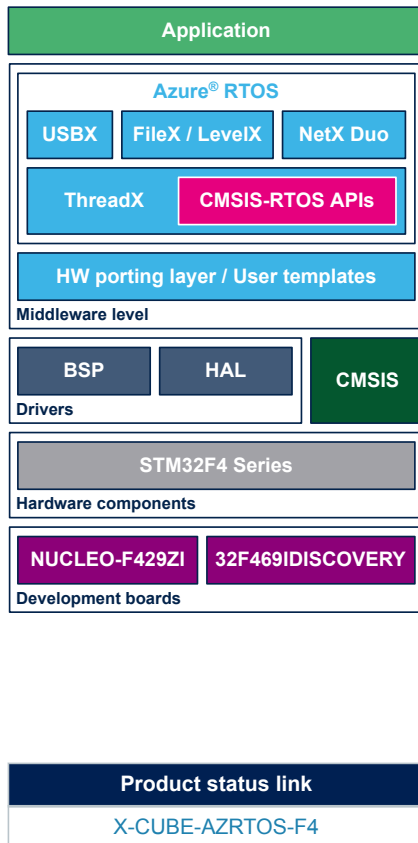


STM32F4 Series Azure[®] RTOS software expansion for STM32Cube



Features

- Based on Azure[®] RTOS release 6.1.7
- Integrated and full featured operating system: Azure[®] RTOS ThreadX
 - FreeRTOS[™] adaptation layer for ThreadX
- Industrial grade networking stack optimized for performance coming with many IoT protocols: Azure[®] RTOS NetX Duo
- 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 Host and Device stacks coming with multiple classes: Azure[®] RTOS USBX
 - The following USB Device classes are provided with examples: HID, CDC ACM, MSC, DFU, CDC ECM, composite HID/CDC ACM
 - The following USB Host classes are provided with examples: HID, MSC, CDC ACM, Dual Class, composite HID/CDC ACM
- Safety pre-certifications (available from Microsoft): IEC 61508 SIL4, IEC 62304 Class C and ISO 26262 ASIL D
- Security pre-certifications (available from Microsoft): EAL4+ for TLS/DTLS, FIPS 140-2 for software cryptographic library
- Many applicative examples available for STMicroelectronics [NUCLEO-F429ZI](#) and [32F469IDISCOVERY](#) boards
- Free user-friendly license terms
- Enhanced for STMicroelectronics toolset: graphical configuration of Azure[®] RTOS middleware with [STM32CubeMX](#) and [STM32CubeIDE](#)
- Update mechanism, which can be enabled by the user to be notified of new releases



1 Description

X-CUBE-AZRTOS-F4 (Azure® RTOS STM32Cube Expansion Package) provides a full integration of Microsoft® Azure® RTOS in the STM32Cube environment for the STM32F4 Series of microcontrollers. Ready-to-run applicative examples provided for the NUCLEO-F429ZI and 32F469IDISCOVERY Evaluation boards, along with a full compatibility with STM32CubeMX and STM32CubeIDE, ensure that X-CUBE-AZRTOS-F4 drastically reduces the learning curve and provides a smooth application development experience with Azure® RTOS and STM32F4 Series microcontrollers.

The scope of this Expansion Package covers the following Azure® RTOS middleware: RTOS (ThreadX), USB Host and Device (USBX), file system including the support for NOR and NAND Flash memories (FileX and LevelX), and networking including Ethernet and Wi-Fi® media (NetX Duo).

A FreeRTOS™ adaptation layer is included and demonstrated, making it easy and quick to migrate from FreeRTOS™ to Azure® RTOS ThreadX for STM32F4 users.

X-CUBE-AZRTOS-F4 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-F4 Expansion Package, which therefore does not support native connectivity to the Azure® IoT Hub.

2 General information

The X-CUBE-AZRTOS-F4 STM32Cube Expansion Package runs on the STM32F4 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.



2.1 Ordering information

X-CUBE-AZRTOS-F4 is available for free download from the www.st.com website and through the STM32CubeMX and STM32CubeIDE software tools.

2.2 What is STM32Cube?

STM32Cube is an STMicroelectronics original initiative to significantly improve designer productivity 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
 - 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 STM32CubeF4 for the STM32F4 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, TCP/IP, graphics, and FAT file system
 - 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

2.3 How does X-CUBE-AZRTOS-F4 complement STM32Cube?

2.3.1 Complementing STM32Cube

X-CUBE-AZRTOS-F4 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.

2.3.2 Enhanced for the STMicroelectronics toolset

The X-CUBE-AZRTOS-F4 STM32Cube Expansion Package includes different applicative examples and is compatible with [STM32CubeMX](#) (enhanced for STMicroelectronics toolset). It can be downloaded from and installed directly into STM32CubeMX, as detailed in user manual [UM1718](#) (freely available on www.st.com), or from the product page on STMicroelectronics website.

3 License

X-CUBE-AZRTOS-F4 is delivered under the [SLA0048](#) software license agreement and its Additional License Terms.

Revision history

Table 1. Document revision history

Date	Revision	Changes
6-Sep-2021	1	Initial release.
19-Nov-2021	2	Added the Azure® RTOS base release in Features . Updated Features and Description : <ul style="list-style-type: none"> • FreeRTOS™ adaptation layer for ThreadX • USB Host and Device classes for USBX • No native connectivity to Azure® IoT

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