

# STM32MP2 Series

**The second-generation of microprocessors  
enabling secure, advanced edge AI in Industry 4.0**



# STM32MP2 microprocessor series



**Robustness for complex industrial applications**



**64-bit MPU with advanced compute capabilities**



**Rich interfaces supporting the growth of connected applications**



**Strong security**

# Designed for highly connected applications

## Industrial & factory automation



- Gateways
- PLCs
- HMIs
- Metering
- Bar code reader



- Anomaly detection
- Pose estimation
- People / object detection
- Face recognition
- Character recognition

## Smart homes



- Gateways
- HMIs
- Whitegoods
- Door bell

- People / object detection
- Face recognition
- Voice recognition



- Secure boot
- Firmware & data encryption
- Context isolation

## Smart city and infrastructure



- Power grid
- EV charging
- Metering
- HMIs

- Traffic management
- Energy management
- Vehicle / pedestrian recognition & tracking
- People & object detection



# Robustness for complex industrial applications



## Industrial qualification combining both:

- 100% operation time for 10 years
- Junction temperature: - 40°C to 125°C



## 10-year longevity commitment renewed every year

## Flexible resource allocation between cores

- Dual or Single Arm® Cortex®-A35 up to 1.5 GHz
- Arm® Cortex®-M33 up to 400 MHz

## Advanced security for Industry 4.0





# 64-bit MPU with advanced Edge AI capabilities

## Edge AI accelerators



- NPU accelerator: **up to 1.35 TOPS**
- Flexible ecosystem to run AI on CPU, GPU, or NPU

