed + Power Delivery controller	High Speed + Power Delivery controller
<b>ADC</b>	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
<b>Memory interface</b>	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
<b>JPEG Codec</b>	-	-	-	-	Yes
<b>Display interface</b>	SPI	SPI, Parallel 8080	SPI, Parallel 8080	RGB, MIPI DSI	RGB, MIPI DSI
<b>Graphics accelerators</b>	-	Chrom-ART	-	 NeoChrom GPU Chrom-ART	 NeoChrom GPU Vector graphics Chrom-ART
<b>Packages</b>	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](#)



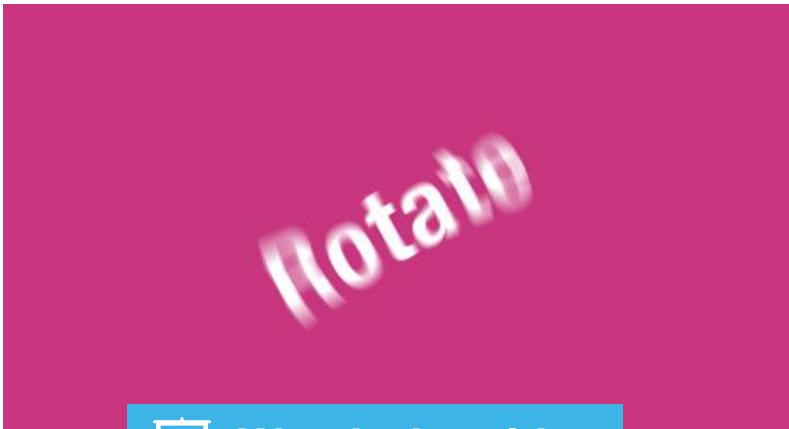
[Watch the video](#)



# Smoother 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](#)

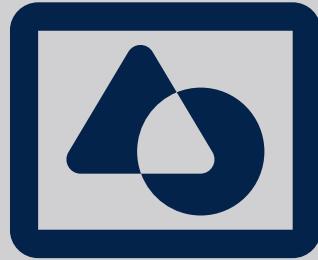
## Enabling outstanding graphics on STM32, such as:

