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STM32H7R/S high-performance lines

Scalable & secure bootflash microcontrollers

The STM32 portfolio

Five product categories

Wireless MCU

Short- and long-range connectivity

Ultra-low-power MCU

Mainstream MCU

High-performance MCU

32-bit general-purpose microcontrollers: from 75 to 3,224 CoreMark score

Embedded MPU

32- and 64-bit microprocessors





Enabling edge AI solutions

Scalable security

MPU portfolio

MCU portfolio

Opening new innovation possibilities with scalable and secure bootflash-microcontrollers

General-purpose MCU lines

STM32H7**R3/S3**

Graphics MCU lines

STM32H7**R7/S7**

Run MPU-like applications on a real-time MCU

Leverage more design freedom

Fast-track your development with MCU ecosystem

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What the STM32H7R/S lines offer

Max performance: 600 MHz bootflash MCU

- Real-time execution from internal or external memories
- High speed serial & parallel memory interfaces up to 200 MHz DTR
- Large internal SRAM

High scalability to optimize your design & reduce costs

- Flexible external memory capacity
- 10 packages: from cost-effective 68 to 225 pins

Security assurance: ready for future security directives

- Target security certification: SESIP Level 3 and PSA certified L3.
- On-the-fly decrypt/encrypt & secure boot

Best-in-class platform for graphics applications

- Powerful 2.5D NeoChrom GPU - smart DMA architecture memory/GPU
- Enabling UIs with HD resolution.

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High-performance & multi-purpose MCUs for a wide range of applications

Smart homes & cities

Industrial

Medical

Point of sales

Robotics

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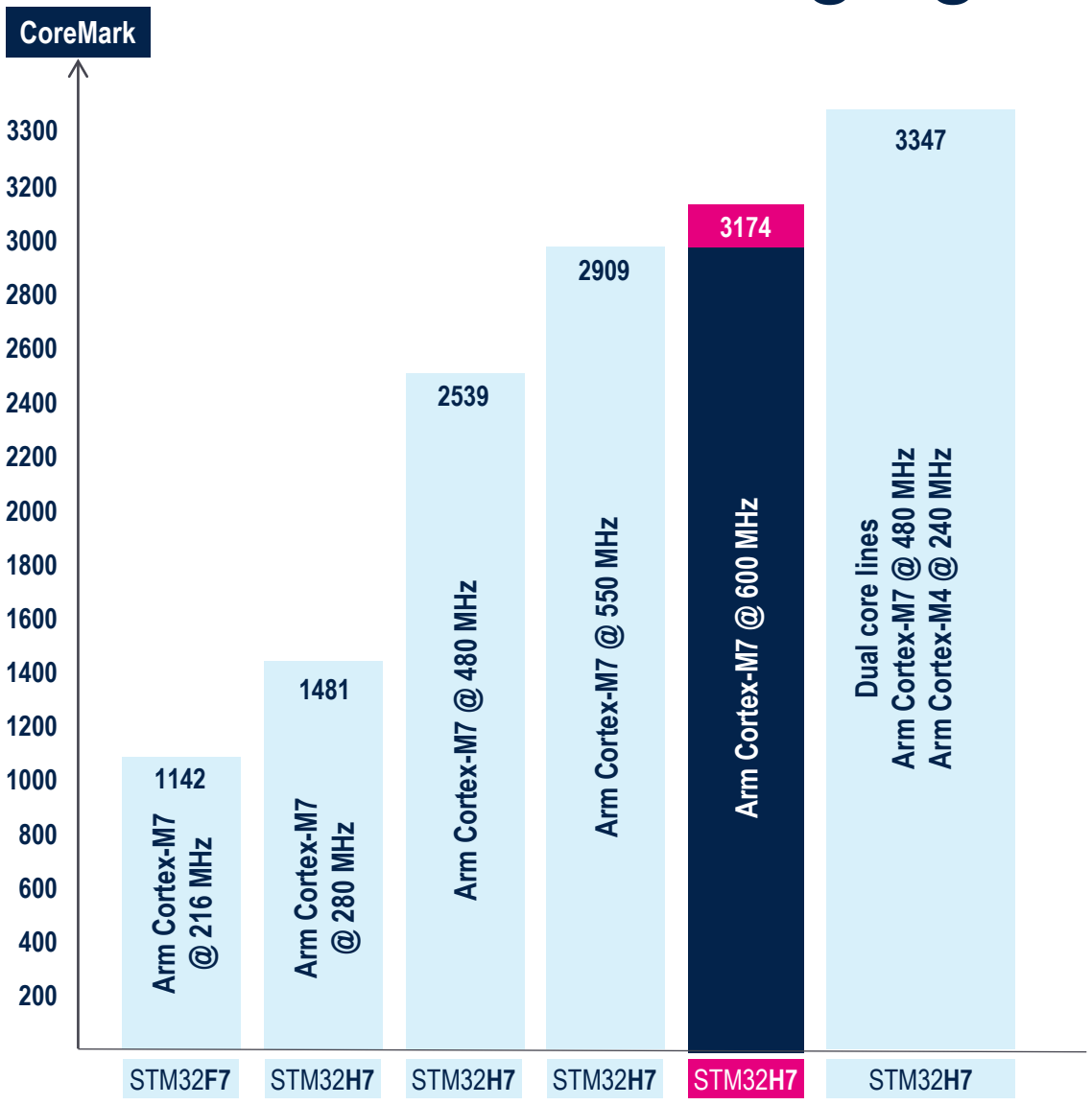
A high-performance architecture leveraging internal and external memories



Arm® Cortex®-M7 @ 600 MHz

- Double precision FPU, MPU, advanced DSP
- 32 Kbytes + 32 Kbytes L1 I/D allowing zero wait-state execution from external memories
- 620 Kbytes of SRAM
- High speed external memory support up to 200 MHz DTR

1284 DMIPS

3174 CoreMark

Why choose the STM32H7R/S bootflash MCU?