## Multimedia capabilities for high-end use cases

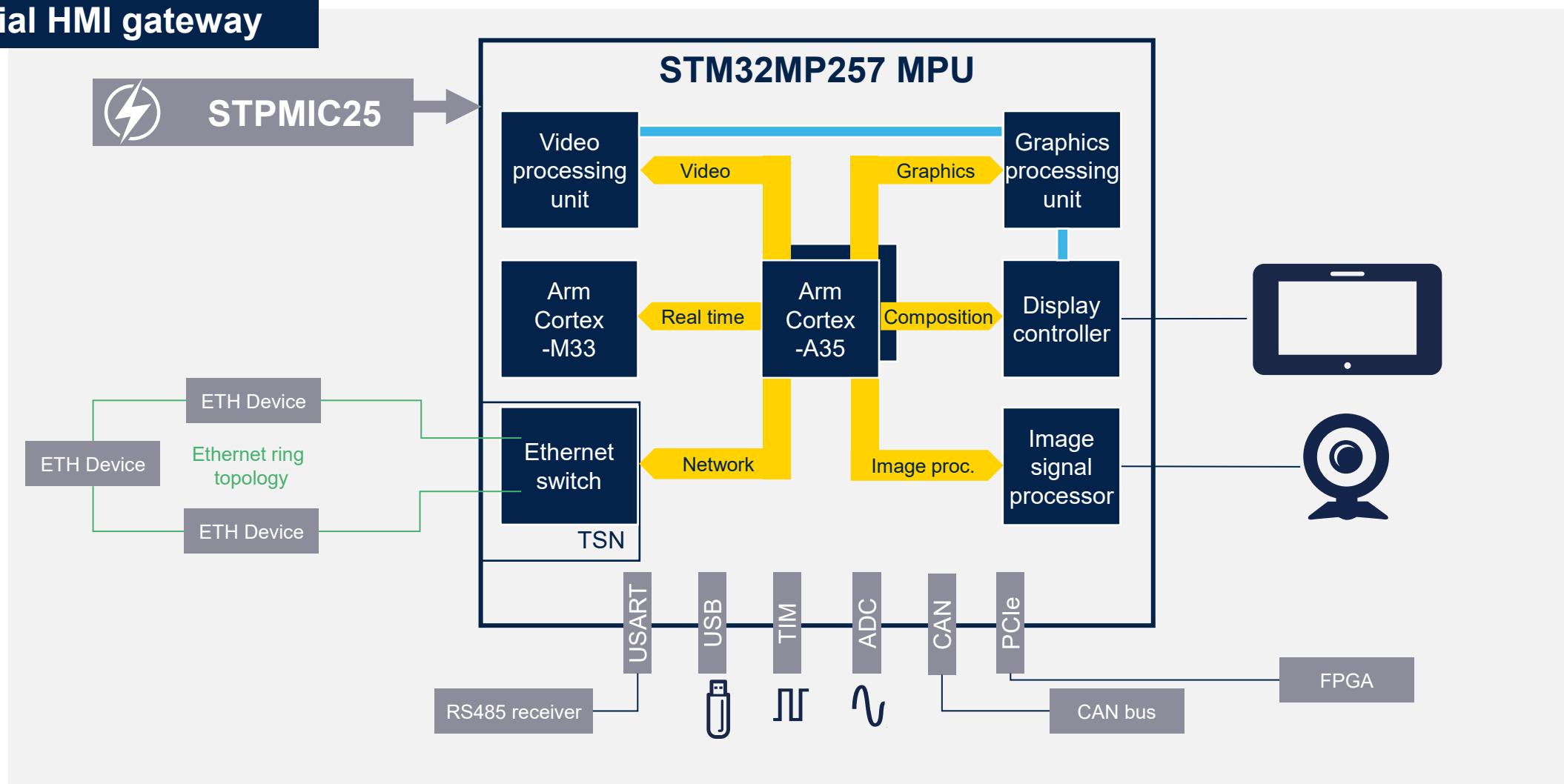


- 3D GPU supports up to 1080p resolution
- Full HD video pipe with RGB, LVDS & DSI outputs
- MIPI CSI-2 camera interface with ISP



# Rich interfaces offloading the CPU for connected applications

## Industrial HMI gateway





# Enhanced security



SESIP3\*  
PSA certified Level 1\*



TrustZone® on Cortex®-A & Cortex®-M: secure boot,  
secure firmware updates and cryptographic operations

Secure provisioning ecosystem

Edge confidential computing thanks to resource isolation

*\*target certifications*