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



# Vector graphics with NeoChromVG GPU

## Scalable vector graphics (SVG)

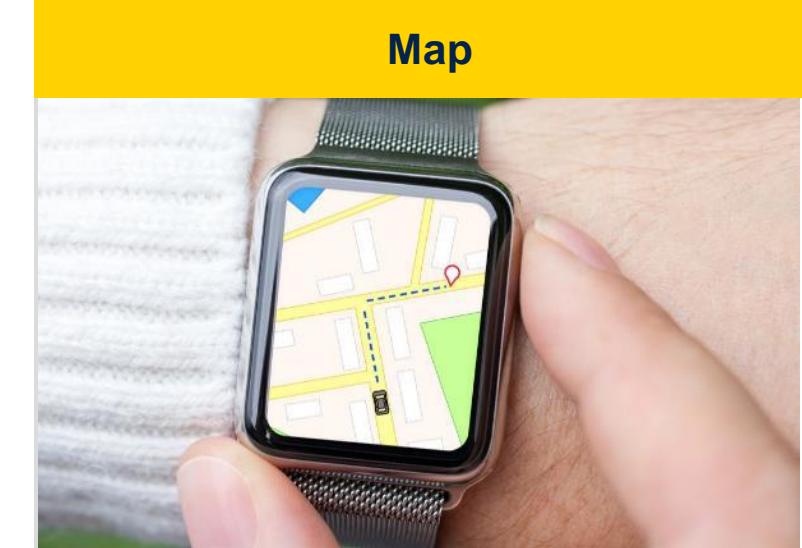