#1 **Lowest cost STM32H7 to-date**

#2 **Fast memory interfaces up to 200MHz DTR**

#3 **More freedom to connect any MCU memory type**

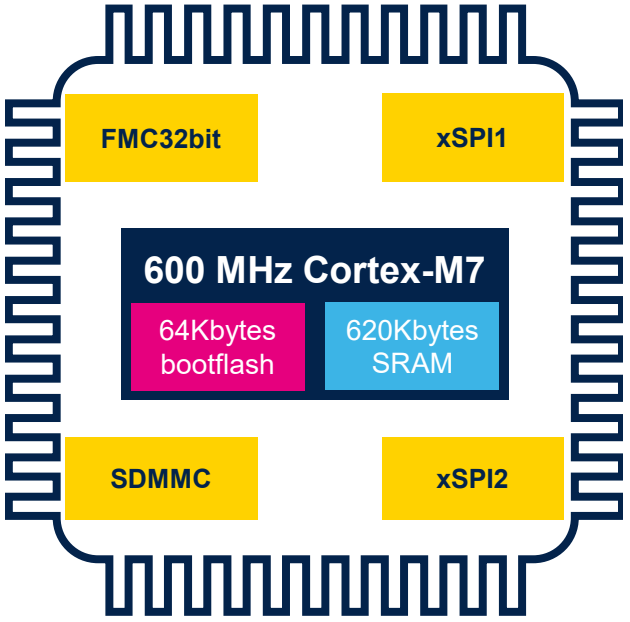
#4 **Ecosystem to configure boot & code execution**

#5 **Load & run code in large internal SRAM for faster execution**

The STM32HR/S lines are the most cost-effective STM32H7 MCUs.
They offer fast external memory interfaces to provide more freedom on memory selection and architecture.

Connect most types of **parallel memories**

Up to 32 bit interfaces @ 100MHz



Connect most types of **serial memories**

1-16 bit interfaces
Up to 200MHz DTR

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Bringing new features to the STM32H7 series

200 MHz Hexadeca SPI with PHY and DTR-mode
Fewer pins, more performance

NeoChrom GPU, JPEG Codec and LTDC
Accelerating MPU-like GUIs

Code execution from external/internal memory
Securing internal & external code & data

I3C with DMA & 2xUSB HS/FS with PHY & UCPD
Enriched communication interfaces

Securing external memories

Security option with memory crypto engine for on-the-fly encryption and decryption

STM32H7S3 or STM32H7S7
S=Crypto

	Rich & fast memory interfaces	Choose tyour preferred memory type
MCE1 w. AES: Block & Stream	**xSPI1/2**	**Up to 200MHz 16-bit Serial** RAM and Flash (DTR)
MCE2 w. Noekeon: Block	**xSPI2/1**	**Up to 200MHz 8-bit Serial** RAM and Flash
MCE3 w. Noekeon: Block	**FMC8/16/32**	**Up to 100MHz 32-bit Parallel** RAM and Flash
2x SDMMC No MCE	**SD/SDIO/MMC**	**Up to 100MHz** e.MMC, SDCard,

Performance impact example using MCE security option

Code execution from external memory with Data in D-TCM

	CoreMark				Fast fourier transform (FFT)	
OctoSPI Flash: 200MHz 16bit Serial PSRAM: 200MHz DTR	**Execute: ext. OctoSPI Cache: ON**	**Execute: ext. 16-bit PSRAM Cache: ON**	**Execute: ext. OctoSPI Cache: OFF**	**Execute: ext. 16-bit PSRAM Cache: OFF**	**FFT example Execute: PSRAM/OctoFlash Cache: ON**	**FFT example Execute: PSRAM/OctoFlash Cache: OFF**
No Cipher vs Block AES/Noekeon:	0-1% impact	0-1% impact	9-% impact	15-22% impact	0-1% impact	12-27% impact
No cipher vs Fast Block AES/Noekeon	0-1% impact	0-1% impact	9-16% impact	15-22% impact	0-1% impact	11-27% impact
No Cipher vs AES Stream	0% impact	0% impact	2.4% impact	3% impact	0-1% impact	1-5% impact

