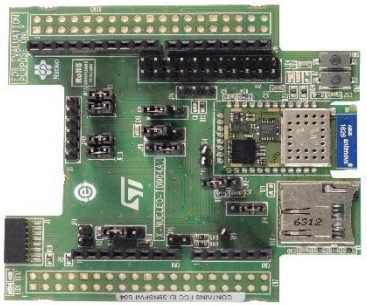
Quick Start Guide

Wi-Fi expansion board based on SPWF04SA module for STM32 Nucleo (X-NUCLEO-IDW04A1)



Version 1.0 (March 3, 2017)

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Quick Start Guide Contents

Wi-Fi expansion board
Hardware overview

X-NUCLEO-IDW04A1 Hardware description

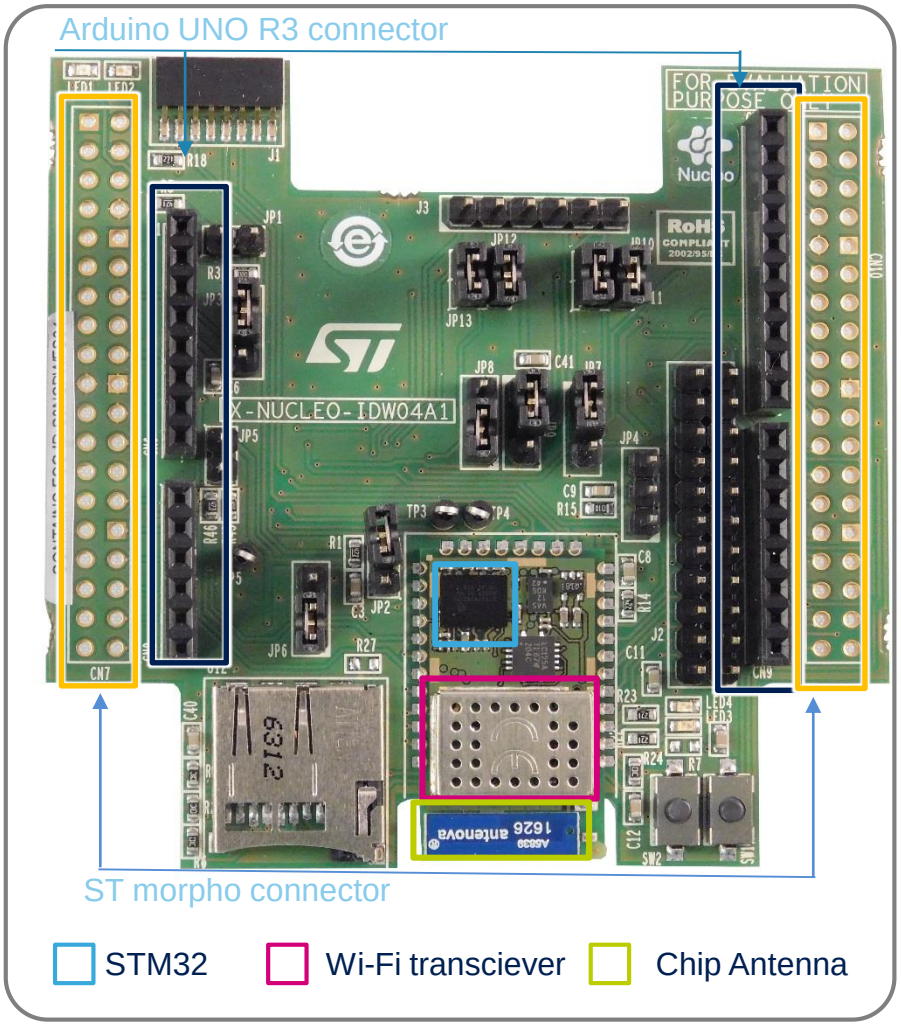
- The X-NUCLEO-IDW04A1 is a Wi-Fi evaluation board based on the SPWF04SA module, which expand the STM32 Nucleo boards. The CE, IC and FCC certified SPWF04SA module has an embedded STM32 MCU, a low-power Wi-Fi b/g/n SoC with integrated power amplifier and power management and an SMD antenna. The SPWF04SA module communicates with the STM32 Nucleo developer board host microcontroller though an USART link. The SPI interface can also be used for the same purpose.

