STM32MP2 microprocessor series

Robustness for complex industrial applications

Rich interfaces supporting the growth of connected applications

64-bit MPU with advanced compute capabilities

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:

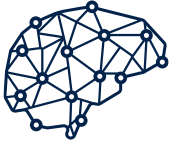- 100% operation time for 10 years
- Junction temperature: - 40°C to 125°C

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

Multimedia capabilities for high-end use cases

- NPU accelerator: **up to 1.35 TOPS** **(0.6 TOPS for STM32MP23x product lines)**
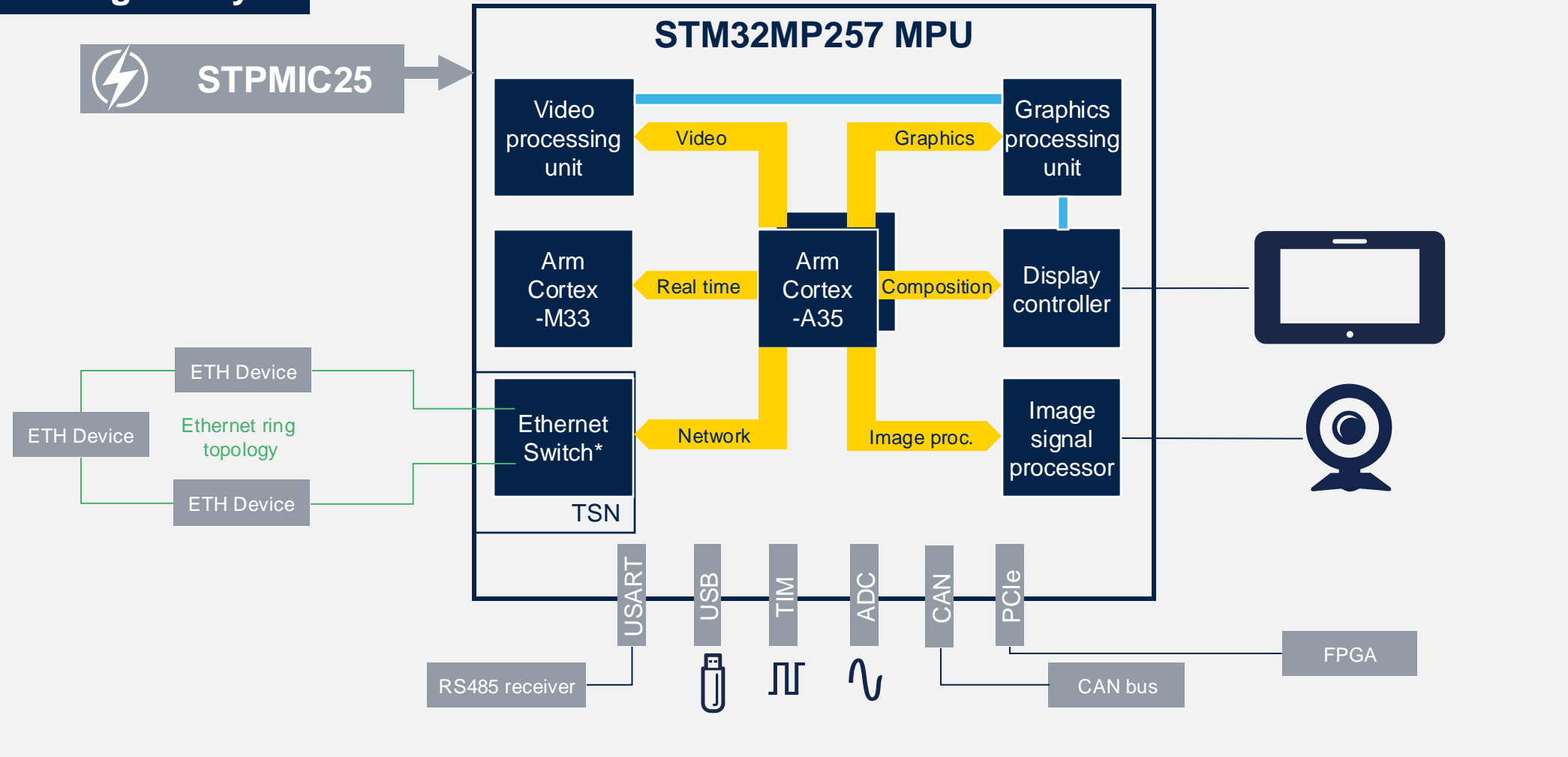- Flexible ecosystem to run AI on CPU, GPU, or NPU

- 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

STPMIC25

STM32MP257 MPU

- Video processing unit
- Graphics processing unit
- Arm Cortex-M33
- Arm Cortex-A35
- Display controller
- Ethernet Switch* — TSN
- Image signal processor

Video • Graphics • Real time • Composition • Network • Image proc.

