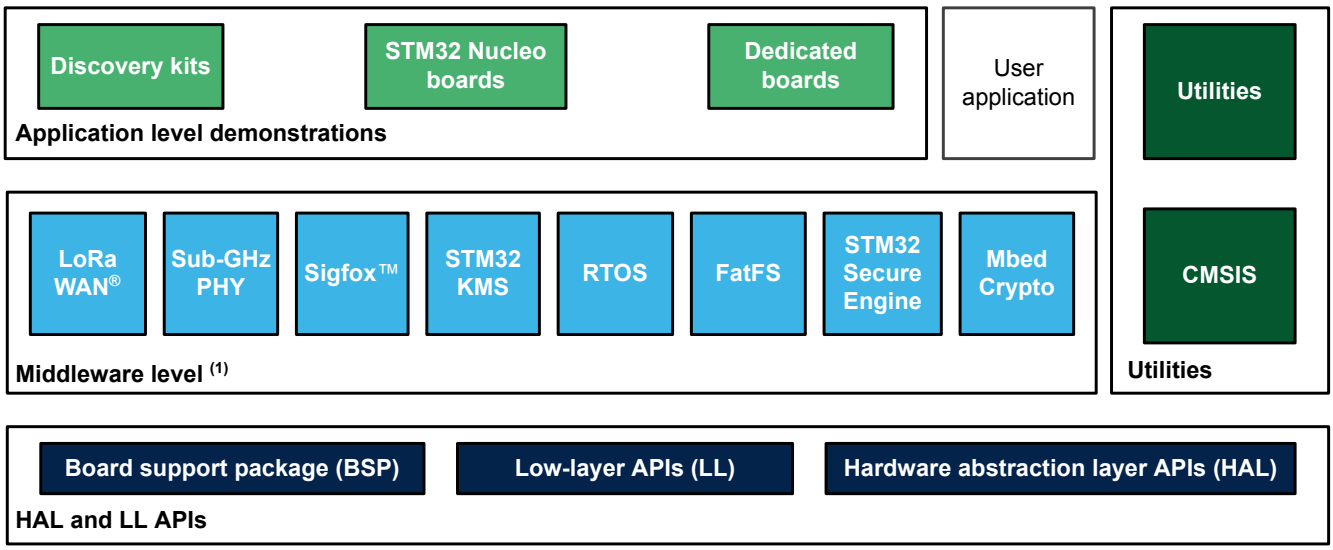
STM32CubeWL

Data brief

STM32Cube embedded software for STM32WL series including LL and HAL drivers, LoRaWAN® and Sigfox™ stacks, KMS, STM32 Secure Engine, sub-GHz PHY, FatFS and FreeRTOS™



(1) The set of middleware components depends on the product Series.

Product link
STM32CubeWL

Features

- Consistent and complete embedded software offer that frees the user from dependency issues
- Maximized portability between all STM32 series supported by STM32Cube
- Application and peripheral examples for easy understanding
- HAL and LL APIs, developed in compliance with MISRA C®:2012 guidelines, and elimination of possible runtime errors with Synopsys® Coverity® static analysis tool
- FreeRTOS™, FatFS, mbed Crypto
- STM32WL-specific middleware components: LoRaWAN® and Sigfox™ stacks, sub-GHz physical layer
- Security middleware components: STM32 Secure Engine, STM32 key management services (KMS)
- Free-of-charge, user-friendly license terms
- Automatic update mechanism with new release notification through STM32CubeMX updater feature
- Published on GitHub in addition to *www.st.com* to propagate bug fixes and improvements faster, open for pull requests and issues to facilitate user contributions and direct feedback

1 Description

STM32Cube is an STMicroelectronics original initiative to significantly improve developer productivity by reducing development effort, time and cost. STM32Cube covers the whole STM32 portfolio.

STM32Cube includes STM32CubeMX, a graphical software configuration tool for pinout and clock tree.

It also comprises the STM32CubeWL MCU Package composed of the STM32Cube hardware abstraction layer (HAL) and the low-layer (LL) APIs, plus a consistent set of middleware components such as FatFS, STM32 Secure Engine, KMS, mbed Crypto and FreeRTOS™, plus LoRaWAN® and Sigfox™ stacks, and sub-GHz PHY connectivity services. All embedded software components are delivered with a full set of examples running on STMicroelectronics boards.