# STM32MP25 security overview



**Memory & peripheral protections**  
against illegal access control



**Secure cryptographic accelerator** for robustness against physical attacks



**Device authentication & attestation**  
during product life cycle



**Code isolation**  
for runtime protection



**Security assurance level 1**

**Software robustness**



**Security ecosystem**



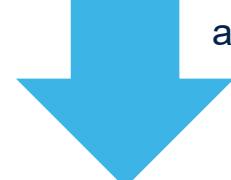
Trusted execution with OP-TEE



In-factory secure secret provisioning (SSP)



STM32Cube framework for MPU  
(Signing & key generation)



and more!



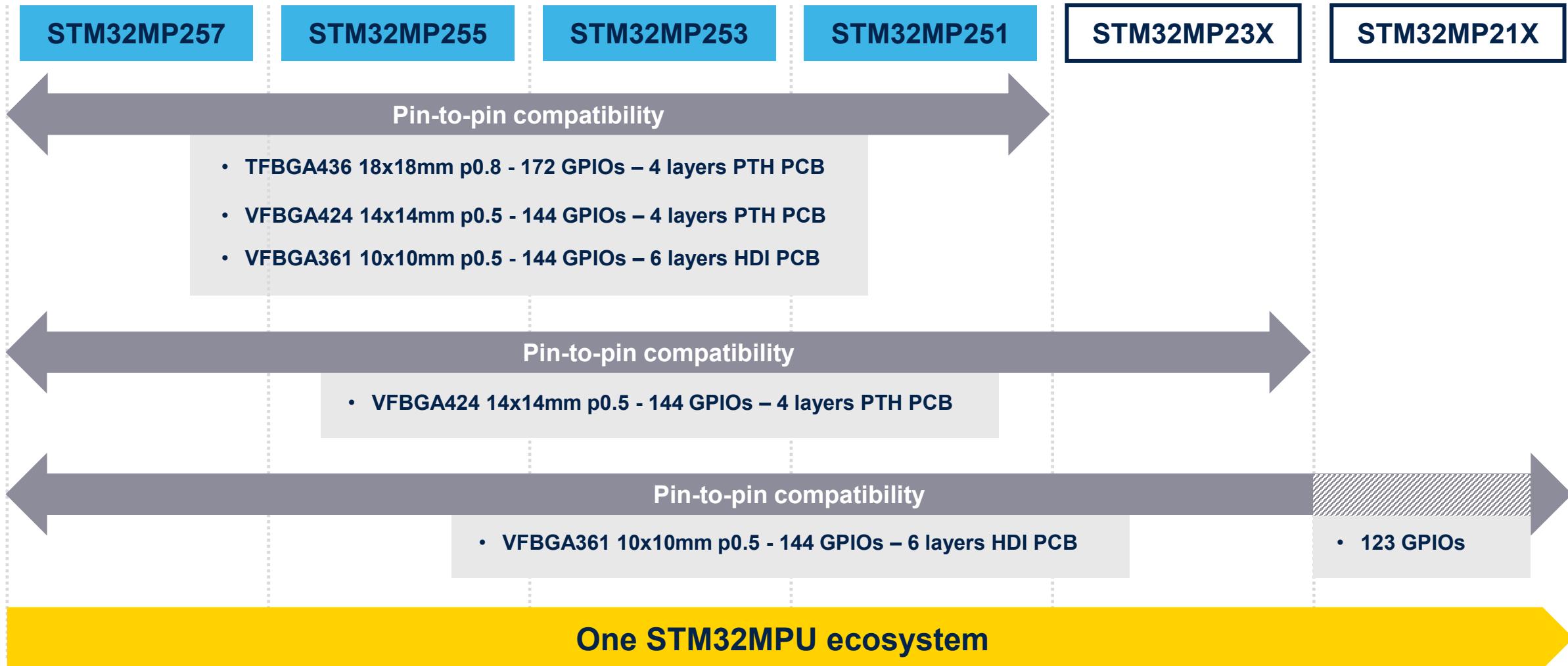
# STM32MP2 MPU series for 64-bit applications