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STM32H7RS power consumption

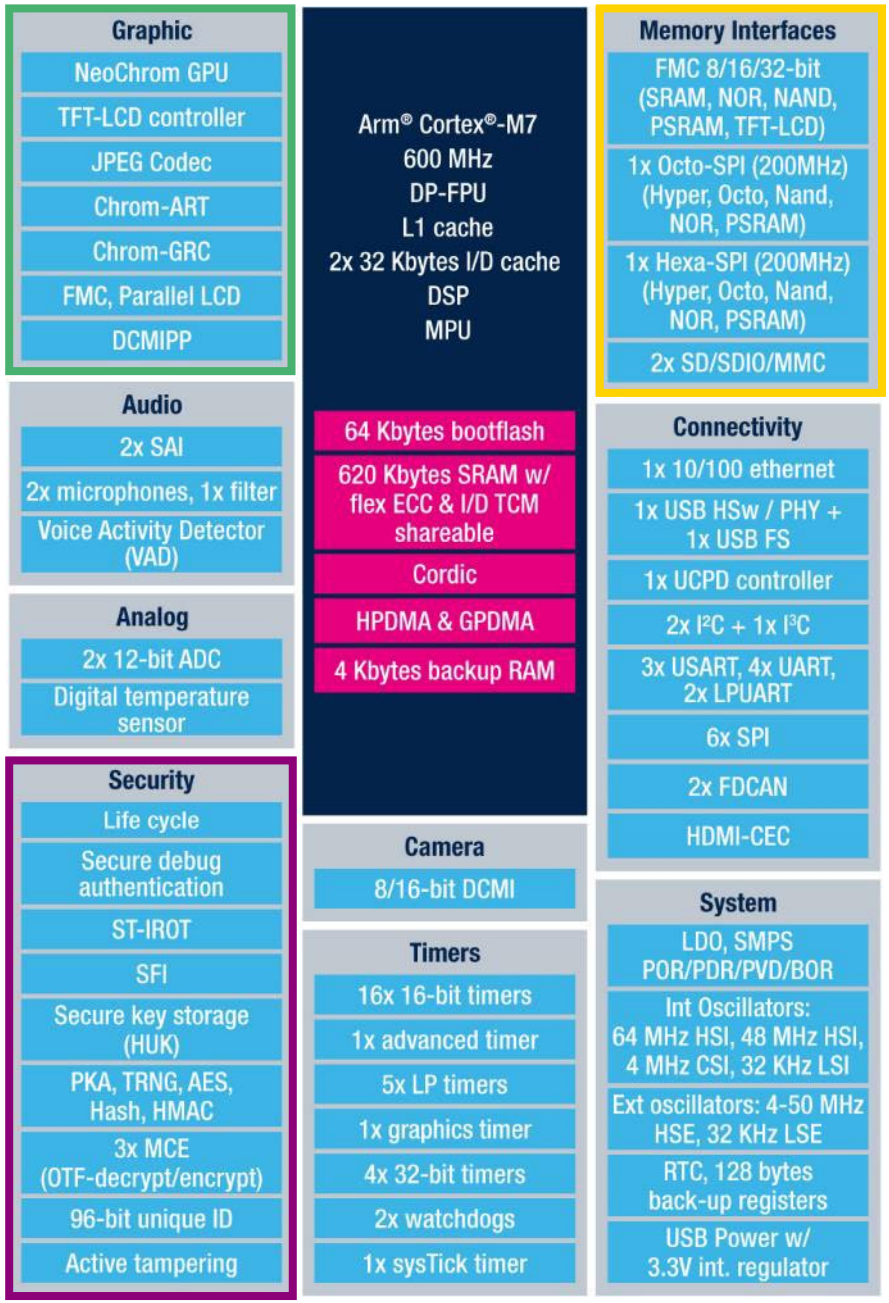
Flexible low power modes

Cortex-M7 RUN (VOS HIGH) 600 MHz	112 µA / MHz
Cortex-M7 RUN (VOS LOW) 400MHz	92 µA / MHz
Cortex-M7 SLEEP (VOS High) 600 MHz	33 µA / MHz
CM7 STOP (SVOS LOW), Flash low power	265 µA
STANDBY, 3.3V	3.7 µA
vBAT	0.8 µA

Notes:

- IDD RUN, code int flash, TYP SMPS, perip off, cache on
- IDD SLEEP: ECC enabled, perip OFF, VOS High
- IDD STANDBY: IWDG OFF, Backup SRAM Off, RTC & LSE ON, 3.3V
- IDD VBAT: Backup SRAM OFF, RTC/LSE ON

STM32H7RS MCU block diagram



High performance

Scalable security

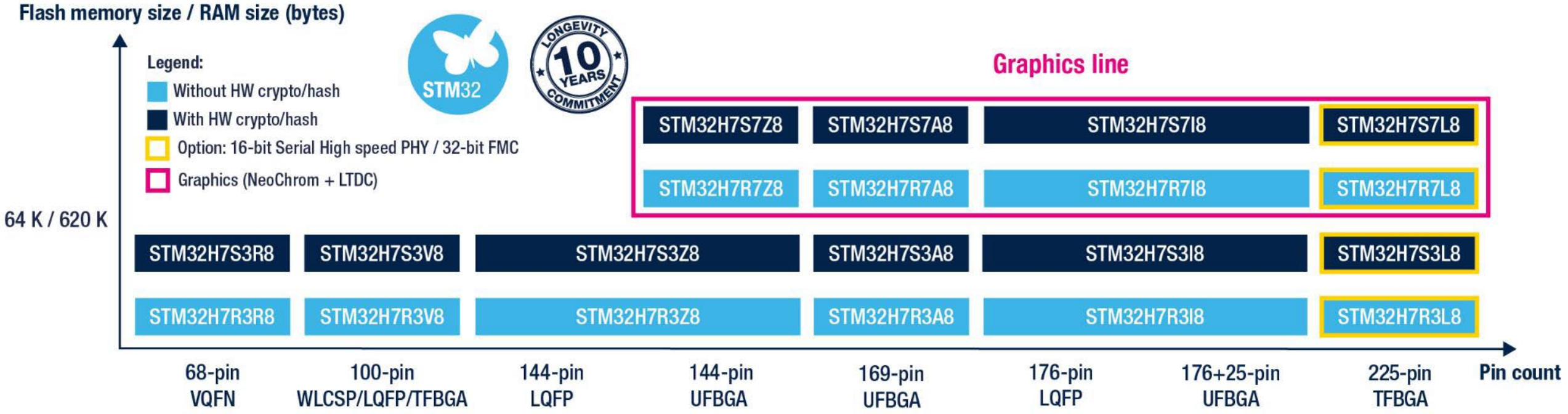
Large embedded RAM memory

Fast & flexible external memory I/F

Advanced graphic capabilities

STM32H7Rx/Sx portfolio

General-purpose & graphics lines, security options, large package offering



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Smoother and richer graphics with NeoChrom GPU

