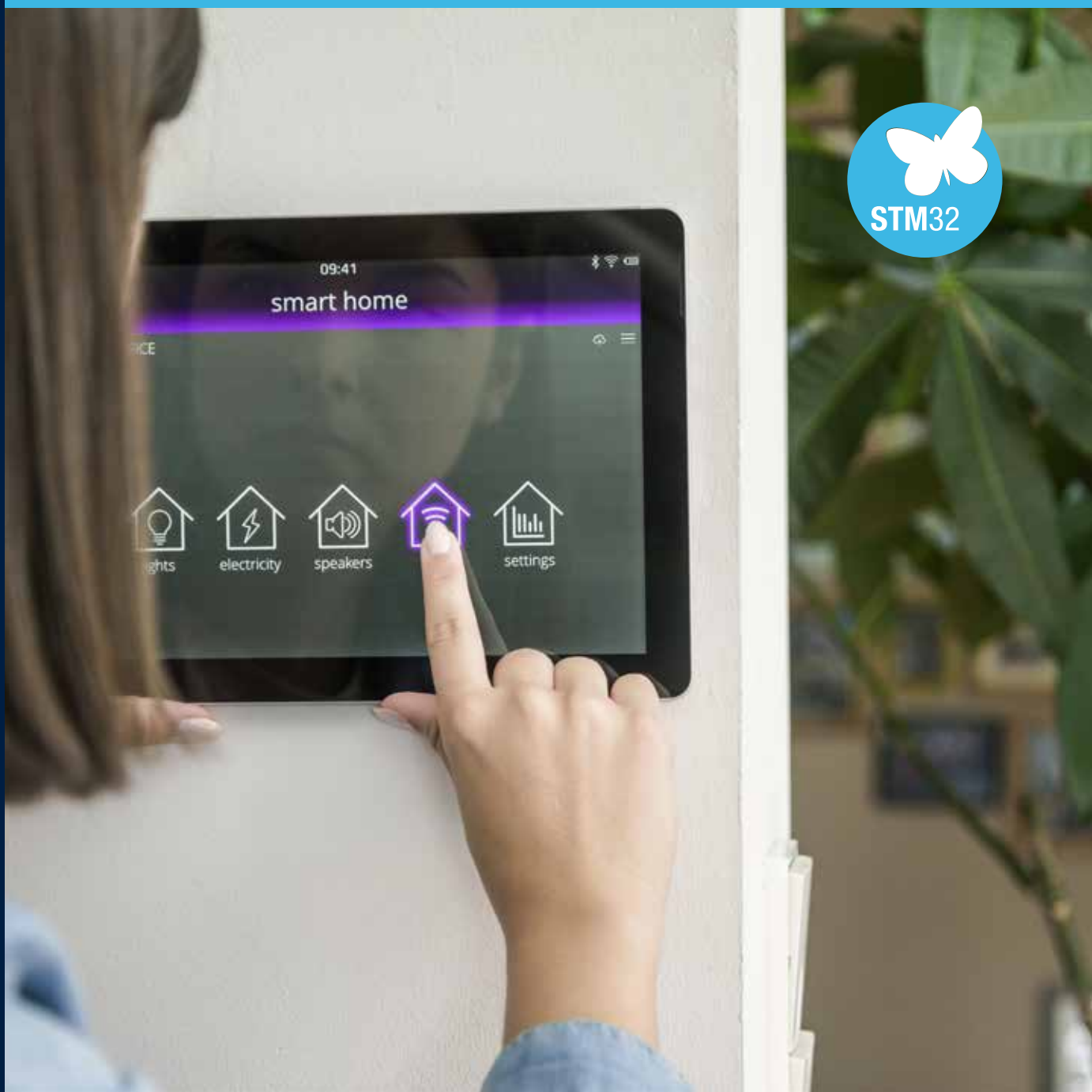
life.augmented

# STM32H7 series Powered by Arm® Cortex®-M7 & -M4 releasing your creativity



# STM32H7
# high performance

## High-performance MCUs with Arm® Cortex®-M7 core and Arm® Cortex®-M4

The STM32H7 series offer the performance of the Cortex-M7 core running up to 480 MHz and add a 240 MHz Cortex-M4 core in dual-core lines. Combined with a smart architecture based on a multi-power domain, developers can always use the best configuration to optimize data transfers and CPU load while minding the power budget. With its embedded hardware accelerators and its extensive digital and analog peripherals, the feature-rich STM32H7 is ideal for industrial environments where fast reaction time is essential. The HMI components (graphic and audio support) allow the device to provide an outstanding user-experience.

### CORE, MEMORIES AND ACCELERATION

- Cortex-M7 core @ 480 MHz
- Cortex-M4 core @ 240 MHz*
- 16 KB + 16 KB I/D L1 Cache
- Double-precision FPU
- 4 x DMA controllers
- 128 KB up to 2 MB dual bank Flash and up to 1.4 MB RAM

Note: * only in STM32H745, STM32H755, STM32H747 and STM32H757

### CONNECTIVITY

- Up to 2 x USB 2.0 OTG FS/HS
- USART, UART, SPI, and I²C
- 2 x CAN (1 x FD and 1 x TT/FD)
- Ethernet MAC
- FMC, Quad-SPI and Dual Octal-SPI
- 2 x SDMMC

### AUDIO

- 3 x I²S + audio PLL
- 4 x SAI
- 2 x 12-bit DAC
- SPDIF-RX

### GRAPHICS

- LCD TFT controller