Product lines	Cortex-A35	CPU	Cortex-M33	Co-processor	AI NPU	GPU LVDS/DSI	FD-CAN	Ethernet	Video Hardware accelerator	PCIe Gen2 / USB3
STM32MP257	2	Up to 1.5GHz	1	400 MHz	•	•	3	3	H.264	•
STM32MP255	2	Up to 1.5GHz	1	400 MHz	•	•	3	2	H.264	•
STM32MP253	2	Up to 1.5GHz	1	400 MHz			3	2		•
STM32MP251	1	Up to 1.5GHz	1	400 MHz				1		•
STM32MP23x	2	Up to 1.5GHz	1	400 MHz	•	•	2	2	H.264 dec	
STM32MP21x	1	Up to 1.5GHz	1	300 MHz			2	2		



Security options available for all STM32MP2 MPUs

# A scalable offering



# STPMIC25 power management IC for STM32MP2 MPU series

Simplify your design and optimize power consumption



DC/DCs & LDOs for  
- STM32MP2  
- Memories  
- External devices



[STPMIC25](#)

Optimized power consumption

BOM savings for typical applications

Small PCB footprint vs. full discrete solution

# STM32MP257 Block Diagram

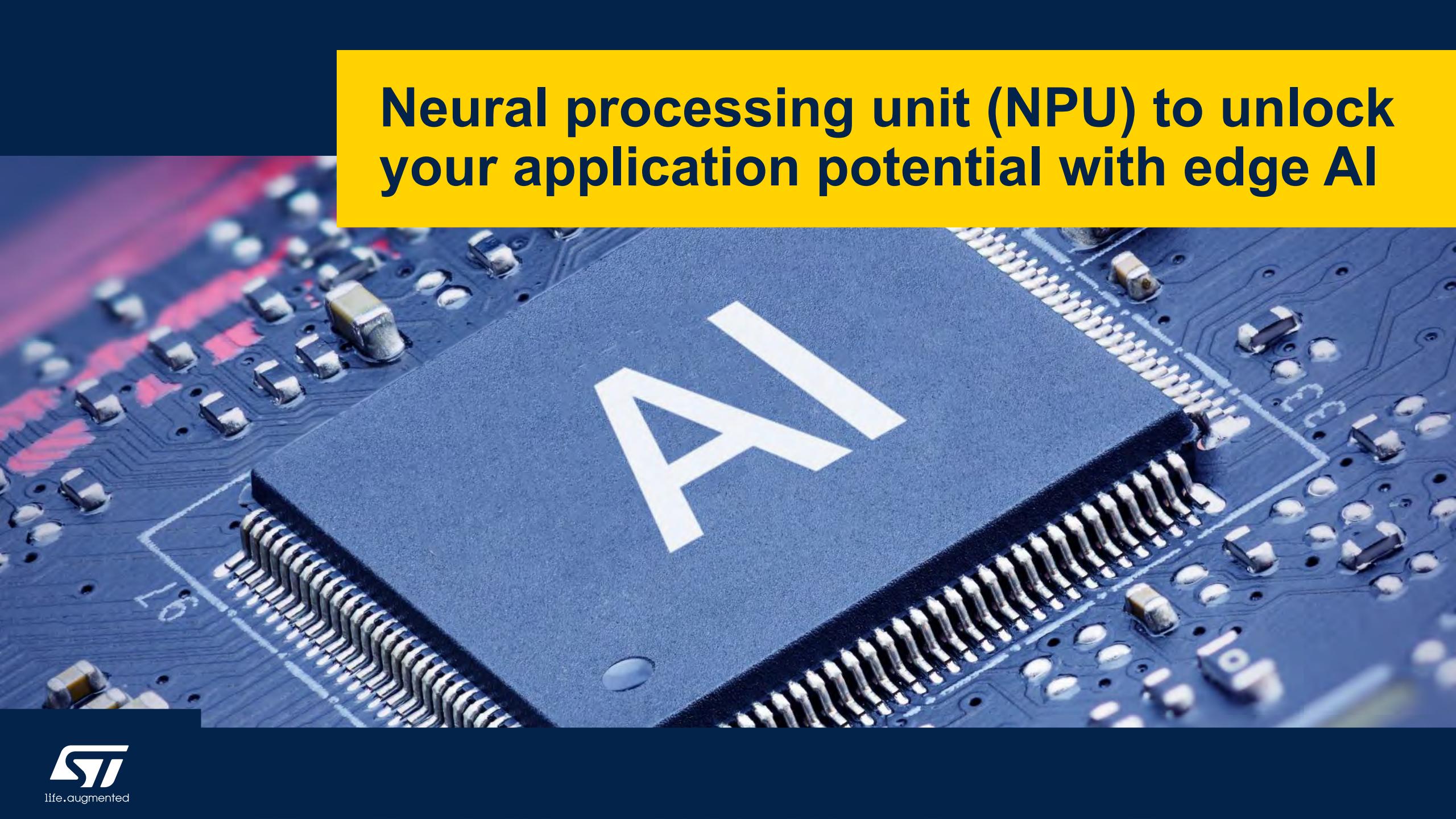


Processing

Enhanced security

Edge AI and multimedia

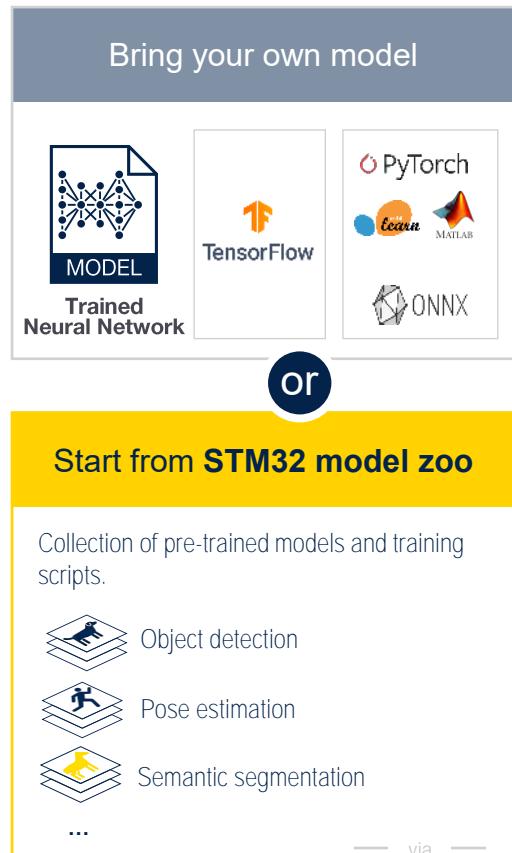
Connectivity



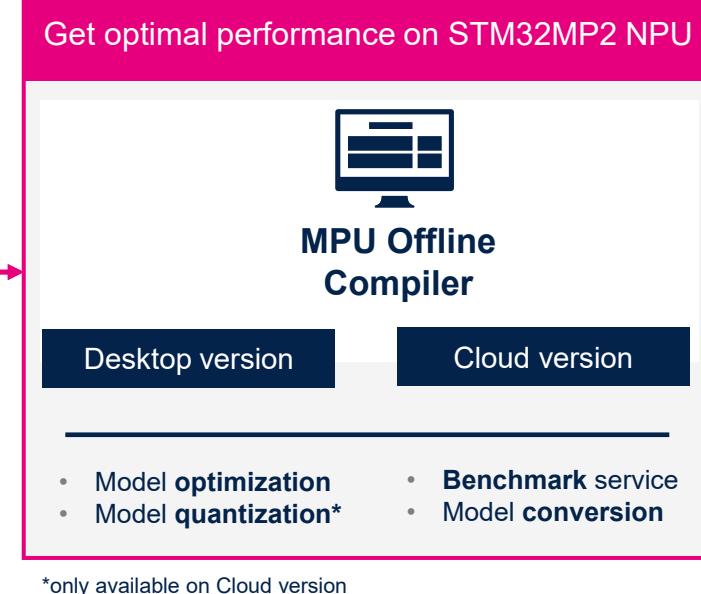
**Neural processing unit (NPU) to unlock  
your application potential with edge AI**

