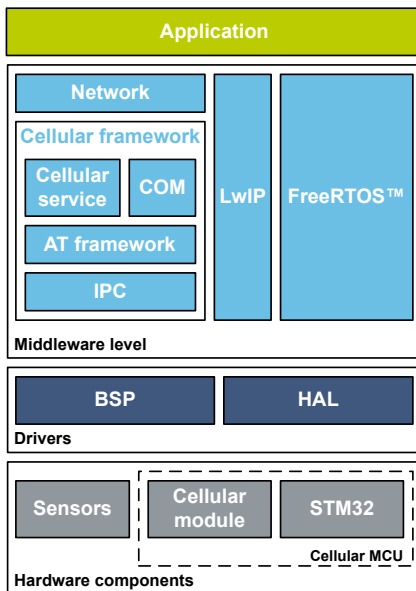


Cellular connectivity software expansion for STM32Cube



Features

- STMicroelectronics framework for devices based on LPWAN cellular networks
- Compatible with the P-L496G-CELL01 and P-L496G-CELL02 cellular-to-cloud packs with optional X-NUCLEO-IKS01A2 motion-MEMS- and environment-sensor board
- Compatible with the B-L475E-IOT01A IoT Discovery board with X-NUCLEO-STMODA1 (ARDUINO® / STMod+ adapter) and MB1329 (STMicroelectronics modem board with the BG96 Quectel module)
- Compatible with the B-L475E-IOT01A IoT Discovery board with X-NUCLEO-STMODA1 (ARDUINO® / STMod+ adapter) and GM01Q-STMOD (Sequans® modem board with the GM01Q Sequans® module, referenced as B-CELL-GM01Q in STMicroelectronics)
- Compatible with the 32L496GDISCOVERY Discovery board or Discovery host board contained in P-L496G-CELL01 or P-L496G-CELL02, and GM01Q-STMOD modem board
- FreeRTOS™ pre-integration for easy integration in a complete platform
- Easy portability across different STM32 microcontroller series thanks to the use of STM32Cube and STM32CubeMX
- BSD-like socket APIs for data plane
- TCP-UDP/IP connectivity with IP stack on host or modem
- Flexible and modular SW architecture for the easy integration of other modems
- Partial GSMA TS34/35 compliance
- PC terminal boot menu for device FW customization: API key, APN, band
- Connected-application examples

Product status link

[X-CUBE-CELLULAR](#)



Description

X-CUBE-CELLULAR consists of a set of libraries and application examples for STM32L4 Series MCUs acting as hosts for cellular connectivity applications.

X-CUBE-CELLULAR runs on the STM32L496AGI6-based low-power Discovery board, driving an STMod+ compatible cellular-modem add-on board.

The P-L496G-CELL01 2G/3G cellular-to-cloud add-on board features the UG96 modem from Quectel (2G/3G). The P-L496G-CELL02 LTE cellular-to-cloud add-on board features the BG96 modem from Quectel (LTE Cat M1/NB/2G fallback). Both modem add-on boards embed an EEPROM for saving the modem system configuration, a SIM socket, and a soldered embedded SIM in the MFF2 format, provisioned with the EMnify MVNO profile.

X-CUBE-CELLULAR runs on the STM32L475VGT6-based IoT node Discovery board, driving a cellular-modem add-on board (based on the BG96 Quectel or GM01Q Sequans® module) through an ARDUINO® / STMod+ adapter.

The X-CUBE-CELLULAR Expansion Package enables users to connect to the Internet through the cellular network by using the provided baseline, and to accelerate their end-product design cycle.

1 General information

The X-CUBE-CELLULAR Expansion Package runs on STM32 microcontrollers based on Arm® cores.

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



1.1 Ordering information

X-CUBE-CELLULAR is available for free download from the www.st.com website.

1.2 What is STM32Cube?

STM32Cube is an STMicroelectronics original initiative to significantly improve designer's productivity by reducing development effort, time and cost. STM32Cube covers the whole STM32 portfolio.

