

## Bluetooth low energy software expansion for STM32Cube

Application	Sample applications
Middleware	BLE, Low Power Manager
Hardware Abstraction	STM32Cube Hardware Abstraction Layer (HAL)
Hardware	STM32 Nucleo expansion boards X-NUCLEO-IDB05A2 (Connect) STM32 Nucleo development board



### Features

- Complete middleware to build Bluetooth low energy applications using [BlueNRG-MS/BlueNRG-M0](#) devices
- Easy portability across different MCU families, thanks to STM32Cube
- Numerous examples to aid understanding:
  - Support for Standard Profiles (Peripheral and Central)
  - Support for Apple Notification Center Service (ANCS)
- Package compatible with [STM32CubeMX](#), can be downloaded from and installed directly into [STM32CubeMX](#)
- Free, user-friendly license terms

### Description

The [X-CUBE-BLE1](#) expansion software package for [STM32Cube](#) runs on the STM32 and includes drivers for [BlueNRG-MS/BlueNRG-M0](#) Bluetooth low energy devices.

The expansion is built on [STM32Cube](#) software technology to ease portability across different STM32 microcontrollers.

The software comes with sample implementations of the drivers running on the [X-NUCLEO-IDB05A2](#) expansion board, when connected to a [NUCLEO-L053R8](#), [NUCLEO-L476RG](#), [NUCLEO-F401RE](#) or [NUCLEO-F411RE](#) development board.

Product summary	
Bluetooth low energy software expansion for STM32Cube	<a href="#">X-CUBE-BLE1</a>
Bluetooth low energy expansion board based on the BlueNRG-M0 module for STM32 Nucleo	<a href="#">X-NUCLEO-IDB05A2</a>
Bluetooth low energy network processor supporting Bluetooth 4.2 core specification	<a href="#">BlueNRG-MS/BlueNRG-M0</a>
STM32 Nucleo-64 development board with STM32F401RE/ STM32F411RE/ STM32L053R8/ STM32L476RG MCU	<a href="#">NUCLEO-F401RE/NUCLEO-F411RE/NUCLEO-L053R8/NUCLEO-L476RG</a>
Applications	Cloud Connectivity Wearable Wireless Connectivity

# 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?

The proposed software is based on the STM32CubeHAL, the hardware abstraction layer for the STM32 microcontroller. The package extends **STM32Cube** by providing a board support package (BSP) for the **BlueNRG-MS/BlueNRG-M0** expansion boards and some middleware components for communication with other Bluetooth LE devices.

**BlueNRG-MS** and **BlueNRG-M0** are very low power Bluetooth low energy (BLE) single-mode network processors, compliant with Bluetooth specifications core 4.2.

The drivers abstract low-level details of the hardware and allow the middleware components and applications to access the **BlueNRG-MS/BlueNRG-M0** device in a hardware-independent fashion.

The software implements low power optimizations to allow system power consumption of a few micro-amps.

The package includes different sample applications and provides support for many standard profiles and for Apple Notification Center Service (ANCS).

Slave profiles (peripheral role):

- Alert Notification Service
- Blood Pressure Service
- Find Me Target
- Glucose Service
- Health Thermometer Service
- Heart Rate Service
- Human Interface Device Service (not supported by **NUCLEO-L053R8**)
- Proximity Reporter
- Time Server

Master profiles (central role):

- Alert Notification Client
- Blood Pressure Collector
- Find Me Locator
- Glucose Collector
- Health Thermometer Collector
- Heart Rate Collector
- Time Client



The package is compatible with [STM32CubeMX](#). It can be downloaded from and installed directly into [STM32CubeMX](#), as detailed in [UM1718](#) (freely available on [www.st.com](#)).

## Revision history

**Table 1. Document revision history**

Date	Rev	Changes
19-Nov-2014	1	First release.
26-Jan-2015	2	Modified the document title, Features and Description on the cover page. Added the Detailed description section.
30-Jun-2015	3	Updated overall system architecture on the cover page.
16-Nov-2015	4	Updated cover page image and description.
26-Jan-2017	5	Updated cover page Features and Detailed description.
14-Feb-2017	6	Updated Detailed description .
20-Dec-2018	7	Updated cover page image, features and description. Added product summary table on the cover page. Updated Section 1.2 How does this software complement STM32Cube?.
22-Apr-2020	8	Updated cover page image, product summary table and <a href="#">Section 1.1 What is STM32Cube?</a> . Added X-NUCLEO-IDB05A2 expansion board and BlueNRG-M0 module compatibility information.

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