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

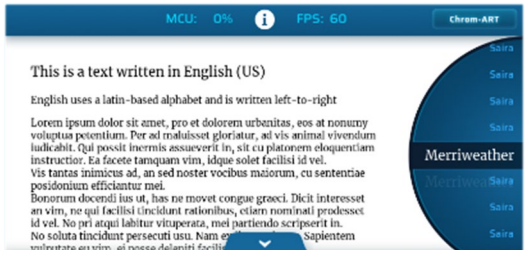
Fully supported in the X-CUBE-TOUCHGFX

NeoChrom GPU

Scale/animate bitmaps

Full screen transitions

360° Bitmap rotations



Text scrolling

Vector graphics (SW)

Perspective correct texture mapping

Fast 2D bitmap copy color format conversion

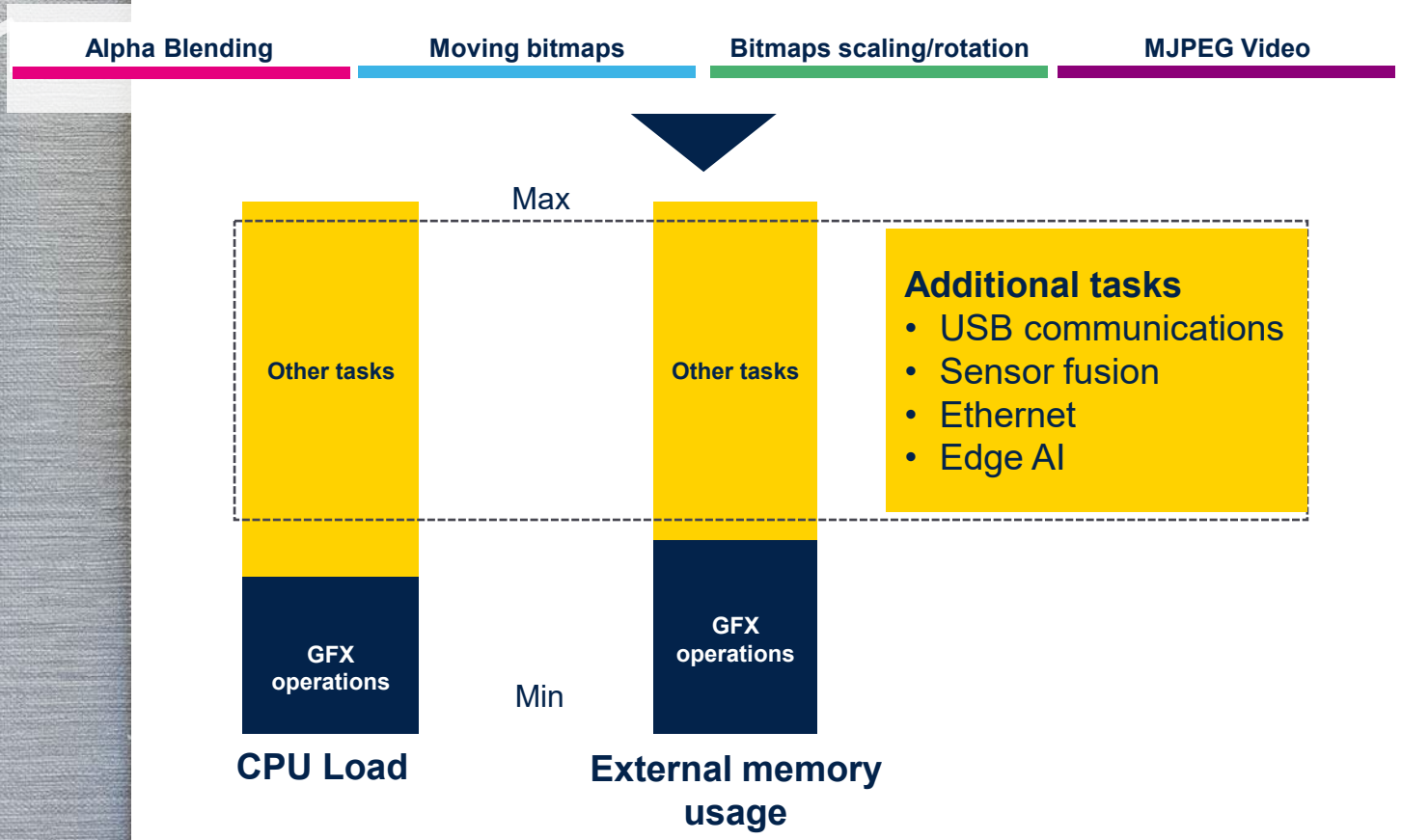
MJPEG videos

GUI application example

MPU-like applications

Run rich GUIs and much more

Watch video now!



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Scalable security to boost your time to market

How many security building blocks do you need to reach your security goals?