- To gain nice dynamic effects
- To save flash memory



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

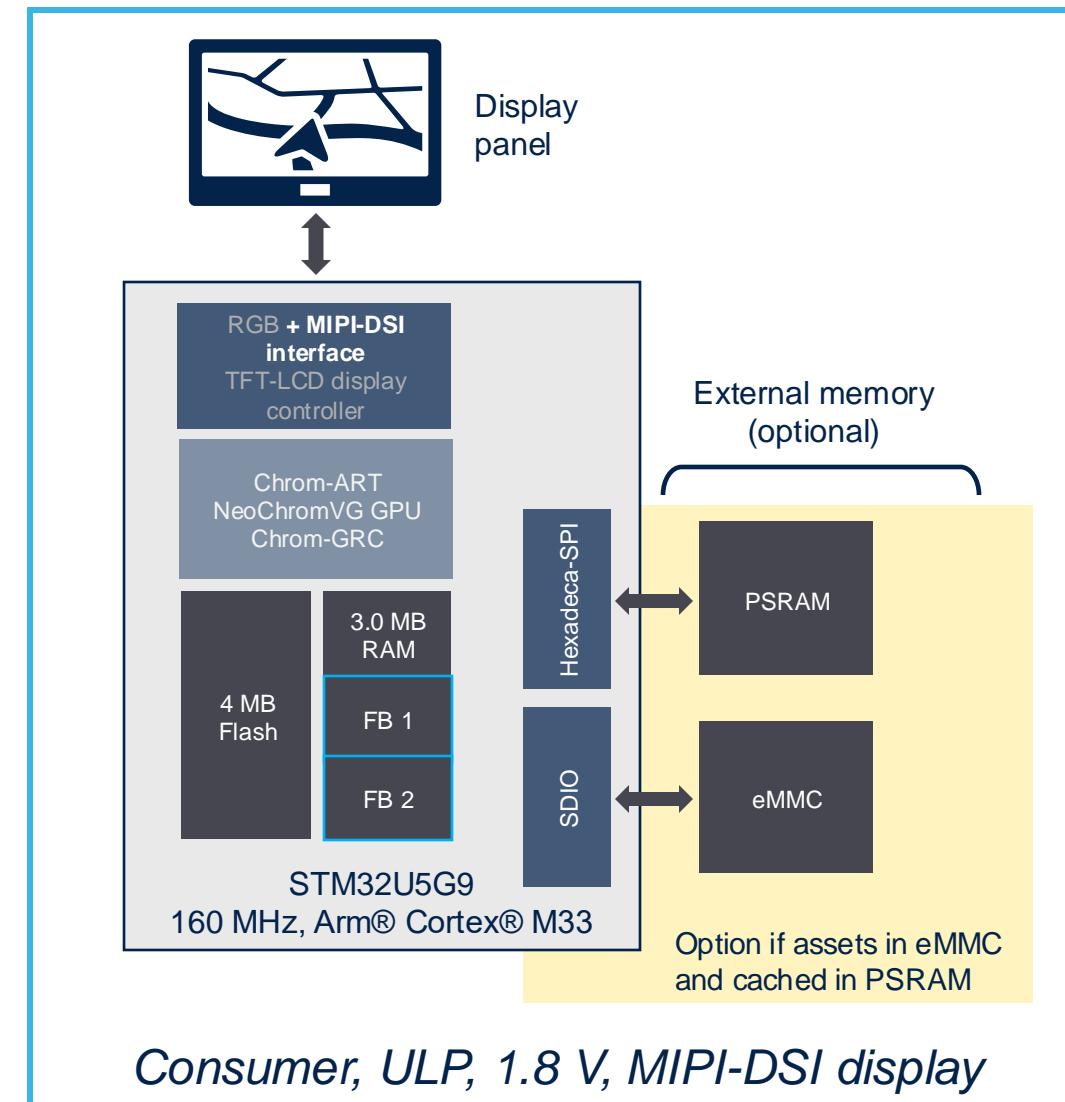
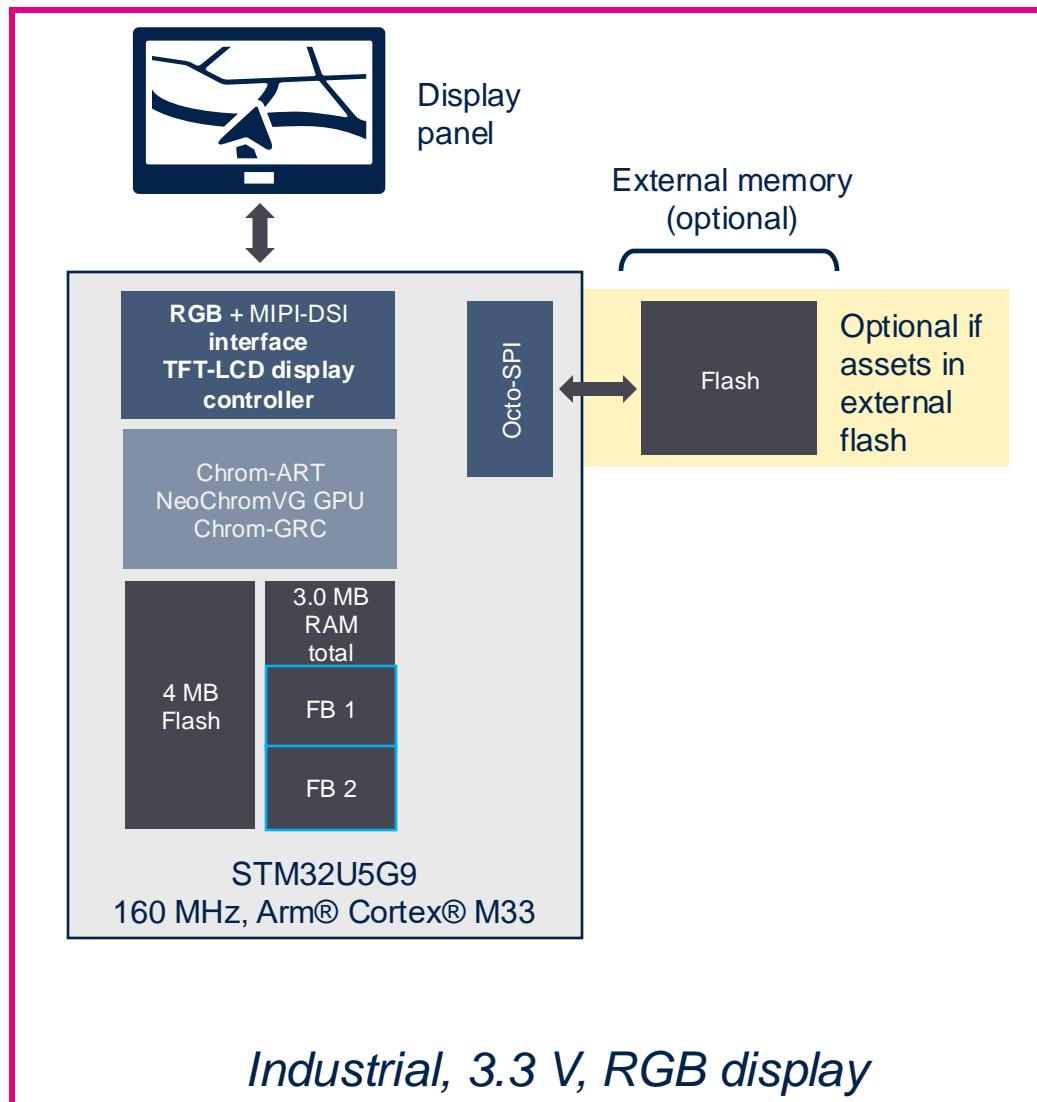
## Map