Main Features

- The X-NUCLEO-IDW04A1 hosts FCC, IC and CE certified SPWF04SA module (FCC ID: S9NSPWFS04, IC ID: 8976C-SPWFS04 and ETSI compliant)
- Compatible with STM32 Nucleo boards
- Equipped both with Arduino UNO R3 connectors and ST morpho connector
- Scalable solution; it can cascade multiple boards for larger systems
- Free development firmware library and examples, compatible with STM32 Cube

Key product on board

SPWF04SA: **ST Stand-alone and Serial-to-Wi-Fi Modules, 802.11 b/g/n compliant**



Latest info available at www.st.com
X-NUCLEO-IDW04A1

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Radio certification

- **Formal notices required by the U.S. Federal Communications Commission (FCC).** Any changes or modifications to this equipment not expressly approved by STMicroelectronics may cause harmful interference and void the user's authority to operate this equipment. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including any interference that may cause undesired operation. This device uses, generates and radiates radio frequency energy. The radio frequency energy produced by this device is well below the maximum exposure limit established by the Federal Communications Commission (FCC). The X-NUCLEO-IDW04A1 contains the FCC certified SPWF04SA module (FCC ID: S9NSPWFS04).

- **Formal notices required by Industry Canada (IC).**
  - **English**: This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.
  - **French**: Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. 'Exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement. The X-NUCLEO-IDW04A1 contains the FCC certified SPWF04SA module (IC ID: 8976C-SPWFS04)

- **Formal notices required by the ETSI (CE).** This module complies with the following European EMI/EMC and safety directives and standards:
  - EN 300 328 V1.9.1:2015
  - EN 301 489-1 V1.9.2:2011 + EN 301 489-17 V2.2.1:2012 + EN 301 489-1 V1.8.1:2008
  - EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + A2:2013
  - EN 62479:2010

Wi-Fi expansion board
Software overview

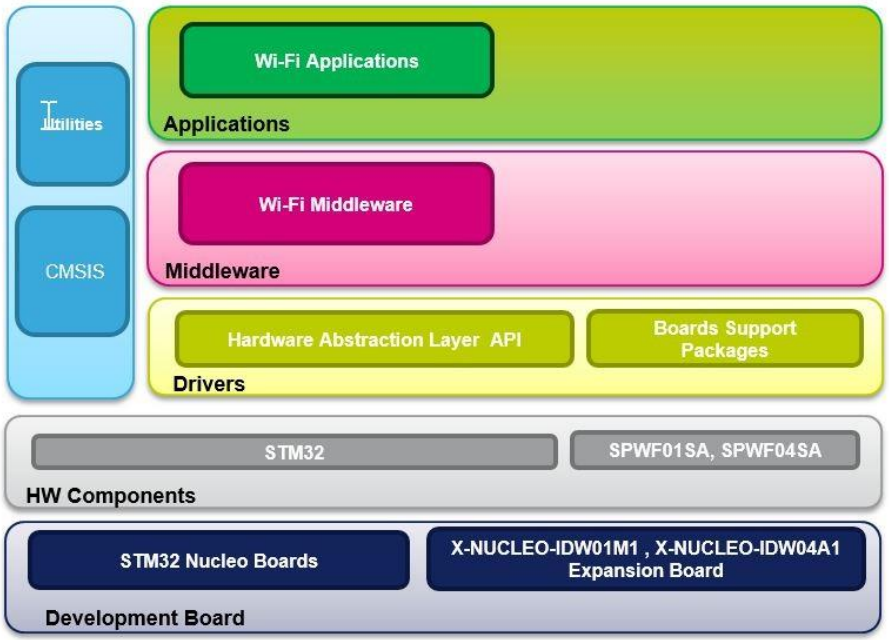
X-CUBE-WIFI1 software description

- X-CUBE-WIFI1 is an expansion software package for STM32Cube. The software runs on STM32 and it can be used for building Wi-Fi applications using the SPWF01SA or SPWF04SA module. It is built on top of STM32Cube software technology that eases portability across different STM32 microcontrollers.
- It is compatible with the NUCLEO-L476RG and the NUCLEO-F401RE when connected to one X-NUCLEO-IDW04A1. The X-CUBE-WIFI1 software comes with examples of implementation.

