

STM32Cube function pack for creating a BLE star network connected via Wi-Fi to IBM Watson IoT cloud

Application	BLESTAR1	
Middleware	BLE	Wi-Fi
Hardware Abstraction	STM32Cube Hardware Abstraction Layer (HAL)	
Hardware	STM32 Nucleo expansion boards X-NUCLEO-IDB05A1 (Connect) X-NUCLEO-IDW01M1 (Connect)	STM32 Nucleo expansion boards X-NUCLEO-IDB05A1 (Connect)
	STM32 Nucleo development board	B-L475E-IOT01A Discovery kit



Features

- Complete firmware to build applications based on BLE and Wi-Fi connectivity, allowing **STM32 Nucleo** boards to connect with both BLE-enabled smartphones and tablets, and cloud-based services
- Integrated MQTT protocol middleware for easy access to Watson IoT cloud services provided by IBM
- Sample application for both **NUCLEO-F401RE** (equipped with **X-NUCLEO-IDB05A1** and **X-NUCLEO-IDW01M1** expansion boards) and **B-L475E-IOT01A** Discovery Kit (equipped with **X-NUCLEO-IDB05A1**) implementing a simultaneous BLE master/slave and Wi-Fi gateway device
- Compatible with BLE sensor nodes implemented using the **FP-SNS-ALLMEMS1**, **FP-SNS-FLIGHT1** and **FP-SNS-MOTENV1** function packs
- Compatible with the **SensNet** application for Android™/iOS™ devices to control the BLE star network and to display the data sent by the slave nodes
- Easy portability across different MCU families, thanks to **STM32Cube**
- Free, user-friendly license terms

Description

FP-NET-BLESTAR1 is an **STM32Cube** function pack which lets you connect your IoT node in a BLE sensor network to the Internet via a Wi-Fi network. Sensor data from a device in the BLE star network can be transparently sent to the IBM Watson IoT cloud platform and visualized on a client connected to the cloud.

The software, together with the suggested combination of STM32 and ST devices, can be used, for example, to develop smart home or remote monitoring applications.

The included sample application configures either an **STM32 Nucleo** board (equipped with the Wi-Fi and BLE expansion boards) or an **STM32L4 Discovery Board** as a BLE master connected to several BLE peripherals, or nodes, in a star network topology. The BLE central device can simultaneously connect to a Wi-Fi network and export data from other nodes to the IBM Watson IoT cloud platform.

The BLE master also acts as a slave by accepting connection with a BLE client (typically an Android™/iOS™ device) which can be used to monitor and control the BLE network.

Product summary	
STM32Cube function pack for creating a BLE star network connected via Wi-Fi to IBM Watson IoT cloud	FP-NET-BLESTAR1
Bluetooth low energy expansion board based on SPBTLE-RF module for STM32 Nucleo	X-NUCLEO-IDB05A1
STM32L4 Discovery kit IoT node	B-L475E-IOT01A

1 Detailed description

1.1 What can you do with STM32Cube function packs?

The [STM32Cube](#) function packs leverage the modularity and interoperability of STM32 Nucleo and X-NUCLEO boards, and STM32Cube and X-CUBE software, to create function examples, embodying some of the most common use cases, for each application area.

These software function packs are designed to exploit as much as possible the underlying [STM32 ODE](#) hardware and software components to best fit the requirements of final users' applications.

Moreover, function packs may include additional libraries and frameworks which do not present the original X-CUBE packages, thus enabling new functionalities and creating a real and usable system for developers.

1.2 What is STM32Cube?

[STM32Cube™](#) is an STMicroelectronics initiative that helps you reduce development effort, time and cost. STM32Cube covers the STM32 portfolio.

STM32Cube version 1.x includes:

- STM32CubeMX, a graphical software configuration tool that allows the generation of C initialization code using graphical wizards.
- A comprehensive embedded software platform specific to each series (such as the STM32CubeF4 for the STM32F4 series), which includes:
 - the STM32Cube HAL embedded abstraction-layer software, ensuring maximized portability across the STM32 portfolio
 - a consistent set of middleware components such as RTOS, USB, TCP/IP and graphics
 - all embedded software utilities with a full set of examples

1.3 How does this software complement STM32Cube?

This software is based on the STM32CubeHAL hardware abstraction layer for the STM32 microcontroller, and extends STM32Cube with a board support package (BSP) for the BLE and the Wi-Fi expansion boards.

The drivers abstract low-level hardware details so middleware components and applications can access and control the BLE module ([SPBTLE-RF](#)) and the Wi-Fi module ([SPWF01SA](#)). The driver for the Wi-Fi ([ISM43362-M3G-L44](#) by Inventek Systems) mounted on the B-L475E-IOT01A Discovery Kit IoT node is also provided.

An open source implementation of the MQTT protocol (<http://www.eclipse.org/paho/>) ported to STM32 is integrated in the package middleware so the STM32-based system can connect with IBM Watson IoT cloud services. MQTT is a lightweight messaging protocol with a small code footprint and low power and bandwidth usage. It is particularly suitable for sensor data telemetry and implementation in embedded systems. More information regarding the MQTT protocol is available at www.mqtt.org.

Revision history

Table 1. Document revision history

Date	Version	Changes
22-Apr-2016	1	Initial release.
16-May-2016	2	Minor text edits.
18-Jan-2017	3	Changed IBM cloud name to Watson IoT.
18-Oct-2017	4	Updated cover image, features and description.
19-Jul-2018	5	Updated cover page image, features and description.

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