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

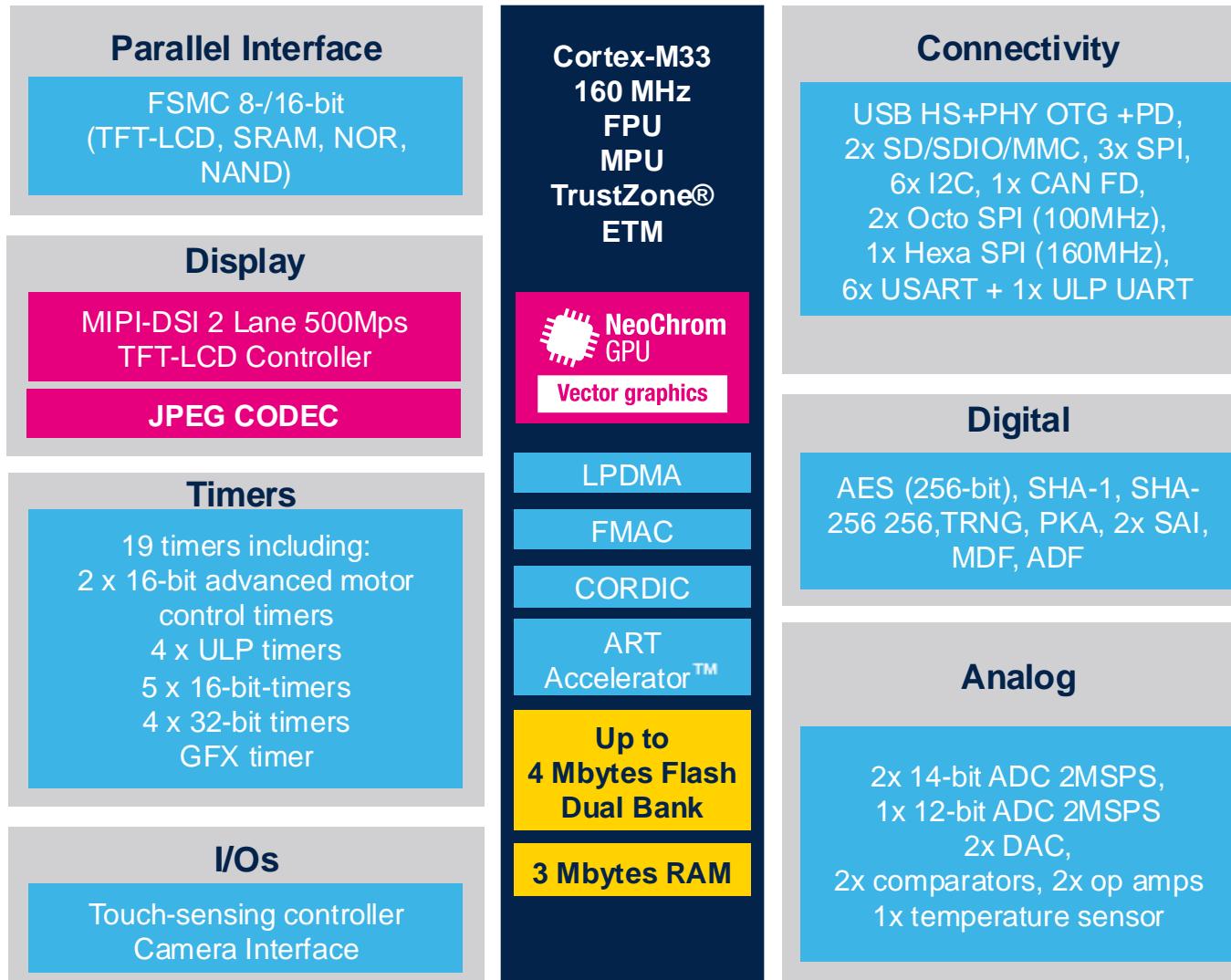
[Read the blog](#) 

# Hardware setup - STM32U5G9 lines





# STM32U5 offers high integration



# STM32U5 development ecosystem



# STM32 development tools

Speed up evaluation, prototyping, and design with hardware tools



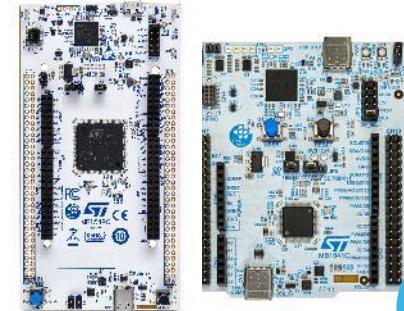
\*\$348



\*\$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](#)

## STM32 Nucleo

Affordable and quick prototyping

[NUCLEO-U575ZI-Q](#)

[NUCLEO-U5A5ZJ-Q](#)

[NUCLEO-U545RE-Q](#)