# Seamlessly integrate AI in your STM32MP2 projects

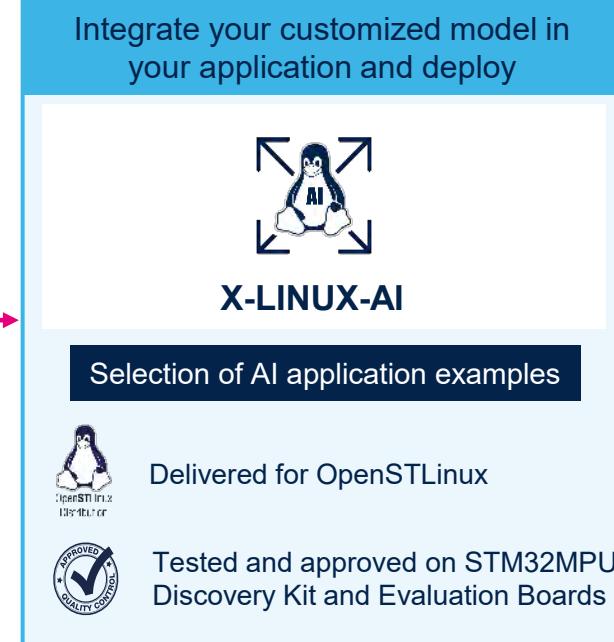
## 1. Train



## 2. Benchmark and optimize



## 3. Create your apps and deploy



# STM32 model zoo

A collection of application-oriented models optimized for STM32

Pose estimation



Human pose estimation

Image classification



Computer vision

Semantic segmentation



Computer vision

Object detection



Computer vision



Hosted on Github

< | >

**Model training scripts**

- Scripts to train models with your own dataset
- Generate and validate your model

# MPU offline compiler

## MPU Offline compiler



### Desktop version

- ✓ Model **optimization**
- ✓ **Benchmark** on local MP2 board
- ✓ Model **conversion**



STM32 Model Zoo



### Cloud version

- ✓ Model **optimization**
- ✓ Model **quantization**
- ✓ **Benchmark** on remote board farm
- ✓ Model **conversion**

#### Supported AI models

 TensorFlow

 ONNX

#### Supported AI formats

- INT8 Quantized per tensor (NPU)
- INT8 Quantized per channel (GPU)
- Dynamic Fixed Point 16b (GPU)

#### AI execution engines

- NPU (prefered)
- GPU
- CPU



## All-in-one solution

All needed packages to bring AI to the edge



## AI frameworks and Apps

- AI frameworks to execute Neural Network models
- Selection of AI application examples
- AI model benchmark application tools for STM32 MPU



## Tooling framework

- Python3, Gstreamer, OpenCV to quickly develop applications



## STM32 MPU agnostic

Compatible with all STM32 MPU series



## OpenSTLinux Distribution

Delivered for OpenSTLinux



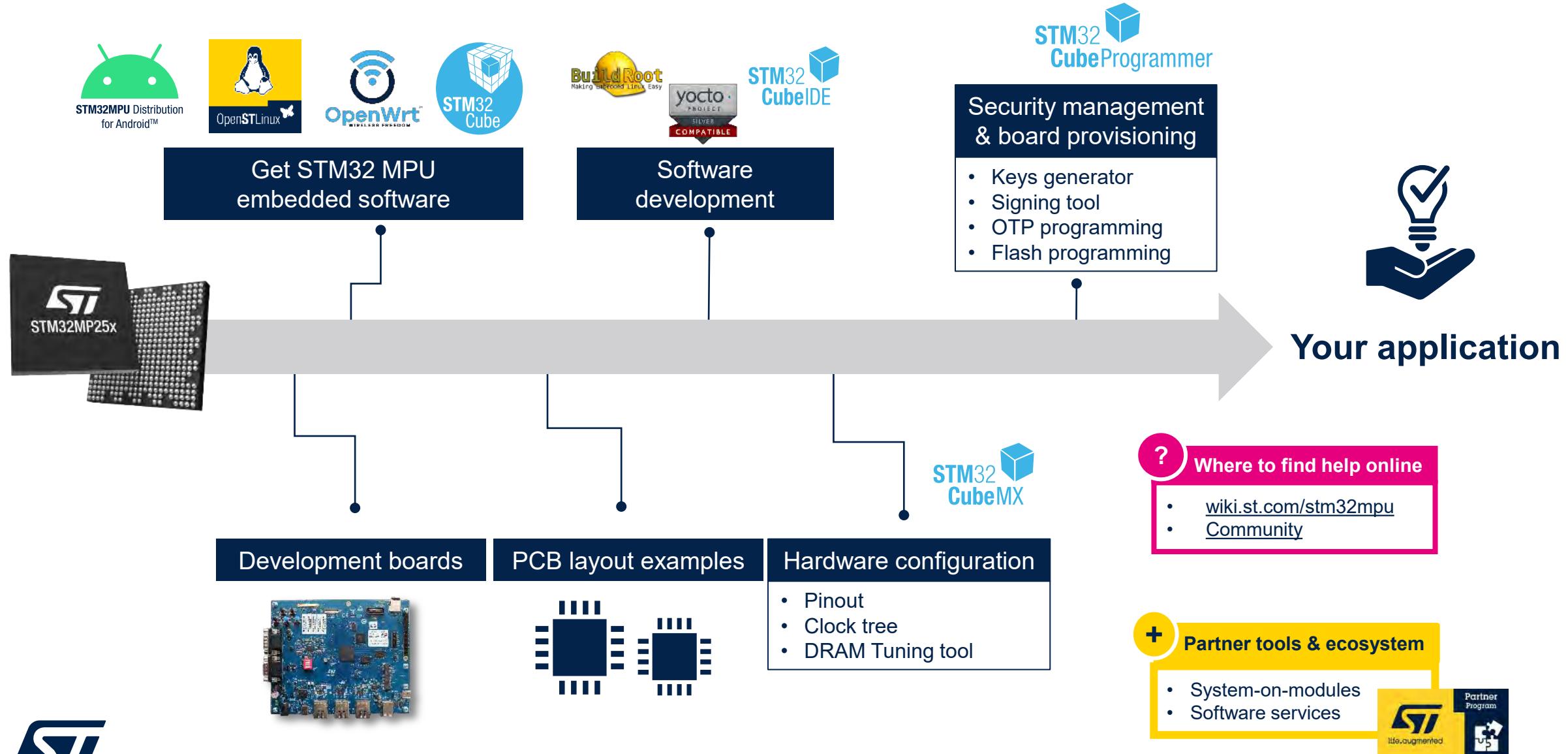
Tested and approved on  
STM32MPU discovery kit and  
evaluation boards