- JPEG Codec
- Chrom-ART Accelerator™
- Chrom-GRC™

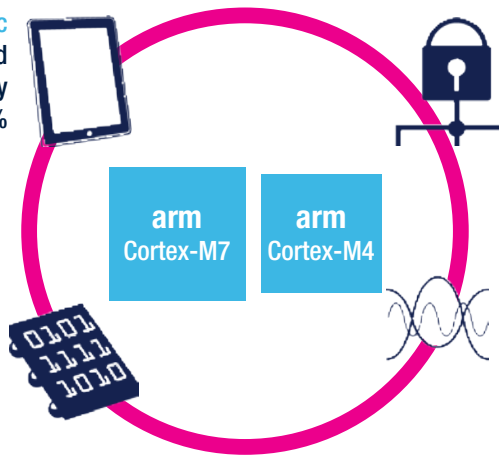
### OTHER

- Optional crypto
- DFSDM
- 16- and 32-bit timers
- 3× ADCs with 16-bit max. resolution (up to 3.6 MSPS)
- Analog (comp, AOP)
- Power supply 1.7V to 3.6V down to 1.62V in regulator bypass mode
- Up to 140 °C supported as maximum junction temperature

## Two powerful cores supported by a robust architecture

**Display nice graphic**
The Chrom-ART Accelerator and MJPEG codec offload the CPU by more than 90%

**Transfer data efficiently across peripherals**
The main DMA takes care of the intensive data transfers between memories with up to 16 channels to offload the CPU




**Manage security**
Uses a dedicated hardware accelerator for cryptography and hashing functions to offload the CPU by more than 90%

**Generate complex wave forms**
High-Resolution timer (2.1ns) can generate complex waveforms synchronized on multiples events, without CPU assistance

## UP TO SEVEN LINES FOR MORE VERSATILITY

Arm® Cortex®-M7 or Cortex®-M7 + Cortex®-M4

### CORE, MEMORIES AND ACCELERATION

- Single-core Cortex-M7 up to 480 MHz
- Dual-core Cortex-M7 480 MHz and Cortex-M4 240 MHz
- Flash and RAM acceleration
- SP-FPU and DP-FPU
- 4 x DMA

### CONNECTIVITY

- 2 x USB2.0 OTG FS/HS
- 2 x SDMMC
- USART, UART, SPI, I²C
- 2 x CAN (1 x FD and 1 x TT)
- HDMI-CEC
- FMC, Dual-mode Quad-SPI
- Camera I/F
- Analog (comp, AOP)