The STM32Cube HAL is an STM32 embedded software layer that ensures maximized portability across the STM32 portfolio, while the LL APIs make up a fast, light-weight, expert-oriented layer which is closer to the hardware than the HAL. HAL and LL APIs can be used simultaneously with a few restrictions.

Both the HAL and LL drivers have been developed in compliance with V-Model requirements for design, implementation, and tests. Furthermore, the STMicroelectronics-specific validation process adds a deeper qualification level, such as compliance with MISRA C®:2012 guidelines, and elimination of possible runtime errors with the Synopsys® Coverity® static analysis tool. Reports are available on demand.

STM32CubeWL gathers in one single package all the generic embedded software components required to develop an application on STM32WL series microcontrollers. Following STM32Cube initiative, this set of components is highly portable, not only within the STM32WL series but also to other STM32 series. In addition, the low-layer APIs provide an alternative, high-performance, low-footprint solution to the STM32CubeWL HAL at the cost of portability and simplicity.

HAL and LL APIs are available in open-source BSD license for user convenience.

2 General information

The STM32CubeWL MCU Package runs on STM32 microcontrollers based on the Arm® Cortex® processor.

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2.1 Ordering information

STM32CubeWL is available for free download from *www.st.com*.

2.2 What is STM32Cube?

STM32Cube is an STMicroelectronics original initiative to improve designer productivity significantly by reducing development effort, time, and cost. STM32Cube covers the whole STM32 portfolio.

STM32Cube includes:

- A set of user-friendly software development tools to cover project development from conception to realization, among which are:
  - STM32CubeMX, a graphical software configuration tool that allows the automatic generation of C initialization code using graphical wizards
  - STM32CubeIDE, an Eclipse®-based IDE, providing code edition, compilation, programming, and debugging capabilities
  - STM32CubeCLT, an all-in-one command-line development toolset with code compilation, board programming, and debug features
  - STM32CubeIDE for Visual Studio Code (STM32VSCode), a complete IDE based on VS Code® platform
  - STM32CubeProgrammer (STM32CubeProg), a programming tool available in graphical and command-line versions
  - STM32CubeMonitor (STM32CubeMonitor, STM32CubeMonPwr, STM32CubeMonRF, STM32CubeMonUCPD), powerful monitoring tools to fine-tune the behavior and performance of STM32 applications in real time
  - STM32CubeWiSE (STM32CubeWiSEcg, STM32CubeWiSEre), graphical tools designed to evaluate and test the capabilities of sub-GHz radios and protocols
- STM32Cube MCU and MPU Packages, comprehensive embedded-software platforms specific to each microcontroller and microprocessor series (such as STM32CubeWL for the STM32WL series), which include:
  - STM32Cube hardware abstraction layer (HAL), ensuring maximized portability across the STM32 portfolio
  - STM32Cube low-layer APIs, ensuring the best performance and footprints with a high degree of user control over hardware
  - A consistent set of middleware components such as RTOS, FAT file system, LoRaWAN®, sub-GHz PHY, Sigfox™, KMS, secure engine, and mbed-crypto
  - All embedded software utilities with full sets of peripheral and applicative examples
- STM32Cube Expansion Packages, which contain embedded software components that complement the functionalities of the STM32Cube MCU and MPU Packages with:
  - Middleware extensions and applicative layers
  - Examples running on some specific STMicroelectronics development boards

3 License

STM32CubeWL is delivered under the SLA0048 software license agreement and its Additional License Terms.

Revision history

Table 1. **Document revision history**

Date	Version	Changes
11-Oct-2019	1	Initial release.
19-Dec-2019	2	Changed classification to public. Removed support for Sigfox, STM32 key management services (KMS) and mbedTLS. Updated License.
04-Nov-2020	3	Reintroduced Sigfox™, STM32 key management services (KMS), and added SBFSU and MbedCrypto.
23-Feb-2026	4	Updated Features and Description. Added Section 2: General information and Section 2.2: What is STM32Cube?.

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