ETH Device
Ethernet ring topology
ETH Device
ETH Device

USART • USB • TIM • ADC • CAN • PCIe

RS485 receiver

CAN bus

FPGA

Not available on STM32MP23x product lines

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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

SESIP 3 — Global Platform™ ✓
Target certification

psacertified™ level three
Target certification

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

STM32 Trust

Security ecosystem

Trusted execution with OP-TEE

In-factory secure secret provisioning (SSP)

STM32Cube framework for MPU (Signing & key generation)
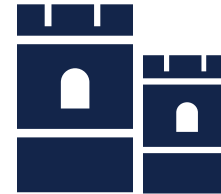
and more!

STM32MP2 MPU series for 64-bit applications

Security options available for all STM32MP2 MPUs

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		

In production   In development

A scalable offering

STM32MP257	STM32MP255	STM32MP253	STM32MP251	STM32MP23X	STM32MP21X

← Pin-to-pin compatibility →

- **TFBGA436 18x18mm p0.8 - 172 GPIOs – 4 layers PTH PCB**
- **VFBGA424 14x14mm p0.5 - 144 GPIOs – 4 layers PTH PCB**
- **VFBGA361 10x10mm p0.5 - 144 GPIOs – 6 layers HDI PCB**

← Pin-to-pin compatibility →

- **VFBGA424 14x14mm p0.5 - 144 GPIOs – 4 layers PTH PCB**

← Pin-to-pin compatibility →

- **VFBGA361 10x10mm p0.5 - 144 GPIOs – 6 layers HDI PCB**
- **123 GPIOs**

One STM32MPU ecosystem

In production   In development

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

System
- Power supply regulator
- Crystal & Internal oscillators
- Cyclic Redundancy Check (CRC)
- Watchdogs (I & W)
- 96-bit unique ID
- Up to 172 GPIOs

Security
- Resource isolation framework
- Octo-SPI OTF Decryption
- DRAM OTF Encryption/Dec
- DES, TDES, AES-256 with SCA
- SHA-256/512, SHA-3, HMAC
- PKA ECC/RSA
- 16x Tamper pins
- T°, V, F and 32KHz detection
- Secure RTC
- Analog true RNG

Audio
- SPDIF Rx 4 inputs
- 4x SAI
- MDF 8 channels / 8 filters

Control
- 3x 16-bit motor control PWM synchronized AC timer
- 10x 16-bit timers
- 5x 16-bit LP timers
- 4x 32-bit timers

Dual Arm® Cortex®-A35 up to 1.5 GHz
- L1 32 Kbytes I/ 32 Kbytes D NEON SIMD MPE
- TrustZone®
- 512 Kbytes L2 cache

Arm® Cortex®-M33 @400 MHz
- 16 Kbytes D-Cache
- 16 Kbytes I-Cache
- FPU / MPU / NVIC
- TrustZone®

- DDR4/LPDDR4 32-bit @ 1.2 GHz
- DDR3(L) 32-bit @ 1066 MHz
- Shared RAM 640 Kbytes including 128 Kbytes Retention RAM
- Backup RAM 8 Kbytes Boot ROM 128 Kbytes OTP fuse 12 Kbytes

Analog
- 3x 12-bit ADC 5 MSPS
- Temperature sensor

Connectivity
- 2x 1Gbps ETH/TSN w/ switch
- 3x CAN-FD / TTCAN
- 3x SDIO3.0 / SD 3 eMMC 5.1
- 16-bit SLC NAND, 8-bit-ECC
- 2x Octo SPI, 8x SPI
- 5x UART, 4x USART
- 1Gbps ETH/TSN port
- PCIe Gen2, 1 lane USB2.0 Host/Device HS or USB3.0 DRD
- USB2.0 Host HS + HS PHY
- USB Type-C connector support
- 8x I²C, 4x I3C, 3x I²S