Watch the video

\*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





# 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  
CubelDE



STM32  
CubeProgrammer



STM32  
CubeMonitor

Verticals and  
Partners solutions

IDEs from Partners

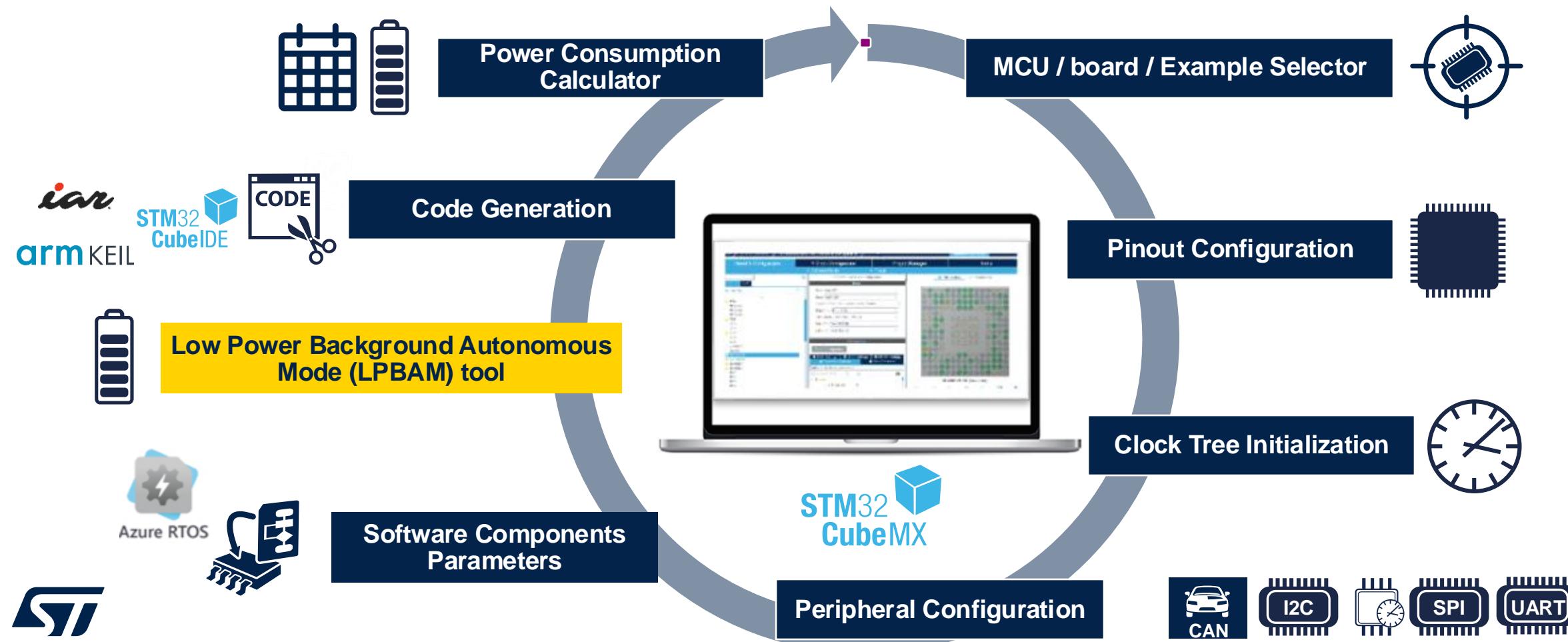
Programmers from Partners

## Worldwide support channels



# STM32CubeMX

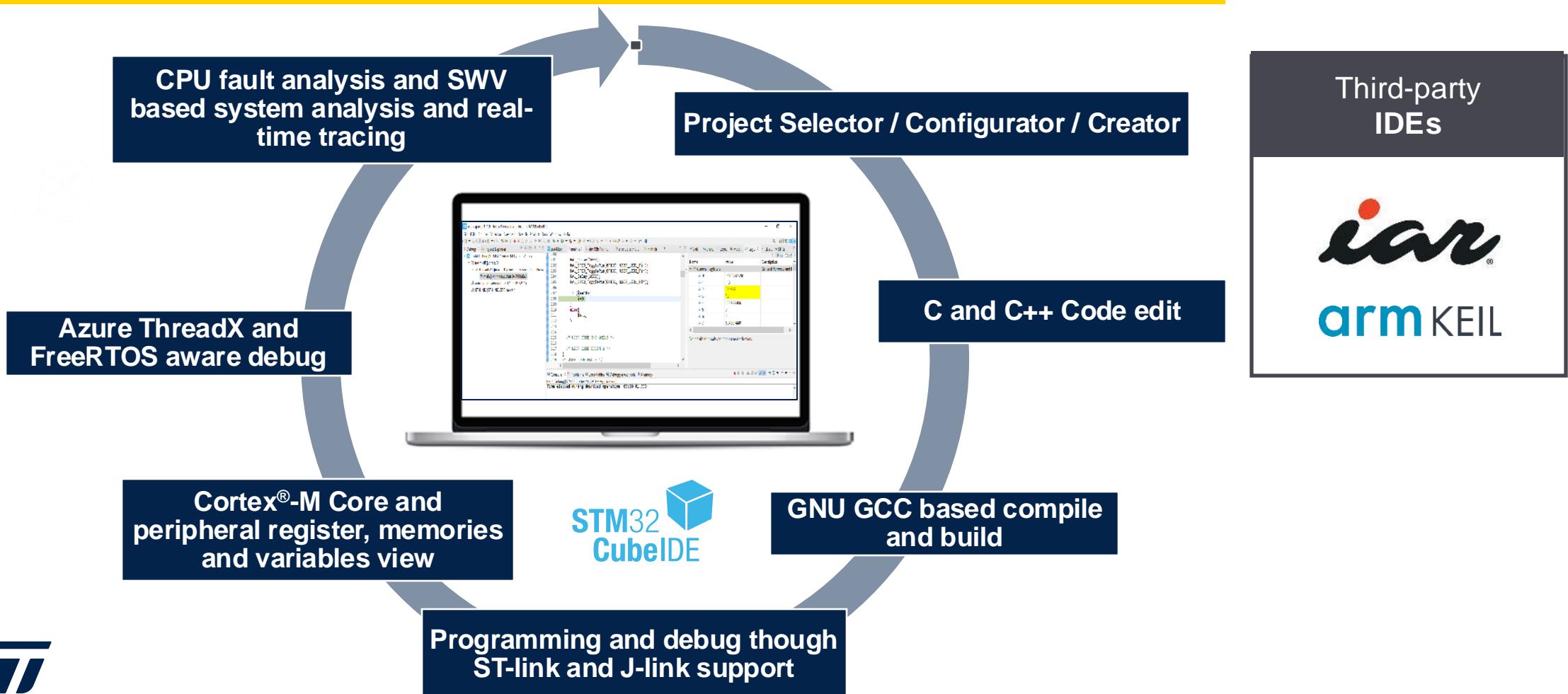
Easily and quickly create and initialize your project