Choose between different security offers

From secure hardware to full solution owned & maintained by ST

target certifications

STM32 Trust

Stronger security

Robust hardware features and turnkey SoC software implementations

Memory protections
against illegal access control

OTP, HDP, WRP, MPU
Ext. Flash Enc/Dec MCE
Ext. RAM Enc/Dec MCE
Secure Debug, Active Tamper

Cryptography
for hardware robustness

Side channel AES, PKA
TRNG, MCE1, MCE2, HUK
NIST - CAVP certified CryptoLib

Platform authentication
during product lifecycle

2 boot stages
Protection level states
Debug authentication

Code isolation
for runtime protection

3 isolation stages
4 encrypted MCE domains
Dedicated keystores

Turnkey SOC security services

- STM32Trust RoT reference codes
- Hardware Security robutness
- Secure Firmware IP Installation
- XIP encrypted code
- Immutable Root of Trust

State-of-the-art security assurance level

SESIP™3

psacertified™
level three

target certifications

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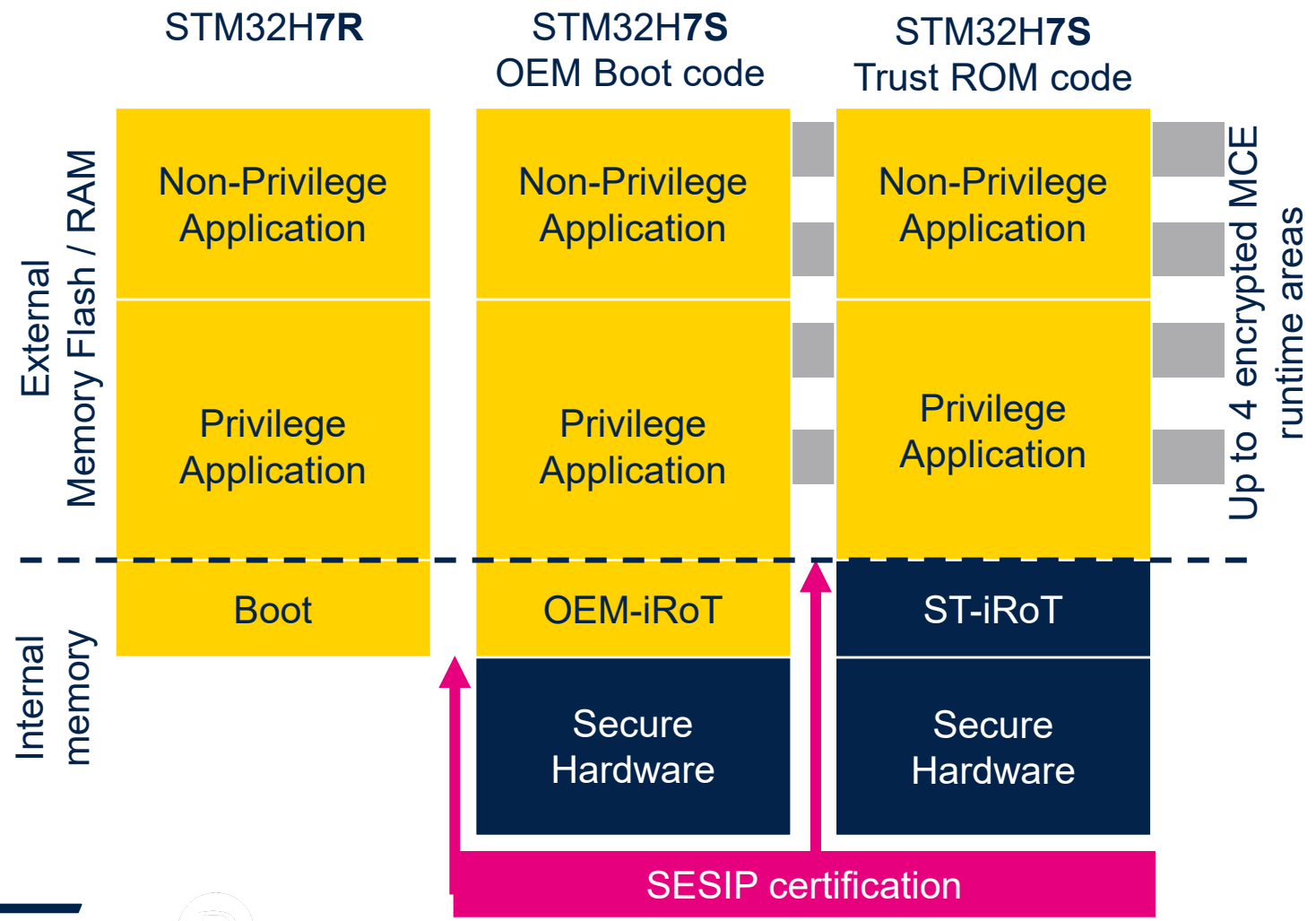
Scalable security to accelerate time to market