Multimedia / AI
- AI / NN HW Acceleration: up to 1.35 TOPS
- 3D GPU: OpenGL ES3.1 / Vulkan 1.3 / OpenCL 3.0
- 1080p60 H.264, VP8 Video Decoder / Encoder
- 24b RGB Disp. 1080p @ 60fps
- LVDS Display 8 lanes with PHY
- DSI Display 4 lanes with PHY
- Camera I/F MIPI CSI-2 2 lanes
- ISP (Camera Pipeline)
- Camera I/F 16-bit Parallel

Processing

Enhanced security

Edge AI and multimedia

Connectivity

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Neural processing unit (NPU) to unlock your application potential with edge AI
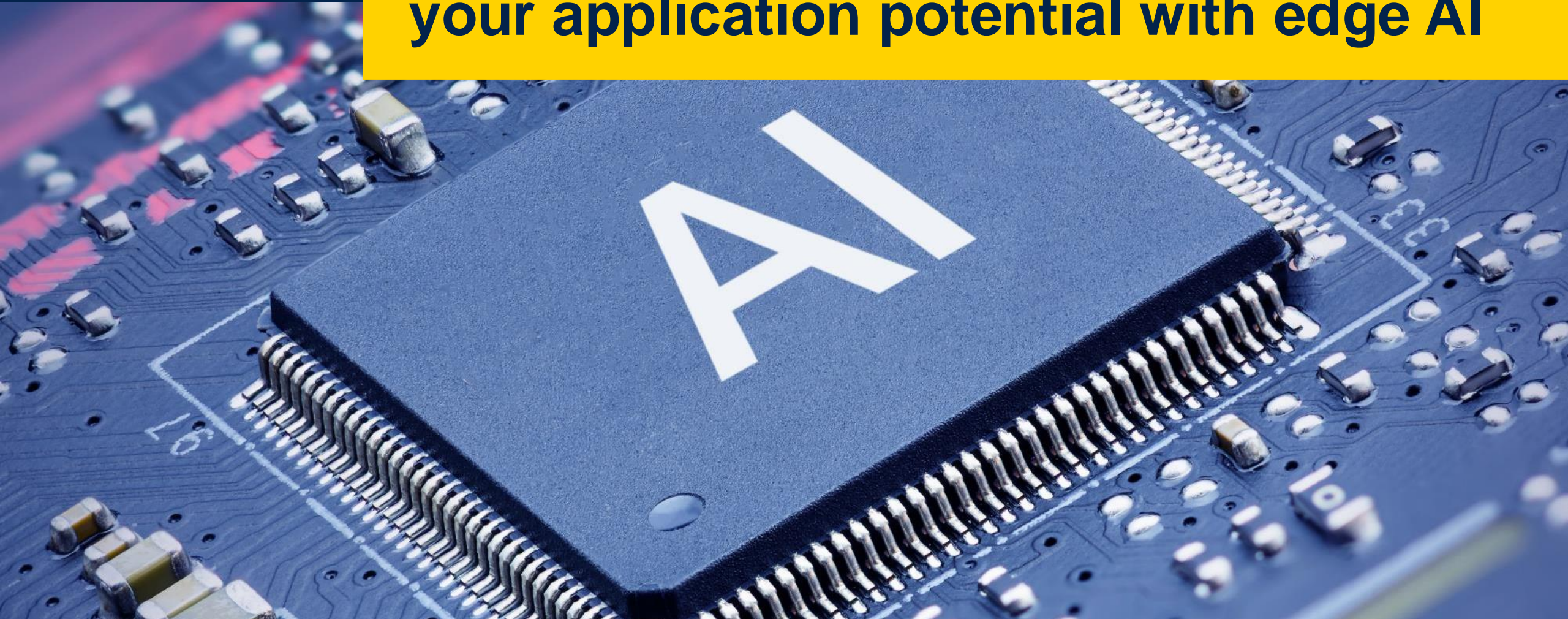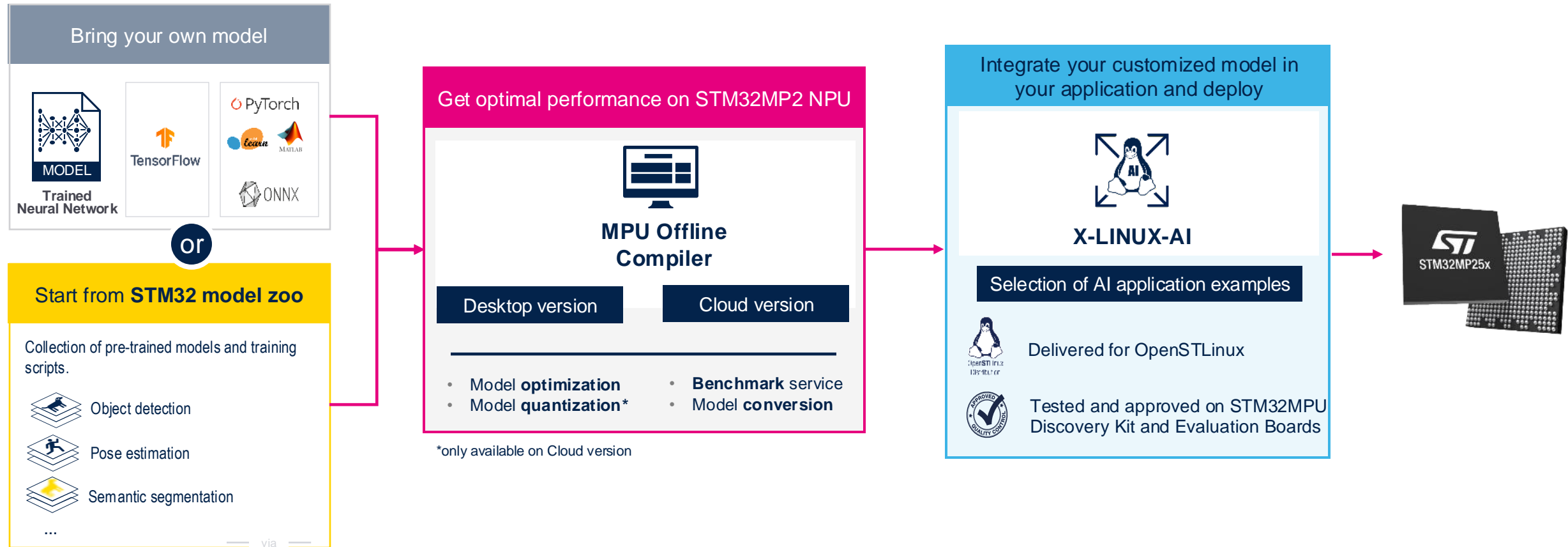
Seamlessly integrate AI in your STM32MP2 projects