### AUDIO

- 3 x I²S + audio PLL
- 4 x SAI
- 2 x 12-bit DAC
- SPDIF-RX

### GRAPHIC

- Chrom-ART Accelerator™

### OTHER

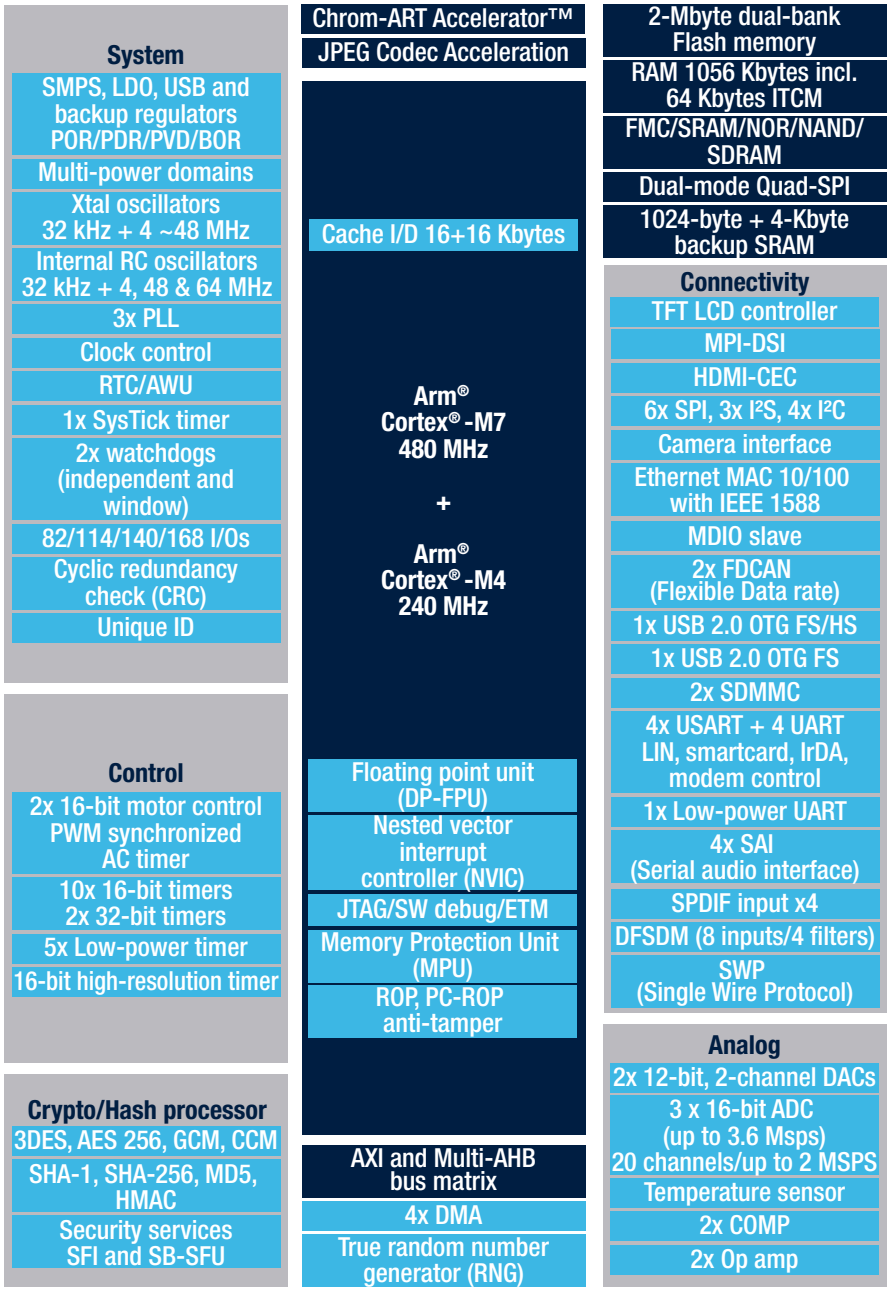
- Crypto/Hash (except H742)[1]
- Security services (except H742)
- TRNG
- DFSDM
- 16- and 32-bit timers, HRTimer
- 3 x 16-bit ADC (up to 3.6 MSPS)
- Voltage range 1.62 to 3.6 V (except 100-pin package : 1.71 to 3.6 V)
- Multi-power domains
- -40°C up to 105°C ambiant
- -40°C up to 125°C ambiant[2]

