# Sub-1 GHz RF communication software expansion for STM32Cube

Application	Applications (Border Router, UDP Sender, UDP Receiver, P2P, wM-Bus)	
Middleware	6LoWPAN	wM-Bus	
Hardware Abstraction	STM32Cube Hardware Abstraction Layer (HAL)	
Hardware	STM32 Nucleo expansion boards X-NUCLEO-IDS01A4/X-NUCLEO-IDS01A5 (Connect) X-NUCLEO-S2868A2/X-NUCLEO-S2915A1 (Connect)	
	STM32 Nucleo development board	
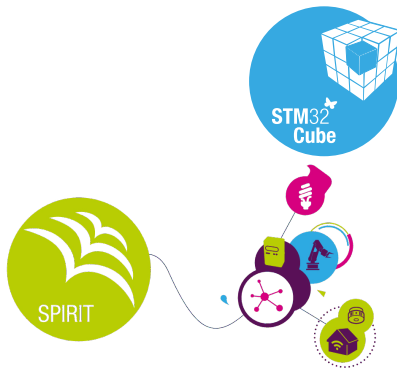
Features

- Firmware package to start developing using SPIRIT1 or S2-LP expansion boards
- Complete middleware to build wireless meter bus (wM-Bus) applications using the wM-Bus library (X-NUCLEO-S2868A2 and X-NUCLEO-IDS01A4 only)
- Middleware library with Contiki OS and Contiki 6LoWPAN protocol stack 3.x (NUCLEO-F401RE and NUCLEO-L152RE only)
- Point-to-point communication sample application for simple buffer transmission and acknowledgement implementation
- Low-power optimizations for the STM32 MCU family
- Easy portability across different MCU families thanks to STM32Cube
- PC-based application (Windows®) for wM-Bus to log meter data
- Free user-friendly license terms
- Sample implementation available on X-NUCLEO-IDS01A4 or X-NUCLEO-IDS01A5 and X-NUCLEO-S2868A2 or X-NUCLEO-S2915A1 expansion boards when connected to NUCLEO-F401RE, NUCLEO-L053R8 or NUCLEO-L152RE boards

Description

X-CUBE-SUBG1 is an expansion software package for STM32Cube. The software runs on the STM32 and includes drivers that recognize the Sub-1 GHz RF communication for SPIRIT1 SPSGRF modules and S2-LP.

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

The software comes with sample applications of P2P, wM-Bus and 6LoWPAN communication protocols, running on a compatible SPIRIT1 or S2-LP expansion board when connected to a compatible STM32 Nucleo development board.

Product summary	
Sub-1 GHz RF communication software expansion for STM32Cube	X-CUBE-SUBG1
Sub-1 GHz RF expansion board based on the SPSGRF-868 module for STM32 Nucleo	X-NUCLEO-IDS01A4
Sub-1 GHz RF expansion board based on the SPSGRF-915 module for STM32 Nucleo	X-NUCLEO-IDS01A5
Sub-1 GHz 868 MHz RF expansion board based on S2-LP radio for STM32 Nucleo	X-NUCLEO-S2868A2
Sub-1 GHz 915 MHz RF expansion board based on S2-LP radio for STM32 Nucleo	X-NUCLEO-S2915A1
Applications	Telecom Infrastructure
	Climate Control
	Industrial Tools
	BLE Connected Nodes
	ISM Radio SubGHz

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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, the hardware abstraction layer for the STM32 microcontroller. The package extends STM32Cube by providing a board support package (BSP) for the compatible expansion boards and some middleware components for point-to-point (P2P), wM-Bus and 6LoWPAN communication protocols.

The drivers abstract low-level details of the hardware and allow the middleware components and applications to access the SPIRIT1 and S2-LP RF functions in a hardware-independent manner. The package also includes sample applications (that the developer can use to start experimenting with the code) for:

- point-to-point simple communication between two nodes
- standalone wM-Bus to design an automatic meter reading system

The wM-Bus firmware sample can be used to develop the following applications:

- electricity meter
- gas meter
- water meter
- heat meter
- automatic meter reading systems

Revision history

Table 1. Document revision history

Date	Version	Changes
30-Apr-2015	1	Initial release.
28-May-2015	2	Updated cover page image.
09-June-2017	3	Updated cover page image and detailed description.
11-May-2018	4	Updated cover page image. Added X-NUCLEO-S2868A1 compatibility information.
09-Dec-2019	5	Updated cover page image and Section 1.1 What is STM32Cube?. Added X-NUCLEO-S2868A2 and X-NUCLEO-S2915A1 compatibility information.

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