1. Train

2. Benchmark and optimize

3. Create your apps and deploy

Bring your own model

PyTorch
TensorFlow
Keras
MATLAB
ONNX

MODEL
**Trained
Neural Network**

or

Start from **STM32 model zoo**

Collection of pre-trained models and training scripts.

- Object detection
- Pose estimation
- Semantic segmentation
- ...

via

Get optimal performance on STM32MP2 NPU

**MPU Offline
Compiler**

| Desktop version | Cloud version |

- Model **optimization**
- Model **quantization***
- **Benchmark** service
- Model **conversion**

*only available on Cloud version

Integrate your customized model in your application and deploy

X-LINUX-AI

Selection of AI application examples

Delivered for OpenSTLinux

Tested and approved on STM32MPU Discovery Kit and Evaluation Boards

STM32MP25x

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

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
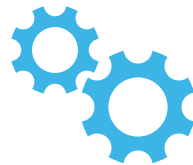
Tooling framework
- Python3, Gstreamer, OpenCV to quickly develop applications

STM32 MPU agnostic
Compatible with all STM32 MPU series

OpenSTLinux Distribution
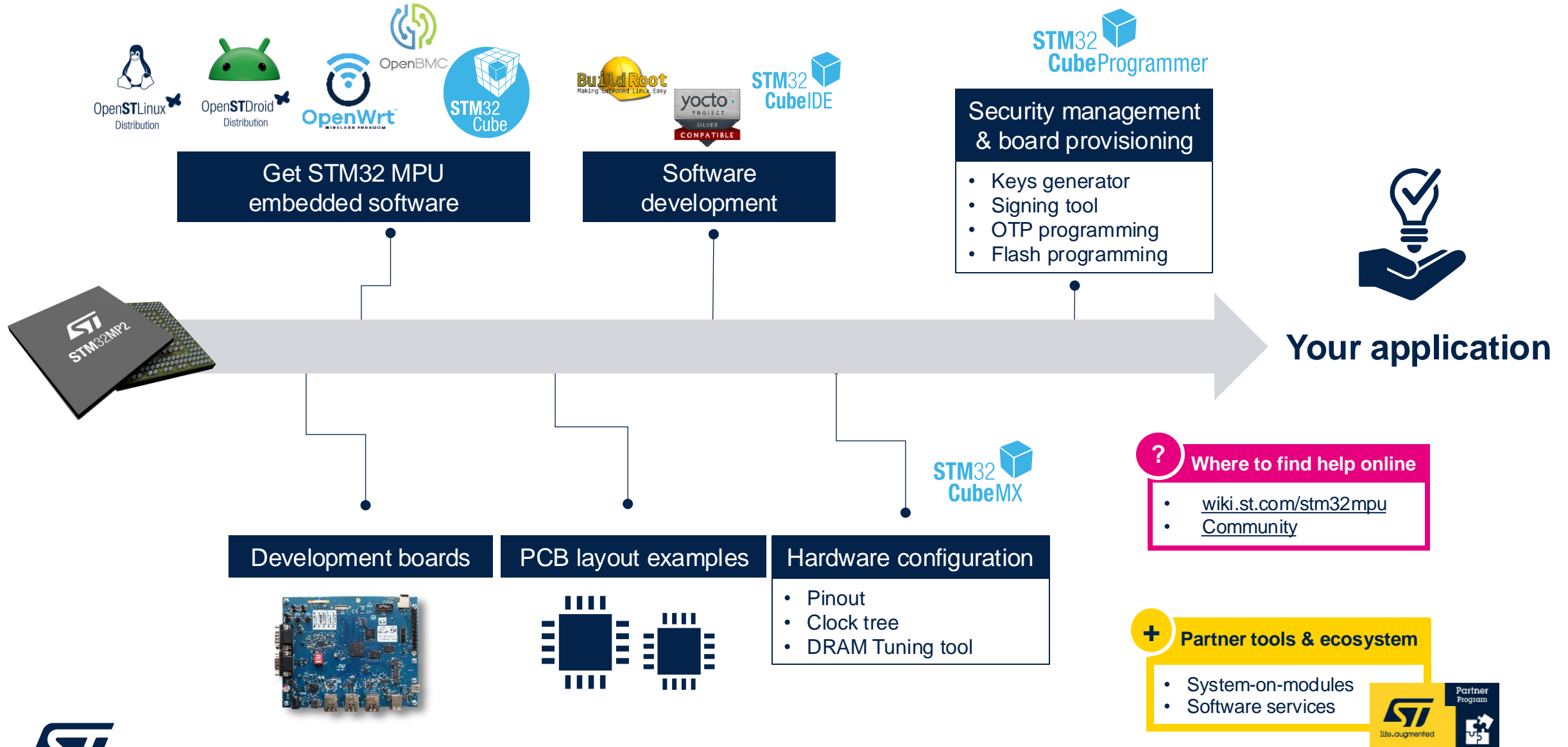Delivered for OpenSTLinux

Tested and approved on STM32MPU discovery kit and evaluation boards

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STM32Cube

Reduce development time & cost with our STM32 ecosystem

Accelerate your time to market

Get STM32 MPU embedded software

Software development

Security management & board provisioning
- Keys generator
- Signing tool
- OTP programming
- Flash programming