| STM32 Product line | $f_{CPU}$ (MHz) | Dual-Bank Flash memory (bytes) | RAM (bytes) | OctoSPI & OTFDEC | Ethernet | Graphic | Power supply | Stop mode (typical) / RAM retention |
|---|---|---|---|---|---|---|---|---|
| **Dual-core lines** | | | | | | | | |
| **STM32H747/757**[1] | 480 + 240 | Up to 2 Mbytes | 1 Mbyte (incl.128 Kbytes DTCM + 64 Kbytes ITCM + 64 Kbytes backup1) + 4 Kbytes backup2 | - | • | TFT-LCD JPEG codec MIPI-DSI | SMPS + LDO | 360 µA / 1MB<br>250 µA / 768KB |
| **STM32H745/755**[1] | 480 + 240 | Up to 2 Mbytes | 1 Mbyte (incl.128 Kbytes DTCM + 64 Kbytes ITCM + 64 Kbytes backup1) + 4 Kbytes backup2 | - | • | TFT-LCD JPEG codec | SMPS + LDO | 360 µA / 1MB<br>250 µA / 768KB |
| **Single-core lines** | | | | | | | | |
| **STM32H7A3/7B3**[1] | 280 | Up to 2 Mbytes | 1,4 Mbyte (incl.128 Kbytes DTCM + 64 Kbytes ITCM + 4 Kbytes backup) | • | - | TFT-LCD JPEG codec Chrom-GRC | SMPS + LDO | 32 µA / 1.4MB<br>28 µA / 32KB |
| **STM32H743/753**[1] | 480 | Up to 2 Mbytes | 1 Mbyte (incl.128 Kbytes DTCM + 64 Kbytes ITCM + 64 Kbytes backup1) + 4 Kbytes backup2 | - | • | TFT-LCD JPEG codec | LDO | 1270 µA / 1MB<br>910 µA / 768KB |
| **STM32H742** | 480 | Up to 2 Mbytes | 692 Kbytes (incl.128 Kbytes DTCM + 64 Kbytes ITCM + 16 Kbytes backup1) + 4 Kbytes backup2 | - | • | | LDO | 1270 µA / 692KB<br>910 µA / 704KB |
| **Value line** | | | | | | | | |
| **STM32H7B0** | 280 | 128 Kbytes | 1,4 Mbyte (incl.128 Kbytes DTCM + 64 Kbytes ITCM + 4 Kbytes backup) | • | - | TFT-LCD JPEG codec Chrom-GRC | SMPS + LDO | 32 µA / 1.4MB<br>28 µA / 32KB |
| **STM32H750** | 480 | 128 Kbytes | 1 Mbyte (incl.128 Kbytes DTCM + 64 Kbytes ITCM + 64 Kbytes backup1) + 4 Kbytes backup2 | - | • | TFT-LCD JPEG codec | LDO | 1270 µA / 1MB<br>910 µA / 768KB |

Notes :
1. Optional - dedicated CPN, STM32H753, STM32H755, STM32H757, STM32H7B3 for the Crypto Variants
2. 125 °C ambiant / 140 °C junction. Dedicated part numbers on STM32H745/H755