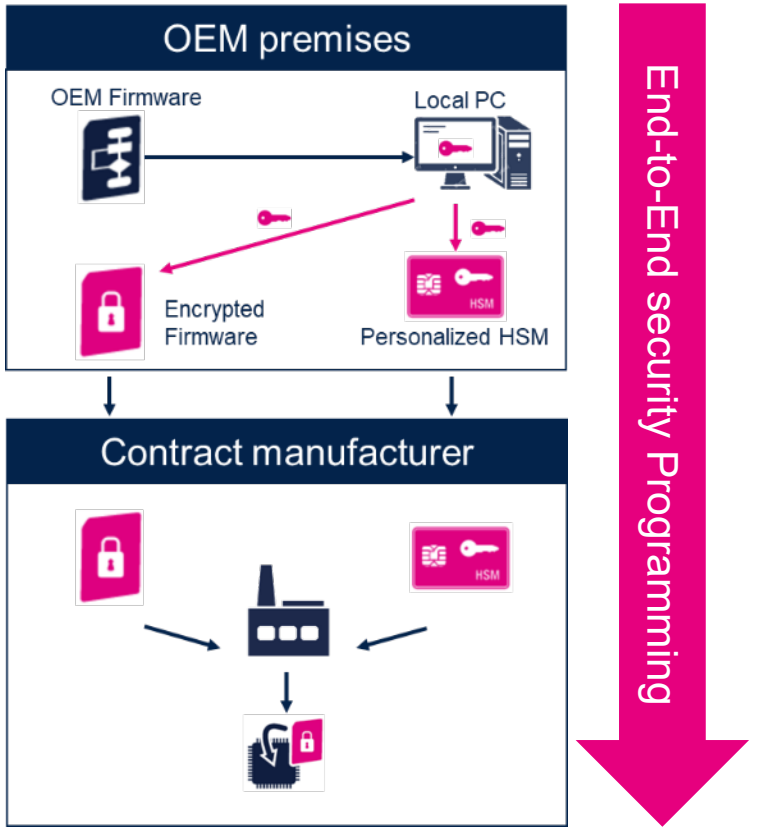


- **Scalable configurations**
- **Security for int./ext. memories**
- **Supporting remote provisioning**
- **Ready for device certification**

STM32 CubeProgrammer

Secure your production flow secure firmware install (SFI)

Protect application firmware during the manufacturing stage



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

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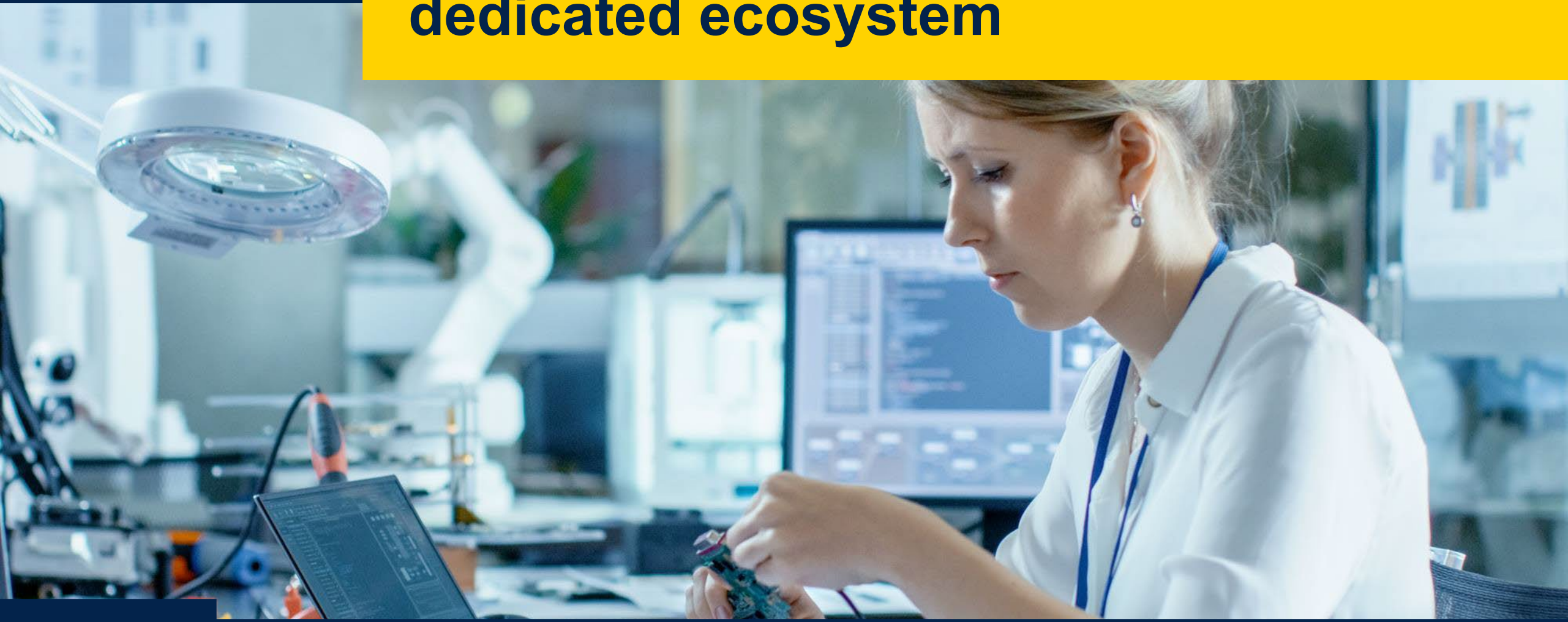
Accelerate your development with our dedicated ecosystem



STM32Cube framework

Tools and software supporting you during all your design steps

Evaluation, prototyping and selection

STM32 Finder

STM32 Evaluation Tools

Hardware and software configuration

STM32 CubeMX

Application development and debug

STM32 CubeMCU Packages

STM32 CubeExpansion & Verticals and partner solutions

STM32 CubeIDE & Partner IDEs

Code and hardware options programming

STM32 CubeProgrammer & Programmers from partners

Run-time application monitoring

STM32 CubeMonitor

Worldwide support channels

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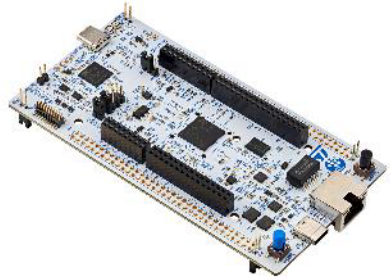
Development tools for STM32H7R series

