

## STM32 LoRa<sup>®</sup> software expansion for STM32Cube

Data brief

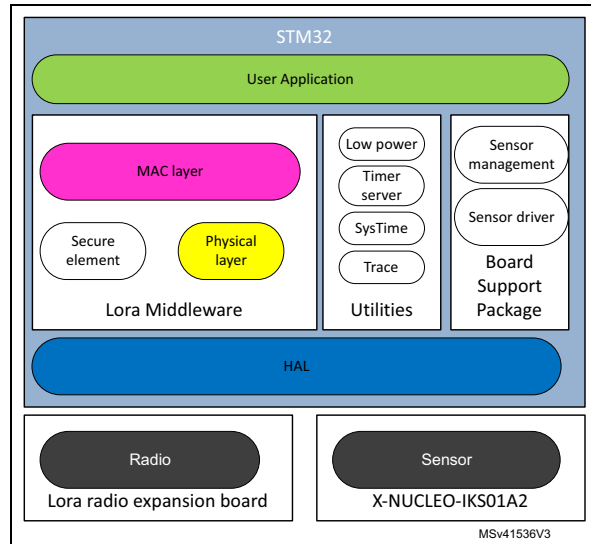
### Features

- Compliant with the LoRa Alliance™ specification protocol, named LoRaWAN™ version V1.0.3 March 2018
- Bidirectional end-devices with class A, class B and class C protocol support
- EU 868 MHz ISM band ETSI (European telecommunications standards institute) compliant
- EU 433 MHz ISM band ETSI compliant
- US 915 MHz ISM band FCC (federal communications commission) compliant
- End-device activation either through OTAA (over-the-air activation) or ABP (activation-by-personalization)
- Adaptive data rate support
- LoRaWAN™ test application for certification tests included
- Low-power optimized
- Full STM32 portfolio compatibility
- Compliant with the CMWX1ZZABZ-091 LoRa<sup>®</sup> module from Murata
- Compliant with the WM-SG-SM-42 LoRa<sup>®</sup> module from USI
- Compliant with the RHF0M003 modem from RiSiNGHF<sup>®</sup>
- Easy secure element integration

### Description

LoRa<sup>®</sup> is a long range wireless area network allowing low-power sensors to report over ranges of up to a dozen kilometers.

The I-CUBE-LRWAN Expansion Package consists of a set of libraries and application examples for STM32L0, STM32L1 and STM32L4 Series microcontrollers acting as end-devices.



This package supports the SX1276MB1MAS, SX1276MB1LAS, SX1272MB2DAS, and the new radio generation sx126x mounted on SX1262DVK1DAS, SX1262DVK1CAS and SX1262DVK1BAS LoRa<sup>®</sup> radio expansion boards, provided by SEMTECH.

This package includes an application running on NUCLEO-L053R8, NUCLEO-L152RE, NUCLEO-L476RG and B-L072Z-LRWAN1 Discovery kits embedding the CMWX1ZZABZ-091 LoRa<sup>®</sup> module from Murata. It also supports a USI<sup>®</sup> LoRaWAN™ technology module through the I-NUCLEO-LRWAN1 expansion board and the RiSiNGHF<sup>®</sup> modem RHF0M003 mounted on LRWAN-NS1 expansion board available in P-NUCLEO-LRWAN3 (coming soon). The application reads sensor data from the X-NUCLEO-IKS01A2 expansion board and sends the sensor data to the LoRa<sup>®</sup> network in class A. For further details about the components of the LoRa<sup>®</sup> middleware library, refer to the *STM32 LoRa<sup>®</sup> software expansion for STM32Cube User manual (UM2073)*.



# Package naming convention

Table 1 shows the I-CUBE-LRWAN package naming convention.

**Table 1. I-CUBE-LRWAN package naming convention**

Package	1 <sup>st</sup> digit	2 <sup>nd</sup> digit	3 <sup>rd</sup> digit
I-CUBE-LRWAN package x.y.z	Major feature support: x = 1: LoRa application only	Supported version of the LoRa stack: – y=0:LoRa stack v1.0.1 – y=1:LoRa stack v1.0.2 – y=2:LoRa stack v1.0.3 – y=3:LoRa stack v1.1	z: FW/SW changes based on a defined package (z = 0,.....,9).

## Ordering information

I-CUBE-LRWAN is available for free download from the [www.st.com](http://www.st.com) website.

## License

The I-CUBE-LRWAN Expansion Package for STM32Cube runs on STM32 32-bit microcontrollers, based on the Arm<sup>®(a)</sup> Cortex<sup>®</sup>-M processor.



The software components provided in this package come with different license schemes as shown in Table 2.

For further details about licenses, refer to the license agreement of each component.

**Table 2. Software component license agreements**

Software component	Owner	License
Cortex <sup>®</sup> -M CMSIS	Arm <sup>®</sup>	Open source BSD
HAL STM32 L0/L1/L4	ST	Open source BSD
LoRaWAN <sup>™</sup> stack	SEMTECH	Open source BSD
Project examples	ST	Ultimate Liberty (source release)

a. Arm is a registered trademark of Arm Limited (or its subsidiaries) in the US and/or elsewhere.

## Revision history

**Table 3. Document revision history**

Date	Revision	Changes
28-Jun-2016	1	Initial release.
29-Aug-2016	2	Updated <i>Features</i> : – Updated compliance of LoRaWAN version from V1.0 January 2015 to V1.0.1 February 2016 – Specified “V1.0” for class A certification.
10-Nov-2016	3	Updated <i>Features</i> .
22-Dec-2016	4	Updated <i>Features</i> and reference to the CMWX1ZZABZ-xxx LoRa module from Murata
7-Feb-2017	5	Updated <i>Features</i> and reference to the CMWX1ZZABZ-091 LoRa module from Murata
16-Mar-2017	6	Updated <i>Features</i> and <i>Description</i> to introduce support of the USI LoRaWAN technology module
14-Dec-2017	7	Updated <i>Features</i> and <i>Description</i> to introduce support of the RISINGHF modem RHF0M003
4-Jul-2018	8	Updated <i>Features</i> , <i>Description</i> and diagram for new version with class B protocol, secure element and new expansion boards

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