STM32 CubeProgrammer

STM32 CubeIDE

Your application

STM32MP2

STM32 CubeMX

Development boards

PCB layout examples

Hardware configuration
- Pinout
- Clock tree
- DRAM Tuning tool

Where to find help online
- wiki.st.com/stm32mpu
- Community

Partner tools & ecosystem
- System-on-modules
- Software services

OpenSTDroid Distribution: available only for STM32MP25x product lines

Development tools for the STM32MP2 series

Speed-up evaluation, prototyping, and design

| Evaluation board STM32MP257F-EV1 | Discovery kit STM32MP257F-DK* | EDT LCD Panel Display | Camera module adapter board B-CAMS-IMX | DSI to HDMI adapter board | More STM32-based dev tools available with our partners |

*To help you get started with STM32MP23x product lines evaluation, you can rely on the STM32MP257F-DK Discovery kit and applicable piece of OpenSTLinux distribution to run with STM32MP23 characteristics (peripherals, features, and performances).

System-on-modules, System-in-packages from Selected Partners

- STM32MP15
- STM32MP13
- STM32MP25
- STM32MP23
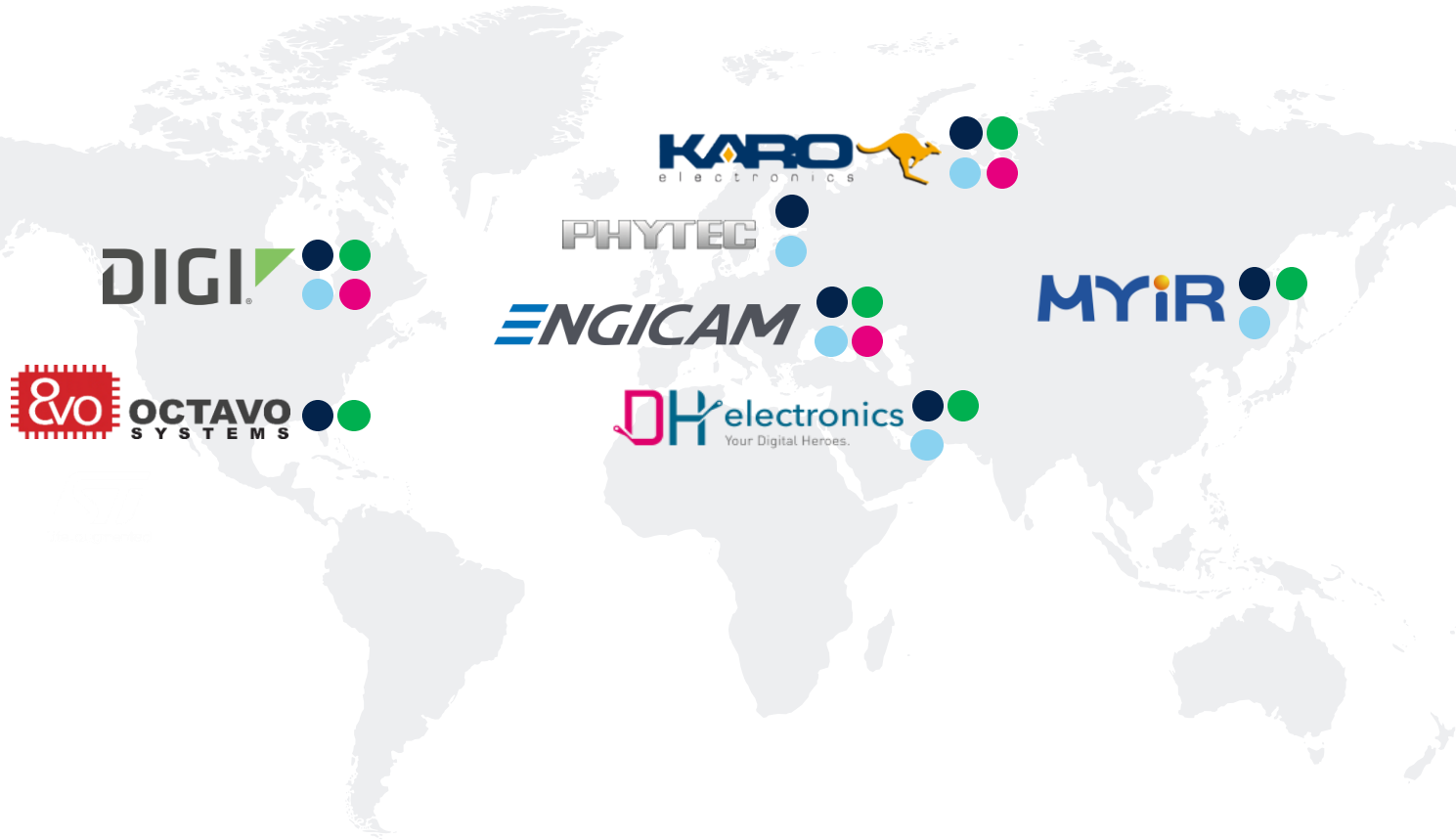
Complete hardware and Software solution