Key features

- Complete middleware to build applications using the Wi-Fi module SPWF01SA or SPWF04SA
- Easy portability across different MCU families thanks to the STM32Cube
- Easy to use abstract APIs to configure and use SPWF01SA or SPWF04SA
- Sample applications that the developer can use to start experimenting with the code
- Free, user-friendly license terms

Overall system architecture



Latest software available at www.st.com
X-CUBE-WIFI1

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X-NUCLEO-IDW04A1: STM32 Nucleo Wi-Fi expansion board
Hardware and Software overview

Setup & Demo Examples
Documents & Related Resources

STM32 Open Development Environment: Overview

Setup & demo examples

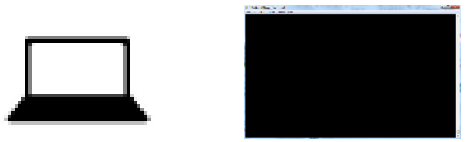
HW prerequisites

- 1x Wi-Fi expansion board (**X-NUCLEO-IDW04A1**)
- 1x STM32 Nucleo development board (**NUCLEO-L476RG** or **NUCLEO-F401RE**)
- 1x USB type A to Mini-B USB cable

NUCLEO-F401RE
NUCLEO-L476RG

Additional requirements:

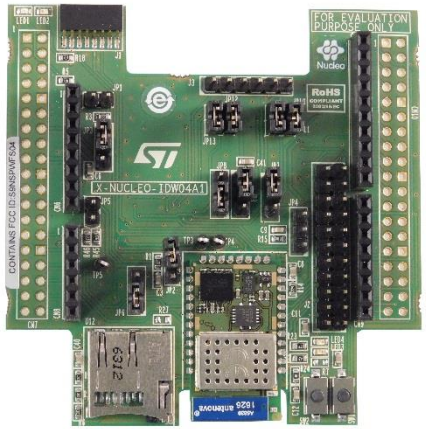
PC (*)



Tera Term
terminal running on PC

Wi-Fi Router

Router with internet
connection



X-NUCLEO-IDW04A1

(*) Microsoft Windows 7 or 8, or above

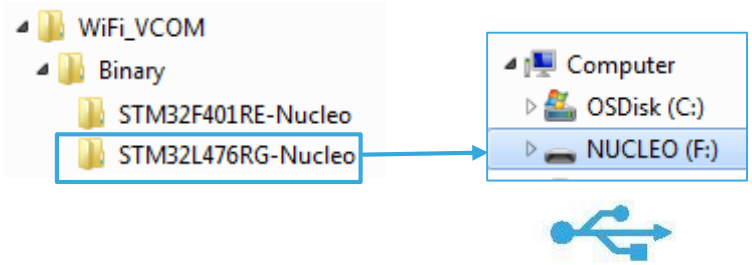
Setup & demo examples
Software prerequisites (1/2)

- **STSW-LINK009**: ST-LINK/V2-1 USB driver
- **STSW-LINK007**: ST-LINK/V2-1 firmware upgrade
- **X-CUBE-WIFI1:** expansion software for STM32Cube
- Copy the .zip file content into the “c:\Program Files (x86)\STMicroelectronics\” folder on your PC
  - The package contains the source code example (Keil, IAR EWARM, System Workbench for STM32) based on NUCLEO-L476RG or NUCLEO-F401RE
- Tera Term Open Source Project (https://ttssh2.osdn.jp/index.html.en)