Jump-start your development with STM32H7R evaluation kits



NUCLEO-H7S3L8

*** $35**

STM32H7S78-DK

*** $99**

- **Prototyping with STM32H7S Nucleo board**
  - 256 Mbit Octo-SPI NOR Flash
  - Ethernet, USB,
  - STLINK debugger, Arduino UNO extension interface
- **Feature-rich prototyping with STM32H7S discovery kit**
  - 1 Gbit Octo-SPI NOR Flash, 256Mbit Octo-SPI PSRAM
  - WVGA TFT display, Ethernet, USB, microSD, audio, microphone mems
  - STLINK debugger, Arduino UNO, and camera extension interfaces
- **Move from idea to implementation in no time**
  - STM32CubeMX assisted project start on STM32H7S Nucleo board
  - Full project template with BSP and ready to call services
  - Preconfigured STM32 clocks, pinout, and peripherals

**Recommended Resale Price (RRP)*

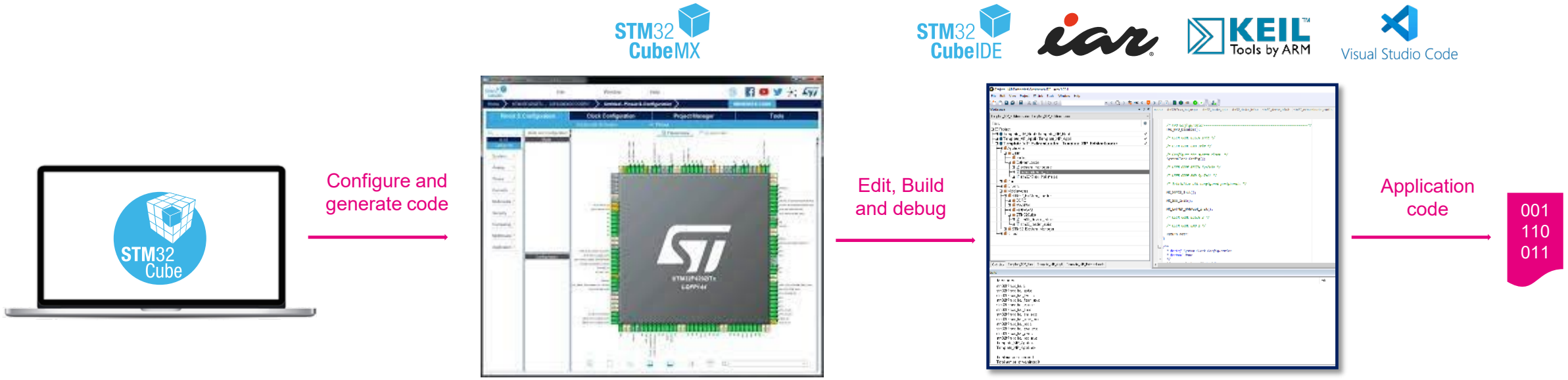
Simplified external memory-based development

Application	STM32CubeMX assisted application project initialization with pinout, clock tree, MCU peripherals and middleware configuration.
External memory loader	STM32CubeMX assisted creation of memory loader tuned for your selected external memory.
Boot	STM32CubeMX assisted creation of your boot project including access management to your selected external memory with Load-and-Run or Execute-in-place boot options.

Simplified external memory-based development

Application

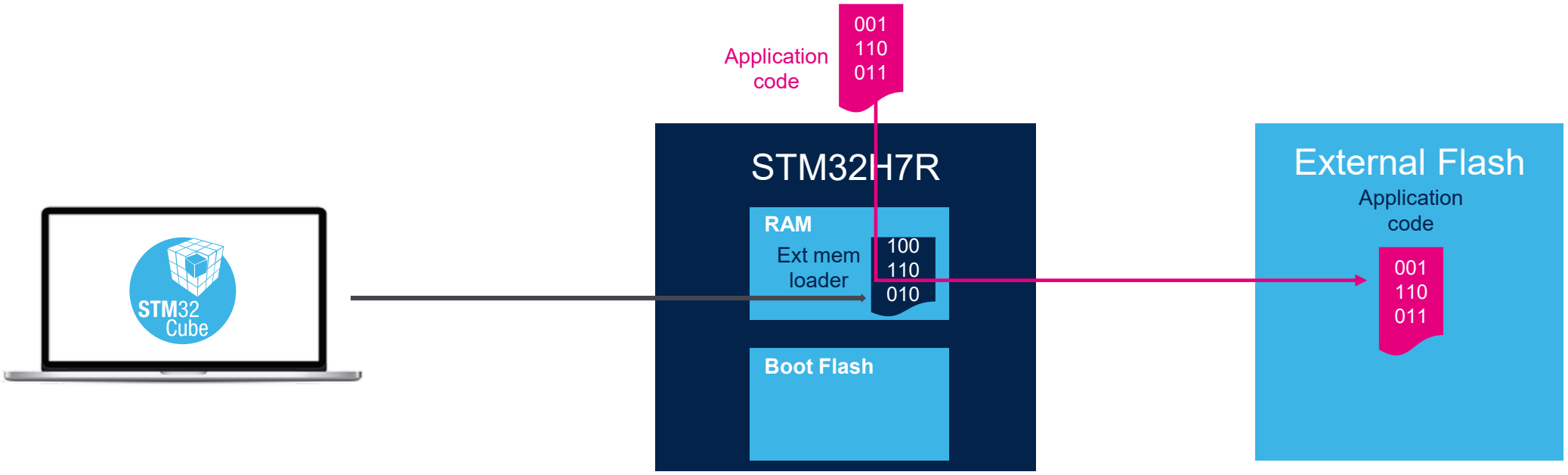
STM32CubeMX assisted application project initialization with pinout, clock tree, MCU peripherals and middleware configuration.