**Reduce development time & cost with  
our STM32 ecosystem**



# Accelerate your time to market





# Development tools for the STM32MP2 series

**Speed-up evaluation, prototyping, and design**



**Evaluation board**  
**STM32MP257F-EV1**

Available April 2024

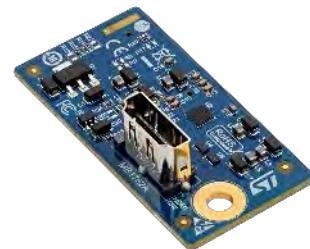


**EDT LCD Panel**  
**Display**

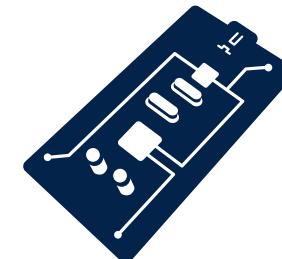


**Camera module**  
**adapter board**  
**B-CAMS-IMX**

Available Q3 2024



**DSI to HDMI**  
**adapter board**



**Discovery kit**  
**STM32MP257-DK**



**More STM32-based dev**  
**tools available with our**  
**partners**

# STM32 MPU embedded software

Same Linux software for STM32MP2 series for easy project migration



## STM32MP2 Starter package\*

To quickly and easily start with any STM32MP2 microprocessor device

## STM32MP2 Developer package\*

To add your own code on top of the STM32MP2 Embedded Software distribution

## STM32MP2 Distribution package\*

To create your own Linux ® distribution as well as your own Starter and Developer packages