**STM32H7 ONLINE TRAINING**
www.st.com/stm32h7-online-training

## STM32H757 BLOCK DIAGRAM



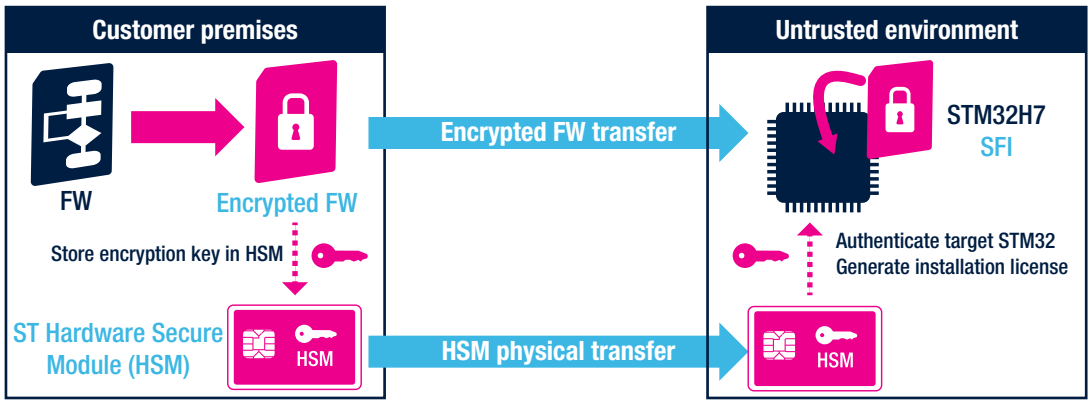

STM32 Trust

The STM32Trust ecosystem combines knowledge, design tools, and ready-to-use original ST software to build strong cyber-protection into new IoT devices, leveraging industry best-practices.

www.st.com/stm32trust

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

**Manage STM32 authentication, firmware decryption and installation**




**Note**: *optional – SFI service available on specific part numbers

# STM32H7 ecosystem

## HARDWARE TOOLS

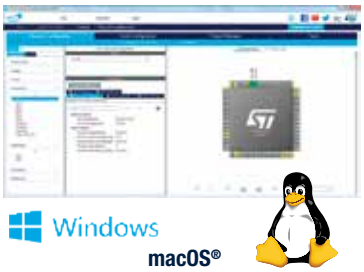
www.st.com/stm32hardwaretools

| Part numbers | | Product Line | Core | SMPS | Crypto-HASH | Display | Ethernet | NOR Serial Flash (Mbits) | SDRAM (Mbits) | SRAM (Mbits) | NOR (Mbits) | eMMC (Gbytes) | SDCard (Bbytes) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Nucleo-144 boards** | | | | | | | | | | | | | |
| | **NUCLEO-H743ZI2** | General-purpose | 1 | - | No | No | Yes | No | - | - | - | - | - |
| | **NUCLEO-H745ZI-Q** | Industrial | 2 | Internal | No | No | Yes | No | - | - | - | - | - |
| | **NUCLEO-H753ZI** | General-purpose | 1 | - | Yes | No | Yes | No | - | - | - | - | - |
| | **NUCLEO-H755ZI-Q** | Industrial | 2 | Internal | Yes | No | Yes | No | - | - | - | - | - |
| | **NUCLEO-H7A3ZI-Q** | General-purpose | 1 | Internal | Yes | No | No | No | - | - | - | - | - |
| **Discovery kits** | | | | | | | | | | | | | |
| | **STM32H745I-DISCO** | Industrial | 2 | Internal | No | 4.3" RGB | Yes | 2 x 512 Mb Quad-SPI | 128 Mb | - | - | 4 GB | - |
| | **STM32H747I-DISCO** | Graphic | 2 | Internal | No | 4" DSI | Yes | 2 x 512 Mb Quad-SPI | 256 Mb | - | - | - | - |
| | **STM32H747I-DISC1** | Graphic | 2 | Internal | No | No | Yes | 2 x 512 Mb Quad-SPI | 256 Mb | - | - | - | - |
| | **STM32H750B-DK** | Value | 1 | - | Yes | 4.3" RGB | Yes | 2 x 512 Mb Quad-SPI | 128 Mb | - | - | 4 GB | - |
| | **STM32H7B3I-DK** | Graphic | 1 | Internal | Yes | 4.3" RGB | No | 1 x 512 Mb Octo-SPI | 128 Mb | - | - | - | - |
| **Evaluation boards** | | | | | | | | | | | | | |
| | **STM32H743I-EVAL2** | General-purpose | 1 | - | No | 5.7" RGB | Yes | 2 x 512 Mb Quad-SPI | 256 Mb | 16 Mb | 128 Mb | - | 8 GB |
| | **STM32H753I-EVAL2** | General-purpose | 1 | - | Yes | 5.7" RGB | Yes | 2 x 512 Mb Quad-SPI | 256 Mb | 16 Mb | 128 Mb | - | 8 GB |
| | **STM32H747I-EVAL** | Graphic | 2 | Internal | No | 4" DSI | Yes | 2 x 512 Mb Quad-SPI | 256 Mb | 16 Mb | 128 Mb | - | 8 GB |
| | **STM32H757I-EVAL** | Graphic | 2 | Internal | Yes | 4" DSI | Yes | 2 x 512 Mb Quad-SPI | 256 Mb | 16 Mb | 128 Mb | - | 8 GB |
| | **STM32H7B3I-EVAL** | Graphic | 1 | Internal | Yes | 7" RGB | No | 1 x 512 Mb Octo-SPI | 256 Mb | 16 Mb | 128 Mb | - | 8 GB |