Simplify Design & save development time

Industrial Grade and ready to go in production

Additional flavors of Software & Hardware

Add layer of customer support

STM32MPU   SOM on st.com

STM32 MPU embedded software

STM32MPU Distribution for Android™

OpenSTDroid Distribution

STM32MP2 Starter package

Provides the software image for the STM32MPU embedded software distribution. Including the OpenSTDroid distribution binaries, and the partition layout required to flash the device with STM32CubeProgrammer.

STM32MP2 Distribution package

Includes Android application frameworks, the OpenSTLinux BSP (Linux kernel, U-Boot, TF-A, OP-TEE) and a toolset to tune the system for your needs, and to handle the built image.

Discover now

OpenSTDroid Distribution: available only for STM32MP25x product lines

Same Linux software for STM32MP2 series for easy project migration

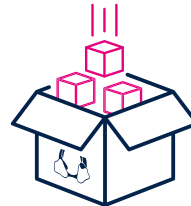**OpenSTLinux Distribution**
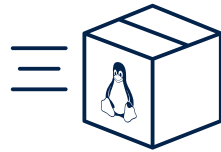
STM32MP2 Starter package

To quickly and easily start with any STM32MP2 microprocessor device
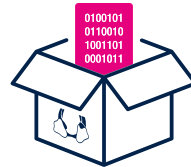
STM32MP2 Developer package

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

Discover now

STM32 MPU embedded software

Accelerate your time to market using expansion packages

Scalable · Flexible · Reliable

OpenSTLinux Expansion packages

LoRaWAN® Server

Microsoft Azure IoT Edge

Amazon AWS

● X-LINUX-ACM	● ● X-LINUX-MSP01
● ● ● X-LINUX-AI	● ● ● X-LINUX-NFC
● ● ● X-LINUX-AWS	● X-LINUX-PREDMNT
● ● ● X-LINUX-AZURE	● ● X-LINUX-QT
● ● ● X-LINUX-GNSS	● ● ● X-LINUX-RT
● ● ● X-LINUX-IOT	● X-LINUX-SPN1
● ● X-LINUX-ISP	● ● ● X-LINUX-TPM
● ● ● X-LINUX-MEMS	● X-LINUX-TSNSWCH

Available · **Planned**

● STM32MP15 · ● STM32MP25
● STM32MP13 · ● STM32MP23

STM32 MPU OpenSTLinux Expansion Packages

24

Extended maintenance to 5 years

2 versions in parallel with 5-year support by ST

References:
- *Linux kernel releases: https://www.kernel.org/category/releases.html*
- *Yocto releases: https://www.yoctoproject.org/development/releases*

OpenSTLinux V5 *(Linux 6.1 LTS / Mickledore 4.2)*

New features & Corrective Support	Corrective Support
V5.0.0	V5.1.0

OpenSTLinux V6 *(Linux 6.6 LTS / Scarthgap 5.0 LTS)*

New features & Corrective Support	Corrective Support	Vulnerability update
V6.0.0 V6.1.0	V6.2.0 V6.2.1	V6.2.2

OpenSTLinux V7 *(Linux LTS / Yocto LTS)*

New features & Corrective Support	Corrective Support	Vulnerability update
V7.0.0 V7.1.0	V7.2.0 V7.2.1	V7.2.2

2023   2024   2025   2026   2027   2028   2029   2030   2031

Software development tools

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

STM32CubeMX

STM32CubeIDE

STM32CubeProgrammer

STM32CubeMX	IDEs Compile and Debug	STM32 programming tool
STM32CubeMX enhanced for MPU	**Multicore solutions**	**STM32CubeProgrammer**
• Device Tree configuration • Device Tree generation • DRAM interface tuning tool	• Free STM32CubeIDE • OpenSTLinux Developer package support • Import DRAM tuning project	• Flash, DRAM and/or system memory • OTP programming • Signing & key generation tools