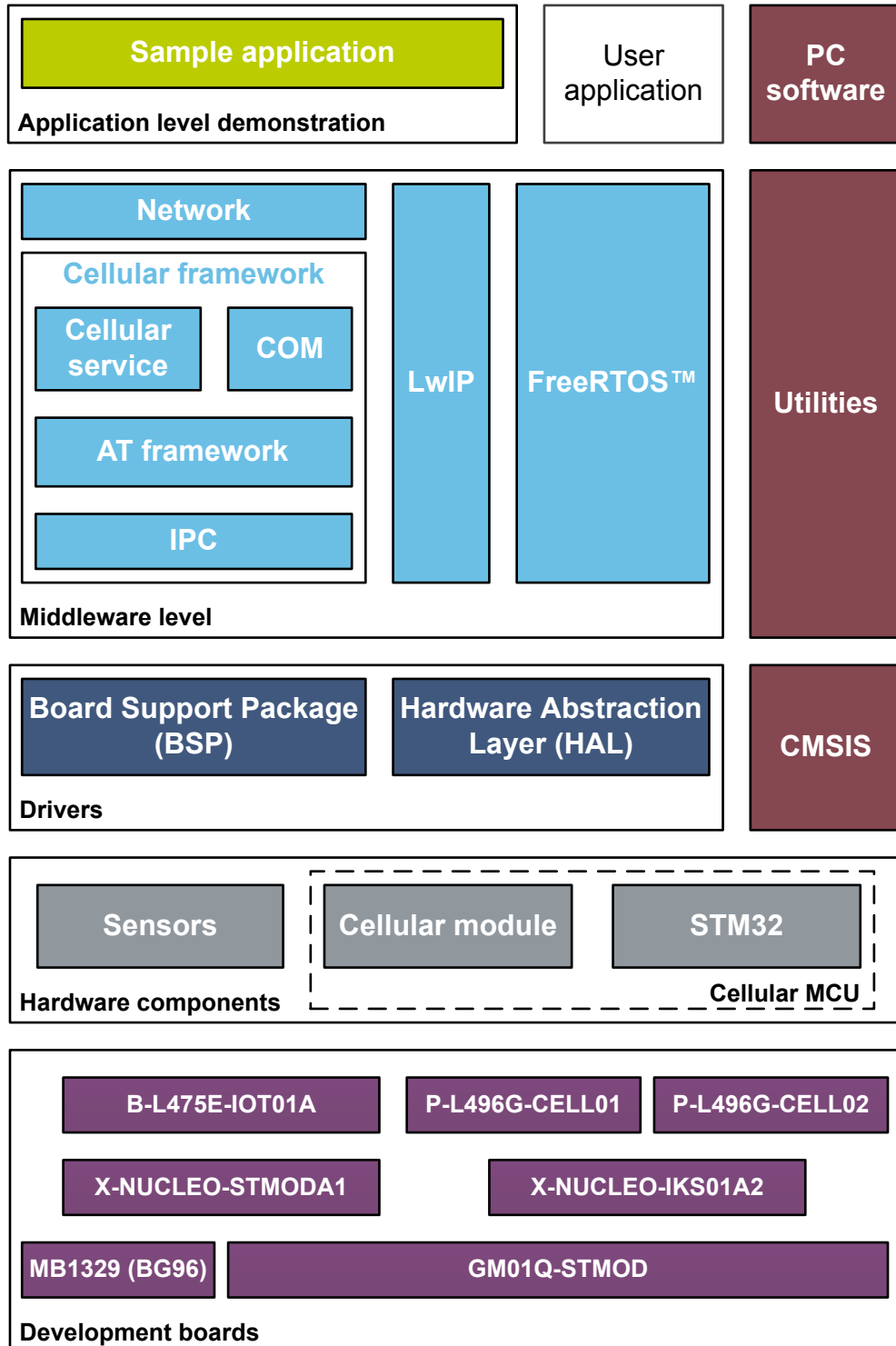
STM32Cube includes:

- A set of user-friendly software development tools to cover project development from the conception to the realization, among which:
 - STM32CubeMX, a graphical software configuration tool that allows the automatic generation of C initialization code using graphical wizards
 - STM32CubeIDE, an all-in-one development tool with peripheral configuration, code generation, code compilation, and debug features
 - STM32CubeProgrammer (STM32CubeProg), a programming tool available in graphical and command-line versions
 - STM32CubeMonitor (STM32CubeMonitor, STM32CubeMonPwr, STM32CubeMonRF, STM32CubeMonUCPD) powerful monitoring tools to fine-tune the behavior and performance of STM32 applications in real-time
- STM32Cube MCU & MPU Packages, comprehensive embedded-software platforms specific to each microcontroller and microprocessor series (such as STM32CubeL4 for the STM32L4 Series), which include:
 - STM32Cube hardware abstraction layer (HAL), ensuring maximized portability across the STM32 portfolio
 - STM32Cube low-layer APIs, ensuring the best performance and footprints with a high degree of user control over the HW
 - A consistent set of middleware components such as FAT file system, RTOS, USB Host and Device, TCP/IP, Touch library, and Graphics
 - All embedded software utilities with full sets of peripheral and applicative examples
- STM32Cube Expansion Packages, which contain embedded software components that complement the functionalities of the STM32Cube MCU & MPU Packages with:
 - Middleware extensions and applicative layers
 - Examples running on some specific STMicroelectronics development boards

2 Software architecture

The top-level architecture of the X-CUBE-CELLULAR Expansion Package is shown in Figure 1.

Figure 1. X-CUBE-CELLULAR architecture



3 License

X-CUBE-CELLULAR is delivered under the *Mix Ultimate Liberty+OSS+3rd-party V1* software license agreement (SLA0048).

The software components provided in this package come with different license schemes as shown in Table 1.

Table 1. Software component license agreements

Software component	Owner	License
Board Support Package (BSP)	STMicroelectronics	BSD-3-Clause
Cortex [®] -M CMSIS	Arm limited	Apache License 2.0
FreeRTOS [™]	Amazon Web Services, Inc.	MIT
mbedTLS	Arm limited	Apache License 2.0
MQTT-C	Liam Bindle	MIT
HAL STM32L4	STMicroelectronics	BSD-3-Clause
LwIP	2001-2004 Swedish Institute of Computer Science	BSD-3-Clause
P-L496G-CELL01, P-L496G-CELL02, B-L475E-IOT01A, 32L496GDISCOVERY, and X-NUCLEO-IKS01A2 BSP drivers	STMicroelectronics	BSD-3-Clause
STM32L4xx CMSIS	STMicroelectronics	BSD-3-Clause
Cellular framework	STMicroelectronics	Ultimate Liberty (source release)
Network library	STMicroelectronics	Ultimate Liberty (source release)
Project examples	STMicroelectronics	Ultimate Liberty (source release)

Revision history

Table 2. Document revision history

Date	Version	Changes
22-Jun-2018	1	Initial release.
2-Nov-2018	2	Extended support to B-L475E-IOT01A with X-NUCLEO-STMODA1 and MB1329.
12-Feb-2019	3	Extended support to B-L475E-IOT01A with X-NUCLEO-STMODA1 and GM01Q-STMOD, and 32L496GDISCOVERY with GM01Q-STMOD. Updated <i>Table 1</i> .
22-May-2019	4	Updated STM32Cube description in What is STM32Cube?
11-Oct-2019	5	Added <i>Network</i> middleware into the cover picture, <i>Figure 1</i> , and <i>Table 1</i> .
21-Apr-2020	6	Updated <i>What is STM32Cube?</i> and <i>Software component license agreements</i> .

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