## SOFTWARE TOOLS

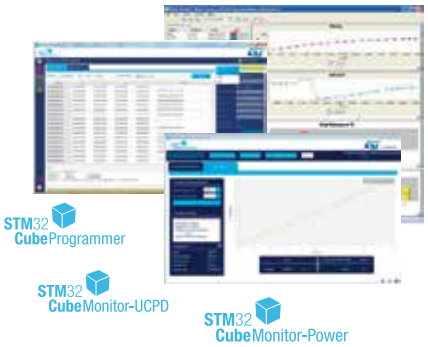
www.st.com/stm32softwaretools

**STM32CubeMX**




**IDEs**

**STM32CubeProg**
**STM32CubeMonPwr**
**STM32CubeMonUCPD**

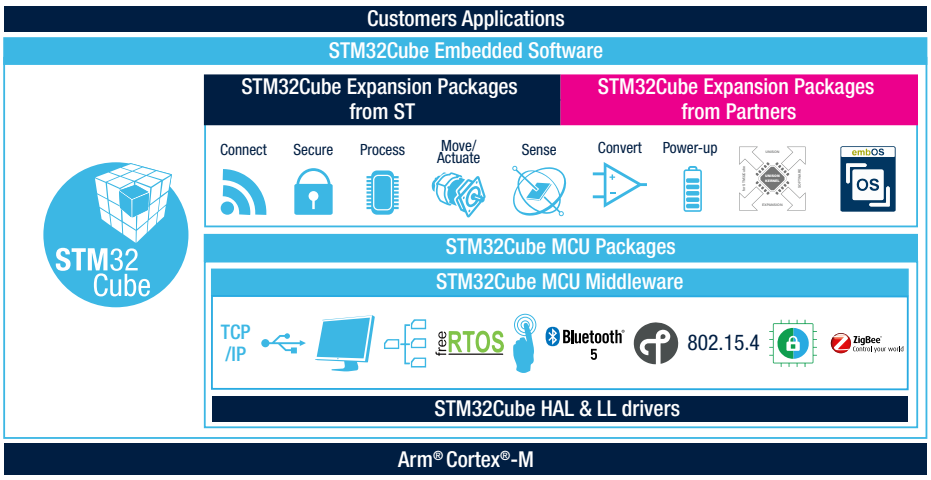



**Notes:**
- ARM Keil, IAR and ac6 support multi-core debugging
- STM32CubeIDE will support multi-core debugging in Q4 2019.

Configure and generate code — Compile and debug — Monitor & program

## EMBEDDED SOFTWARE

www.st.com/stm32embeddedsoftware

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