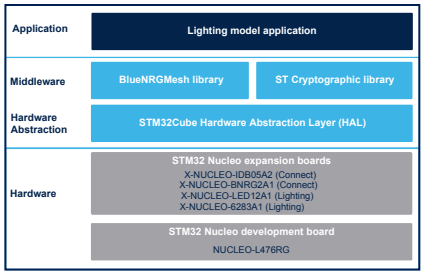
FP-LIT-BLEMESH1

Data brief

STM32Cube function pack for IoT nodes with Bluetooth® Low Energy mesh connectivity and lighting model



STM32 Open Development Environment

STM32 Cube

Product summary	
STM32Cube function pack for IoT nodes with Bluetooth® Low Energy mesh connectivity and lighting model	FP-LIT-BLEMESH1
Bluetooth® Low Energy expansion boards based on the BlueNRG-M0/ BlueNRG-M2SP modules for STM32 Nucleo	X-NUCLEO-IDB05A2/X-NUCLEO-BNRG2A1
LED driver expansion board based on LED1202 device for STM32 Nucleo	X-NUCLEO-LED12A1
STM32 Nucleo-64 development board with STM32L476RG MCU	NUCLEO-L476RG
6-channel ambient light sensor, with flicker extraction expansion board based on VD6283 for STM32 Nucleo	X-NUCLEO-6283A1
Applications	Industrial Equipment Wireless Connectivity

Features

- Complete software to build a mesh network with Bluetooth® Low Energy nodes supporting the Bluetooth® mesh lighting model, defined in Bluetooth® mesh specification V1.0.1
- Hue, saturation, and lightness (HSL) values set by the STBLEMesh Android and iOS app using the lighting model or from Ambient Light Sensor on X-NUCLEO-6283A1, changes the RGB values of the X-NUCLEO-LED12A1 LED expansion board connected to a NUCLEO-L476RG
- Compatible with BLE-enabled smartphones to monitor and control multiple Bluetooth® Low Energy nodes, using the proxy protocol and legacy Bluetooth® Low Energy GATT connectivity
- Two-layer security, thanks to the 128-bit AES CCM encryption and 256-bit ECDH protocol, ensuring protection from multiple attacks, including Replay, Bit-Flipping, Eavesdropping, Man-in-the-Middle, and Trashcan
- Sample implementation available on:
  - the X-NUCLEO-IDB05A2, X-NUCLEO-LED12A1 and X-NUCLEO-6283A1 expansion boards connected to a NUCLEO-L476RG development board
  - the X-NUCLEO-BNRG2A1, X-NUCLEO-LED12A1 and X-NUCLEO-6283A1 expansion boards connected to a NUCLEO-L476RG development board
- Easy portability across different MCU families, thanks to STM32Cube
- Free, user-friendly license terms

Description

FP-LIT-BLEMESH1 is an STM32Cube function pack, which lets you connect Bluetooth® Low Energy nodes to a smartphone via Bluetooth® Low Energy, through a suitable Android™ or iOS™ application or use the Ambient Light Sensor on X-NUCLEO-6283A1 to set the HSL values and send the data to the lighting hardware using the Bluetooth® Low Energy mesh lighting model.

The software lets you easily create your own application for extending Bluetooth® mesh networks (by offering a ready-to-use mesh core library), a complete set of compatible APIs, and a lighting demo application running on either X-NUCLEO-IDB05A2 or X-NUCLEO-BNRG2A1, X-NUCLEO-LED12A1 and X-NUCLEO-6283A1 expansion boards connected to a NUCLEO-L476RG development board.

The software runs on the STM32 microcontroller and includes all the necessary drivers to recognize the devices on the STM32 Nucleo development board and the expansion boards.

1 Detailed description

1.1 What can you do with STM32Cube function packs?

STM32Cube function packs leverage the modularity and interoperability of STM32 Nucleo and X-NUCLEO boards together with STM32Cube and X-CUBE software to create function examples for some of the most common use cases of different application technologies.

These software function packs are designed to exploit the underlying STM32 ODE hardware and software components as much as possible to best satisfy the requirements of final user applications.

Moreover, function packs may include additional libraries and frameworks that are not present in the original X-CUBE packages, thus enabling new functionalities allowing real and usable system for developers.

1.2 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.

1.3 How does this function pack complement STM32Cube?

The proposed software is based on the STM32CubeHAL, which is the hardware abstraction layer for the STM32 microcontroller. The package extends STM32Cube by providing a Bluetooth® Low Energy mesh library.

The package also includes a sample lighting model application that the developer can use to start experimenting with the mesh library code.

The STBLEMesh app lets you provision, unprovision, create groups, and set the HSL values of the connected node using the lighting model.

Revision history

Table 1. **Document revision history**

Date	Revision	Changes
24-Feb-2022	1	Initial release.
21-Jun-2023	2	Added reference to X-NUCLEO-6283A1. Updated Cover image, Product summary, Features and Description.

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