# STM32 MPU embedded software

Accelerate your time to market using expansion packages



LoRaWAN®  
Server



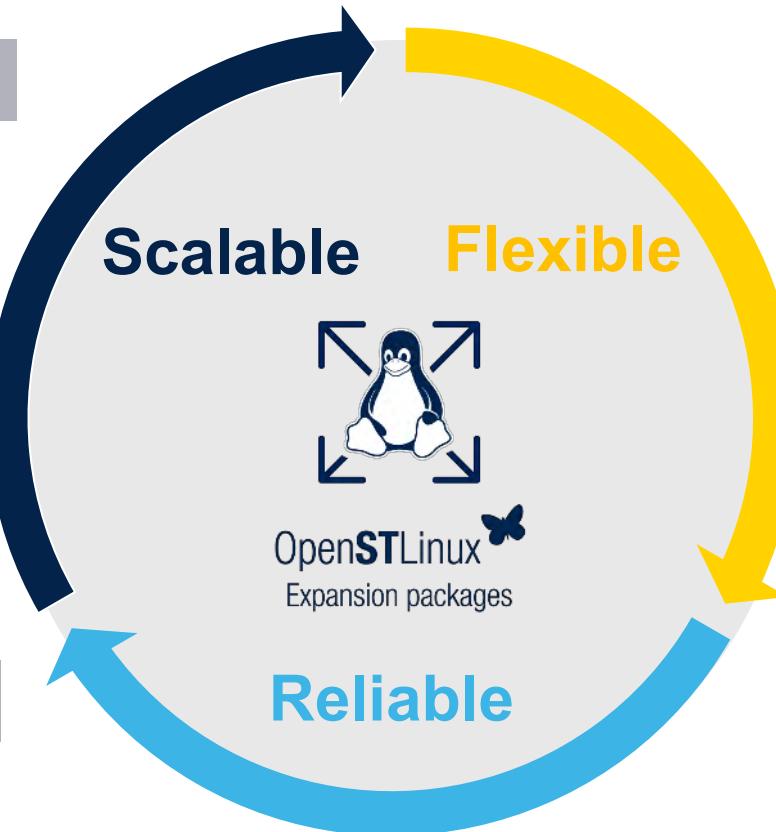
Microsoft Azure  
IoT Platform

Microsoft Azure  
IoT Edge



qualified  
device

Amazon  
AWS

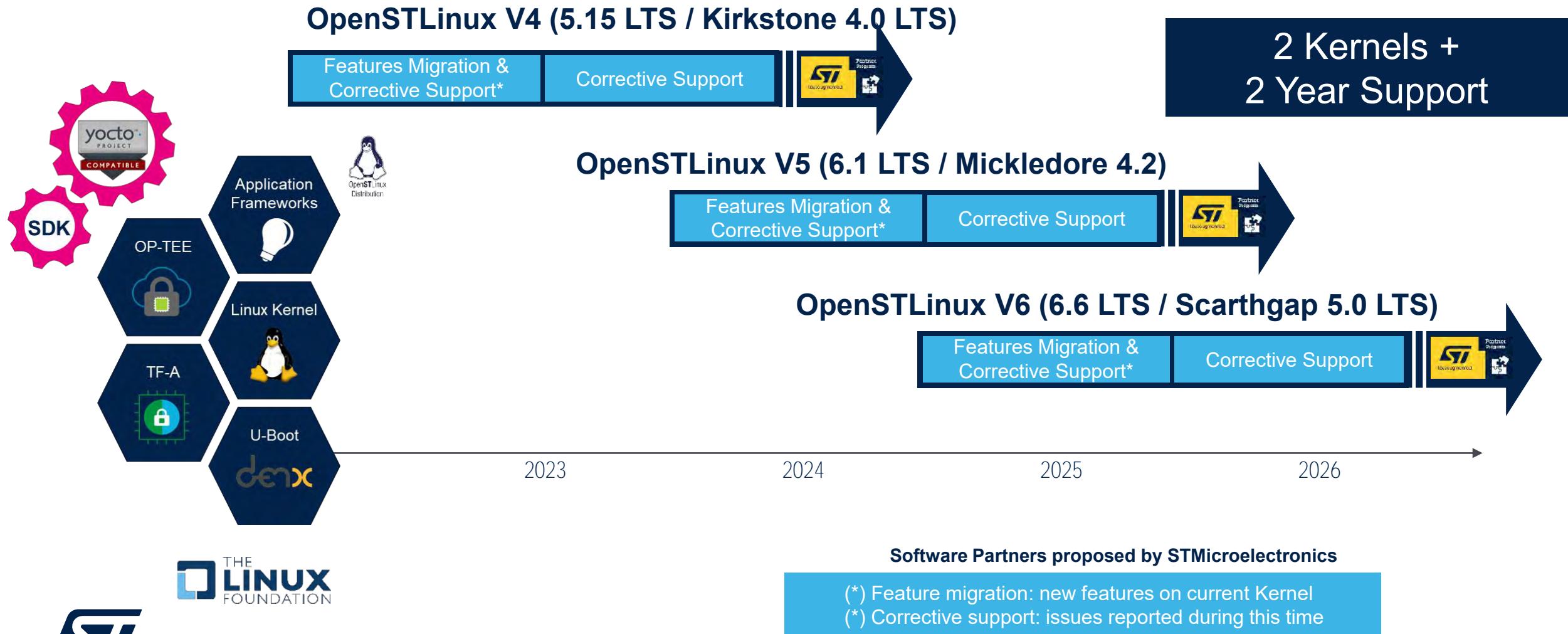


STM32 MPU OpenSTLinux Expansion Packages

	X-LINUX-NFC
	X-LINUX-GNSS
	X-LINUX-AI
	X-LINUX-RT
	X-LINUX-PREDMNT
	X-LINUX-IOT01E/A

Planned  
Available

# OpenSTLinux long-term Support Releases and support scheme



# Software development tools

STM32Cube provides the same tools across the STM32MP2 series for greater ease of use



## STM32CubeMX

### STM32CubeMX enhanced for MPU

- Device Tree configuration
- Device Tree generation
- DRAM interface tuning tool

