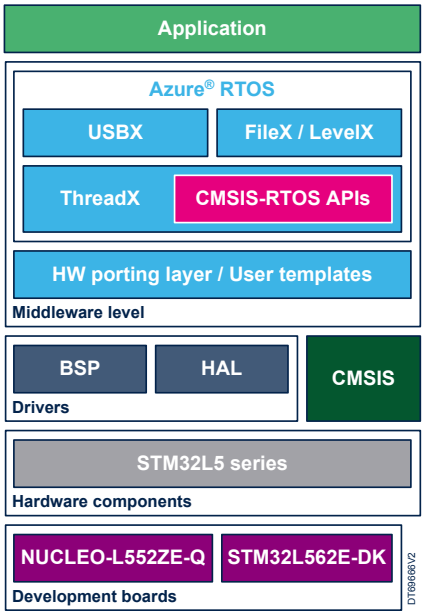
X-CUBE-AZRTOS-L5

Data brief

STM32L5 series Azure® RTOS software expansion for STM32Cube



Product status link
X-CUBE-AZRTOS-L5

Features

- Based on Azure® RTOS release 6.2.0
- Integrated and full-featured operating system: Azure® RTOS ThreadX
  - FreeRTOS™ adaptation layer for ThreadX
  - CMSIS RTOS V2 adaptation layer for ThreadX
- Advanced Flash file system (FS) / Flash translation layer (FTL), fully featured to support NOR and NAND flash memories: Azure® RTOS FileX and Azure® RTOS LevelX
- USB Device stack coming with multiple classes: Azure® RTOS USBX
  - The following USB Device classes are provided with examples: HID, CDC ACM, composite HID/CDC ACM with USB Power Delivery Type-C consumer
- Azure® RTOS FileX, Azure® RTOS LevelX, and Azure® RTOS USBX running with Azure® RTOS ThreadX or in bare-metal mode
- Safety documentation packages (available from Microsoft) enabling the use in applications targeting IEC 61508, IEC 62304, and ISO 26262
- High security assurance from hardware to software, including middleware such as TLS/DTLS and cryptography
- Many applicative examples available for STMicroelectronics NUCLEO-L552ZE-Q and STM32L562E-DK boards
- Free user-friendly license terms
- Enhanced for STMicroelectronics toolset: graphical configuration of Azure® RTOS middleware and initialization code generation with STM32CubeMX and STM32CubeIDE
- Update mechanism, which the user can enable to be notified of new releases

Description

X-CUBE-AZRTOS-L5 (Azure® RTOS STM32Cube Expansion Package) provides a full integration of Microsoft® Azure® RTOS in the STM32Cube environment for the STM32L5 series of microcontrollers. Ready-to-run applicative examples provided for the NUCLEO-L552ZE-Q and STM32L562E-DK Evaluation boards, along with a full compatibility with STM32CubeMX and STM32CubeIDE, ensure that X-CUBE-AZRTOS-L5 drastically reduces the learning curve and provides a smooth application development experience with Azure® RTOS and STM32L5 series microcontrollers.

The scope of this Expansion Package covers the following Azure® RTOS middleware: RTOS (ThreadX), USB Device (USBX), and file system including the support for NOR and NAND flash memories (FileX and LevelX).

Azure® RTOS FileX, Azure® RTOS LevelX, and Azure® RTOS USBX are also available to run in bare-metal mode without the Azure® RTOS ThreadX kernel.

FreeRTOS™ and CMSIS RTOS V2 adaptation layers are included and demonstrated, making it easy and quick to migrate from FreeRTOS™ or another RTOS to Azure® RTOS ThreadX for STM32L5 users.

X-CUBE-AZRTOS-L5 is only an STM32Cube integration of middleware stacks from Microsoft® Azure® RTOS. Neither the *"Azure SDK for Embedded C"* nor the *"Azure IoT Middleware for Azure RTOS"*, available from www.github.com/azure, are part of the X-CUBE-AZRTOS-L5 Expansion Package, which therefore does not support native connectivity to the Azure® IoT Hub.

1 General information

The X-CUBE-AZRTOS-L5 STM32Cube Expansion Package runs on the STM32L5 microcontrollers based on the Arm® Cortex® processor.

Note: Arm is a registered trademark of Arm Limited (or its subsidiaries) in the US and/or elsewhere.
All other trademarks are the property of their respective owners.

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1.1 Ordering information

X-CUBE-AZRTOS-L5 is available for free download from the *www.st.com* website and through the STM32CubeMX and STM32CubeIDE software tools.

1.2 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 all-in-one development tool with peripheral configuration, code generation, code compilation, and debug features
  - STM32CubeCLT, an all-in-one command-line development toolset with code compilation, board programming, and debug features
  - 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
- STM32Cube MCU and MPU Packages, comprehensive embedded-software platforms specific to each microcontroller and microprocessor series (such as STM32CubeL5 for the STM32L5 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, USB Device USB-PD, touch library, FAT file system, mbedTLS, mbed-crypto, and TFM
  - 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

1.3 How does X-CUBE-AZRTOS-L5 complement STM32Cube?

1.3.1 Complementing STM32Cube

X-CUBE-AZRTOS-L5 extends STM32Cube by providing a full porting of Azure® RTOS middleware stacks, based on the STM32Cube HAL hardware abstraction layer for the STM32 microcontroller for maximized consistency and level of integration.

Azure® RTOS is a professional-grade, highly reliable and market-proven middleware suite ideally complementing the extensive STM32Cube ecosystem providing free development tools, software bricks and Expansion Packages. STM32 users can now also leverage the rich services of Azure® RTOS, which meet the needs of tiny, smart, connected devices, while still enjoying all the user-friendly features and terms they have always known with STM32Cube.

1.3.2 Enhanced for the STMicroelectronics toolset

The X-CUBE-AZRTOS-L5 STM32Cube Expansion Package includes different applicative examples and is compatible with STM32CubeMX (enhanced for the STMicroelectronics toolset). It can be downloaded from and installed directly into STM32CubeMX, as detailed in the user manual UM1718 (freely available on *www.st.com*), or from the product page on STMicroelectronics website.

2 License

X-CUBE-AZRTOS-L5 is delivered under the SLA0048 software license agreement and its Additional License Terms.

Revision history

Table 1. **Document revision history**

Date	Revision	Changes
19-Nov-2021	1	Initial release.
26-Sep-2023	2	Updated the Azure® RTOS base release to 6.2.0 in Features. Added the possibility to run Azure® RTOS FileX, Azure® RTOS LevelX, and Azure® RTOS USBX in bare-metal mode in Features and Description. Added the CMSIS RTOS V2 adaptation layer for Azure® RTOS ThreadX in Features and Description. Updated Features: • Added composite HID/CDC ACM with USB Power Delivery Type-C consumer to the USB Device classes • Updated the safety documentation and security assurance • Updated the enhancement for STMicroelectronics toolset Updated What is STM32Cube?