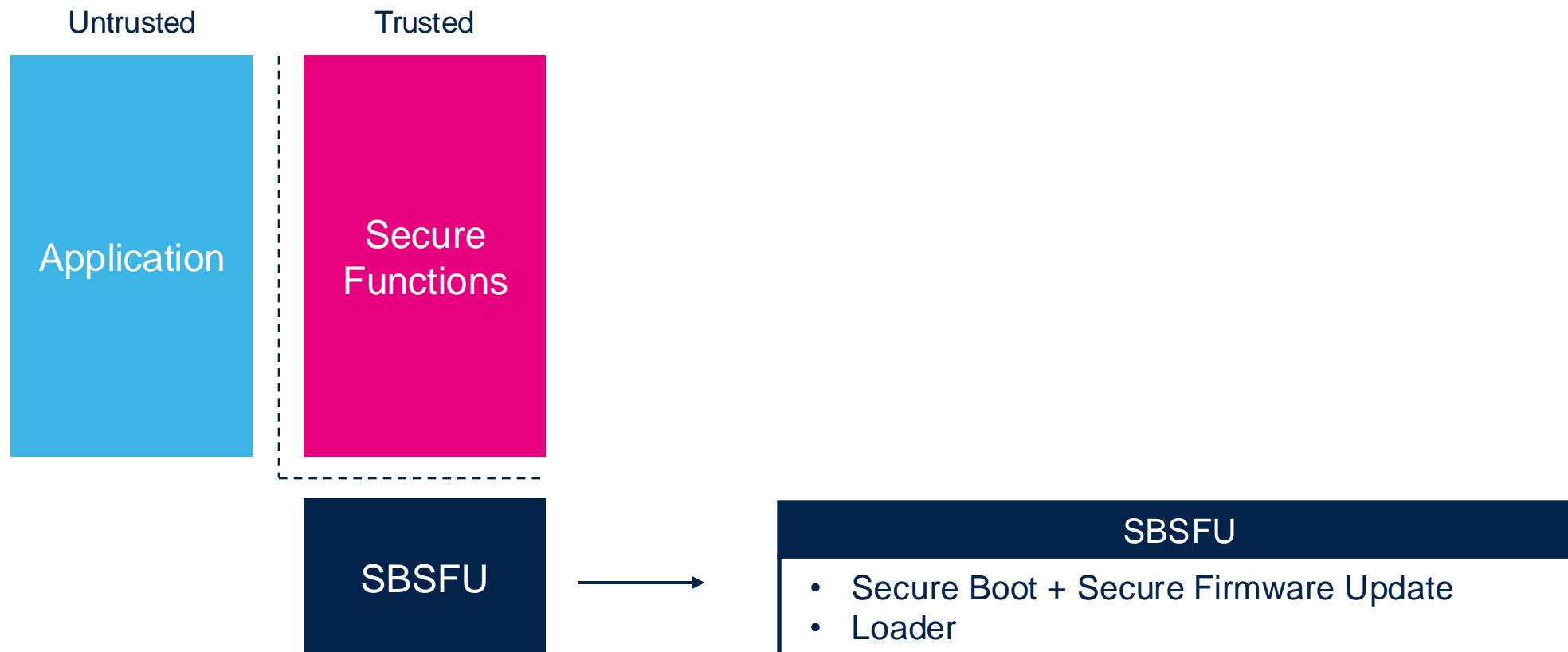
# STM32CubelDE and third-party IDEs

Simplify and accelerate your application development

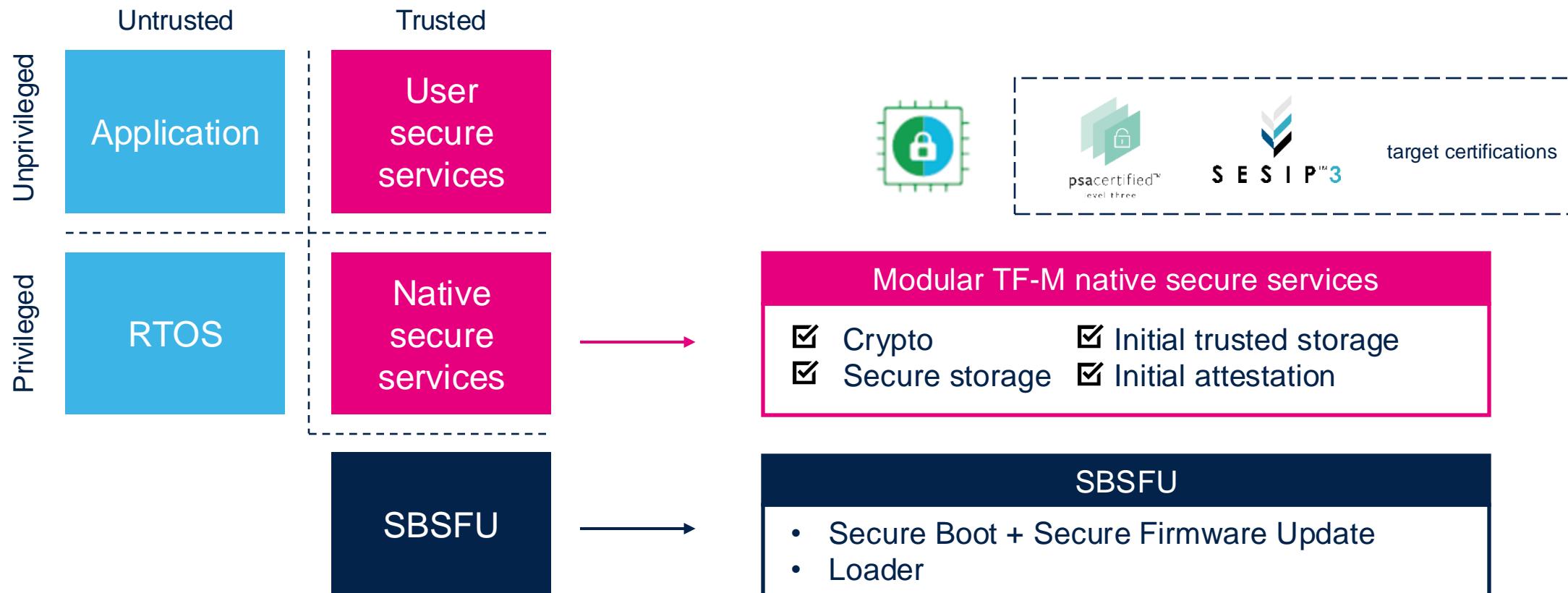


# STM32Cube SBSFU secure boot and secure firmware update

## Reference code for PSA immutable Root of Trust

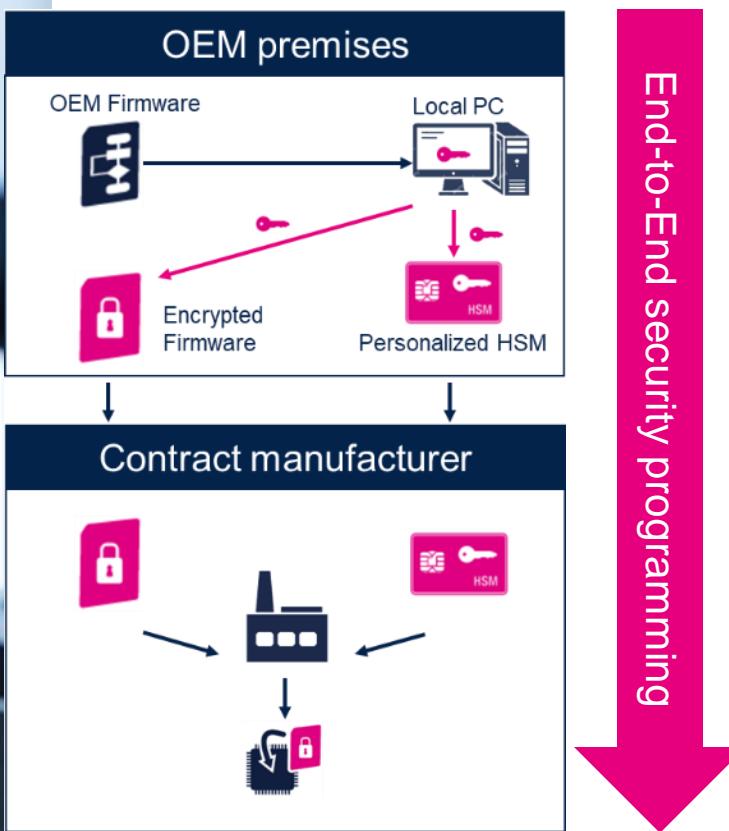


## Scalable reference code framework leveraging STM32U5 security features



# Secure your production flow with Secure Firmware Install (SFI)

## Protect application firmware at the