Mesh over Bluetooth low energy software expansion for STM32Cube

Application	Lighting demo	
Middleware	BlueNRG Mesh library	ST Cryptographic library
Hardware Abstraction	STM32Cube Hardware Abstraction Layer (HAL)	
Hardware	STM32 Nucleo expansion boards X-NUCLEO-IDB05A2 (Connect) X-NUCLEO-BLUENRG2A1 (Sense)	
	STM32 Nucleo development board	

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STM32 Cube

BlueNRG

Features

- Complete software to build Mesh network with Bluetooth low energy (BLE) nodes, extending network coverage to large areas up to 32767 nodes and 126 hops
- Use of BLE enabled smartphones to monitor and control multiple BLE nodes via proxy protocol and legacy BLE GATT connectivity
- Two-layer security, thanks to 128-bit AES CCM encryption and 256-bit ECDH protocol, ensuring protection against multiple attacks, including Replay, Bit-Flipping, Eavesdropping, Man-in-the-Middle and Trashcan
- Supported models include vendor model, partial configuration model, and samples for on-off and level generic models
- Sample implementation available on the X-NUCLEO-IDB05A2 and X-NUCLEO-BNRG2A1 expansion boards connected to a NUCLEO-L152RE or NUCLEO-L476RG development board
- Easy portability across different MCU families, thanks to STM32Cube
- Free, user-friendly license terms

Description

The X-CUBE-BLEMESH1 expansion software package for STM32Cube runs on the STM32 and provides easy-to-use networking APIs based on a Mesh profile library and a BLE stack.

The expansion is built on STM32Cube software technology to ease portability across different STM32 microcontrollers.

The software lets you easily create your own application for extending BLE Mesh networks (by offering a ready-to-use Mesh core library), a complete set of compatible APIs, and a lighting reference design demo application running on the X-NUCLEO-IDB05A2 and X-NUCLEO-BNRG2A1 expansion boards connected to a NUCLEO-L152RE or NUCLEO-L476RG development board.

Product summary	
Mesh over Bluetooth low energy software expansion for STM32Cube	X-CUBE-BLEMESH1
Bluetooth low energy expansion boards based on the BlueNRG-M0A/BlueNRG-M2SP modules for STM32 Nucleo	X-NUCLEO-IDB05A2/X-NUCLEO-BNRG2A1
Bluetooth low energy wireless network processor	BlueNRG-M0/BlueNRG-2N
STM32 Nucleo development board	STM32 Nucleo
Applications	Cloud Connectivity Industrial Tools Wireless Connectivity

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1 Detailed description

1.1 What is STM32Cube?

STM32Cube is a combination of a full set of PC software tools and embedded software blocks running on STM32 microcontrollers and microprocessors:

- STM32CubeMX configuration tool for any STM32 device; it generates initialization C code for Cortex-M cores and the Linux device tree source for Cortex-A cores
- STM32CubeIDE integrated development environment based on open-source solutions like Eclipse or the GNU C/C++ toolchain, including compilation reporting features and advanced debug features
- STM32CubeProgrammer programming tool that provides an easy-to-use and efficient environment for reading, writing and verifying devices and external memories via a wide variety of available communication media (JTAG, SWD, UART, USB DFU, I2C, SPI, CAN, etc.)
- STM32CubeMonitor family of tools (STM32CubeMonRF, STM32CubeMonUCPD, STM32CubeMonPwr) to help developers customize their applications in real-time
- STM32Cube MCU and MPU packages specific to each STM32 series with drivers (HAL, low-layer, etc.), middleware, and lots of example code used in a wide variety of real-world use cases
- STM32Cube expansion packages for application-oriented solutions.

1.2 How does this software complement STM32Cube?

This software is based on the STM32CubeHAL hardware abstraction layer for the STM32 microcontroller. The package extends STM32Cube by providing a board support package (BSP) for the X-NUCLEO-IDB05A2 and X-NUCLEO-BNRG2A1 expansion boards, and the middleware Bluetooth Mesh library.

The drivers abstract low-level details of the hardware and allow the middleware components and applications to access data in a hardware-independent fashion.

The package also includes a sample lighting application that the developer can use to start experimenting with the Mesh library code. To this aim, mobile apps for Android and iOS are available on the respective stores letting you provision, unprovision, create groups and control nodes in the Mesh network using your own BLE enabled smartphone.

Revision history

Table 1. Document revision history

Date	Version	Changes
20-Jun-2018	1	Initial release.
09-Apr-2020	2	Added X-NUCLEO-BNRG2A1 expansion board and NUCLEO-F303RE development board compatibility information.
02-Nov-2020	3	Updated cover page image and product summary table. Added references to X-NUCLEO-IDB05A2.
09-Dec-2021	4	Removed support for the NUCLEO-F303RE development board. Added BlueNRG-M0 compatibility information.

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