## IDEs Compile and Debug

### Multicore solutions

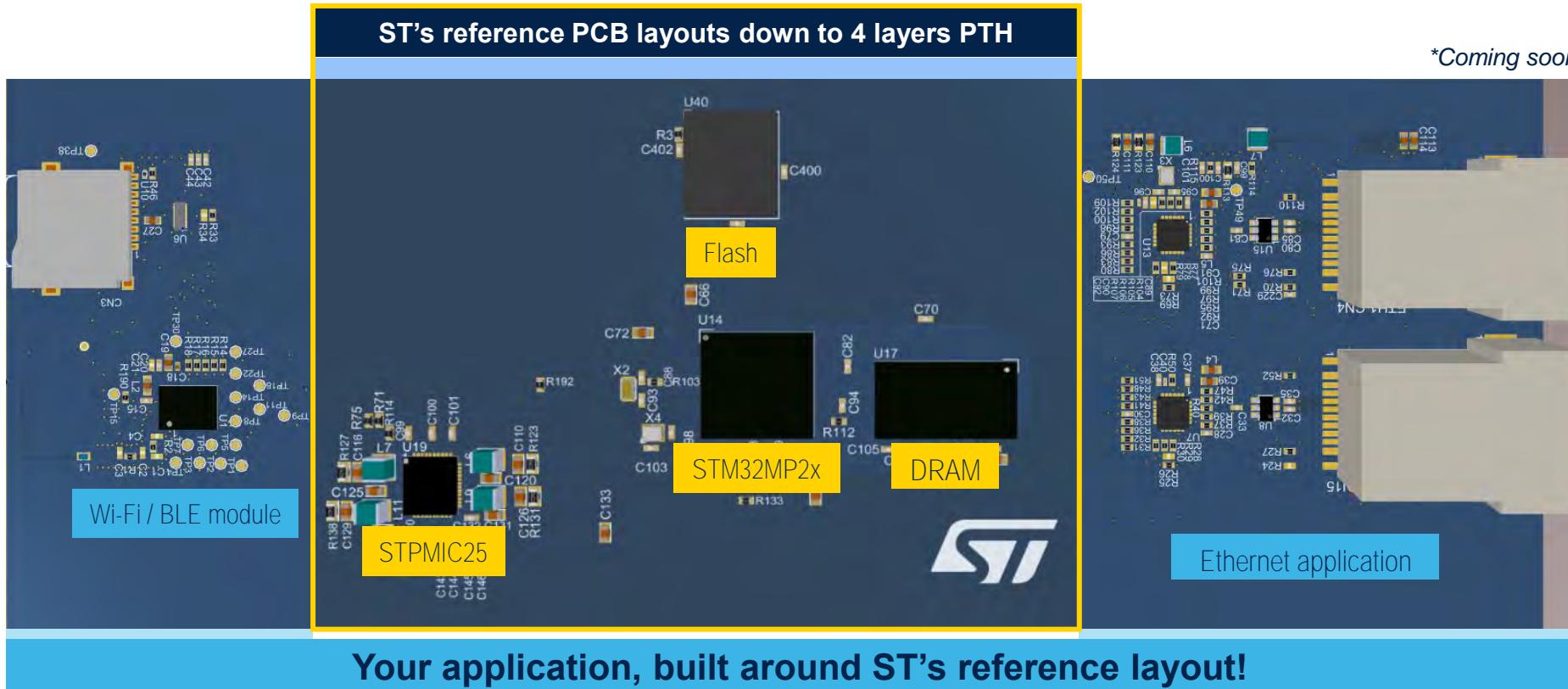
- Free STM32CubeIDE
- OpenSTLinux Developer package support
- Import DRAM tuning project

## STM32 programming tool

### STM32CubeProgrammer

- Flash, DRAM and/or system memory
- OTP programming
- Signing & key generation tools

# Plug & play solution for STM32MP2 series for project reuse



PCB layout examples\*  
based on Altium projects  
provide you with a modular  
approach to build your  
designs

- All different BGAs packages, STPMIC25, Flash and different DRAM types (DDR3L, DDR4 & LPDDR4)
- Signal integrity and power integrity checks completed
- Developers can reuse the layouts and add their own interfaces linked to their end projects

# Advanced HMI with stunning graphics



Multiple libraries to run on STM32MP2



GTK



Android™



# Enhance your added value by relying on ST and Authorized Partner solutions



A growing base of ST Authorized Partners

ST continues to invest in the most recognized  
open-source standards

From idea to final product, our partners help  
you build end-to-end solutions

Solutions for edge computing & IoT  
from sensors to the cloud

Discover our partners products  
and services



# Our technology starts with You



Find out more at [www.st.com/STM32MP2](http://www.st.com/STM32MP2)

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