ST's reference PCB layouts down to 4 layers PTH

Coming soon

Flash

STM32MP2x

DRAM

STPMIC25

Wi-Fi / BLE module

Ethernet application

Your application, built around ST's reference layout!
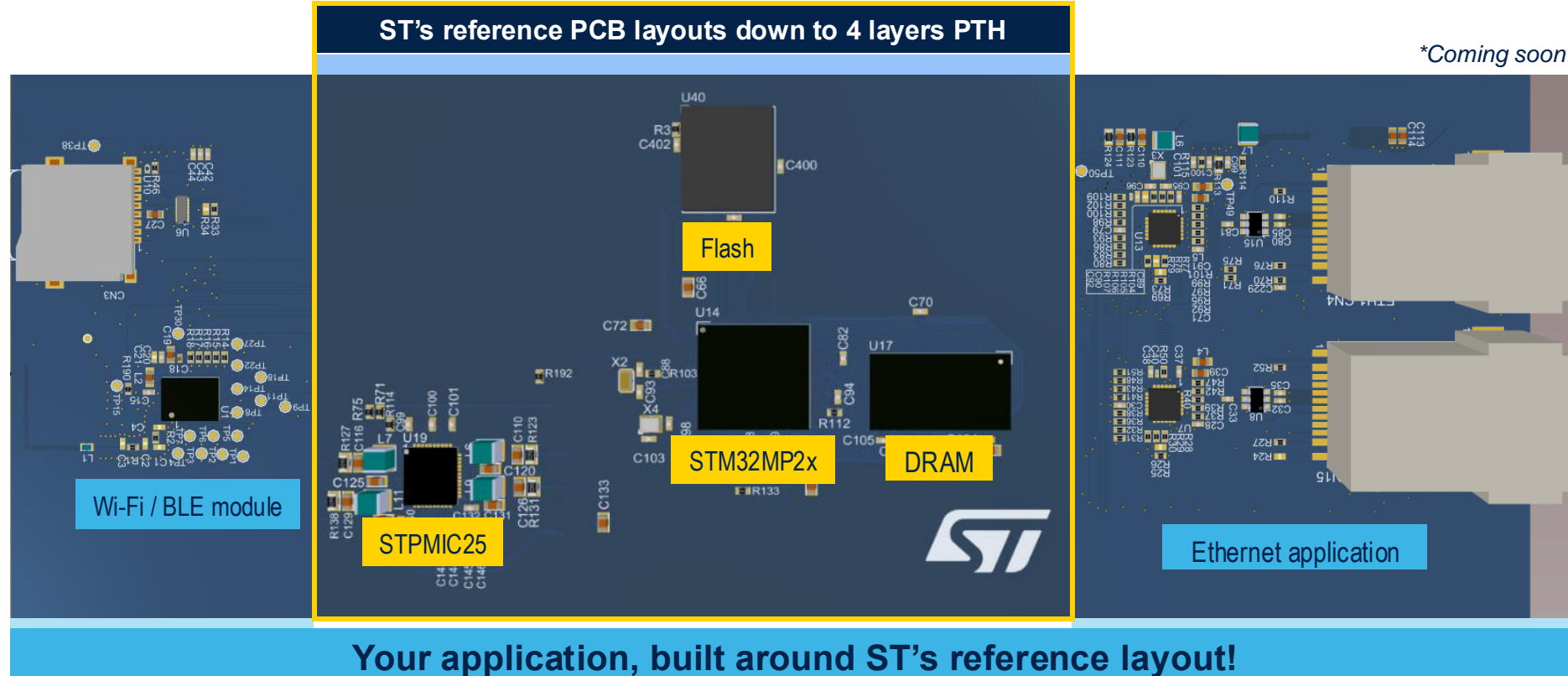
PCB layout examples* based on Altium projects provide you with a modular approach to build your designs

- 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

Speed up your development

Enhance stability, reliability, and simplify your design process with validated DRAM on the STM32 MPU portfolio

Performance optimization

Reduced development costs

Regulatory and quality assurance

Get the list here

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

life.augmented