contract manufacturer



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



[www.st.com/x-cube-stl](http://www.st.com/x-cube-stl)

**Compiler independent certified self-test library for Cortex®-M33 core, Embedded Flash and RAM**



**Safety Manual  
FMEA, FMEDA**

**ECC on RAM and Flash  
Brown-out Reset  
Clock Security System  
Dual Watchdog**



# STM32U5 in open-source frameworks

STM32U5 is ready for community contribution

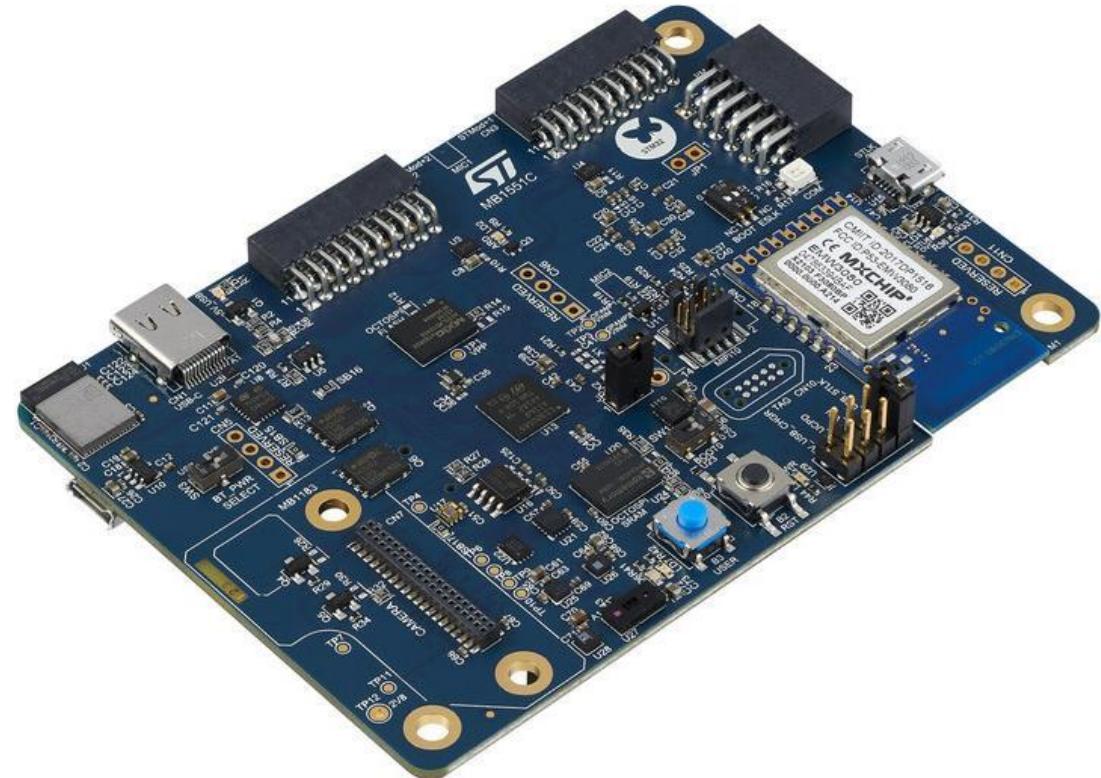
arm  
MBED



Zephyr™



ARDUINO





# Azure IoT Platform certified for Azure IoT Plug and Play

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



**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



STM32  
CubeExpansion

X-CUBE-AWS

[B-U585I-IOT02A](#)

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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[@ST\\_World](#)



[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](http://www.st.com/STM32U5)

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