Simplified external memory-based development

External memory loader

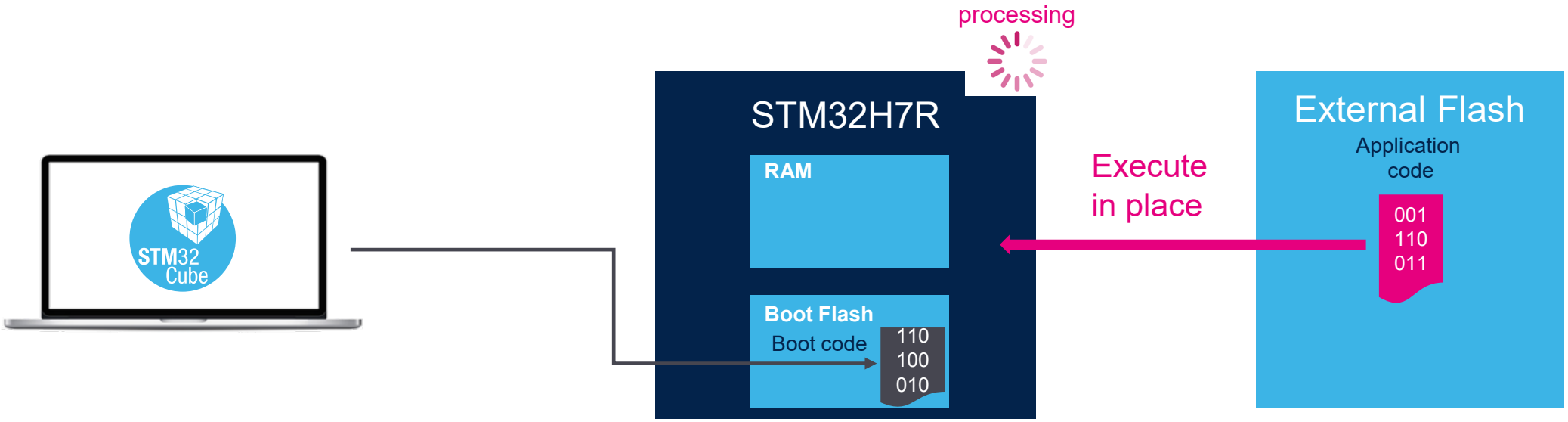
STM32CubeMX assisted creation of memory loader tuned for your selected external memory.



Simplified external memory-based development

Boot

STM32CubeMX assisted creation of your boot project including access management to your selected external memory with Load-and-Run or Execute-in-place boot options.



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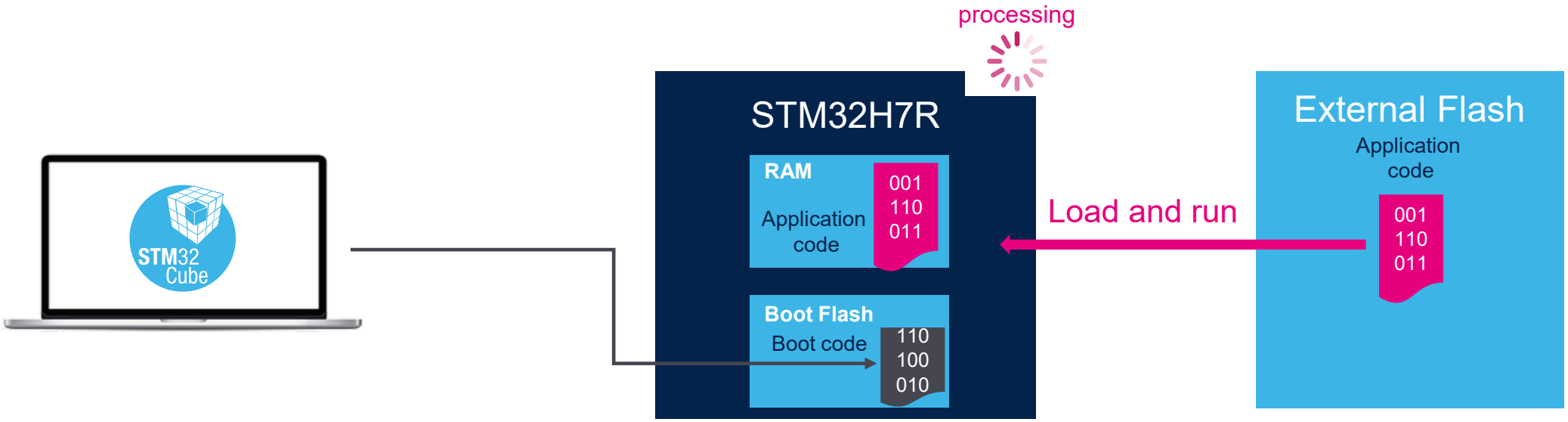

Our technology starts with You

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