Setup & demo examples
Software prerequisites (2/2)

- **Please check the firmware version flashed on the X-NUCLEO-IDW04A1 board**
  - In order to check the version, please follow these steps:

1



From **WiFi-VCOM** project, drag and drop Project.bin on Nucleo drive

2 Open Tera Term or any other serial port terminal on the PC connected to the STM32 Nucleo board using the following settings: baud: 115200, Data: 8bit, Parity: None; Stop Bit: 1bit, Flow Ctrl: None

3 Reset the board and type on the terminal AT+S.STS. Visually check the date code for version compare it with the latest SPWF04SA FW version available on www.st.com/wifimodules.
In case the onboard SPWF04 module FW version is not the latest one, please proceed with the update.

- **STSW-WIFI004**
  - The STSW-WIFI004 (*) package provides the up-to-date SPSWF04Sx Wi-Fi Module Firmware
  - Please see the document “X-NUCLEO-IDW04A1-FW upgrading over UART” located in X-CUBE-WIFI/Documentation folder for more details on how to flash the FW to the X-NUCLEO-IDW04A1

(*) Available at www.st.com within Q2 / '17

Start coding in just a few minutes with X-CUBE-WIFI1

1 Go to www.st.com/x-nucleo

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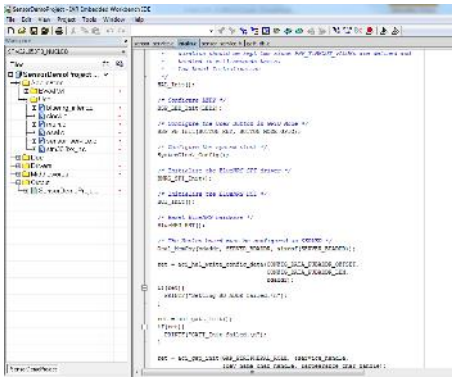
2 Select X-NUCLEO-IDW04A1

3 Download and unpack X-CUBE-WIFI1

X-CUBE-WIFI1 package

- _htmresc
- Documentation ← **Package documentation**
- Drivers ← Wi-Fi USART driver
- Middlewares ← Wi-Fi middleware
- Projects ← **Application examples**
- package.xml
- Release_Notes.html

4 Download and install STM32 Nucleo ST-LINK/V2-1 USB driver STSW-LINK009



6 Modify and build application

KEIL™ Tools by ARM

IAR SYSTEMS

ac6

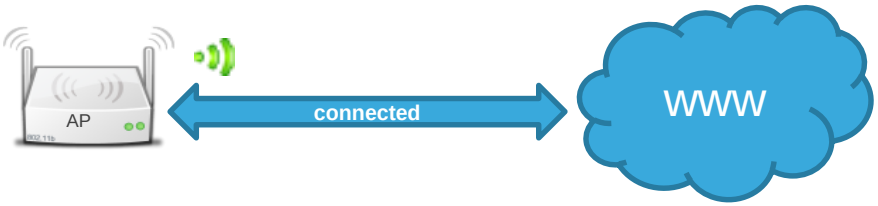
Open STM32 Tools

5 Open project example HTTP_Request and in your toolchain select the project/target configuration.

Evaluate using X-CUBE-WIFI1 (1/4)

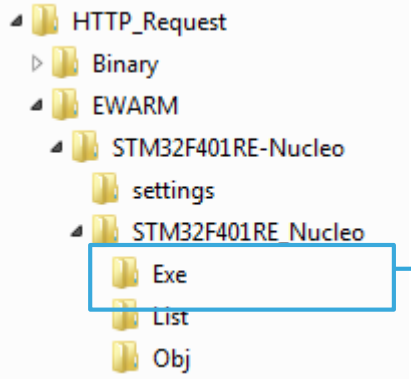
1 Setup Wi-Fi router and internet connection

- Please setup the Wi-Fi router by powering it on.
- Please make sure that the router is connected to the internet



Wi-Fi expansion board
Evaluate using X-CUBE-WIFI1 (2/4)

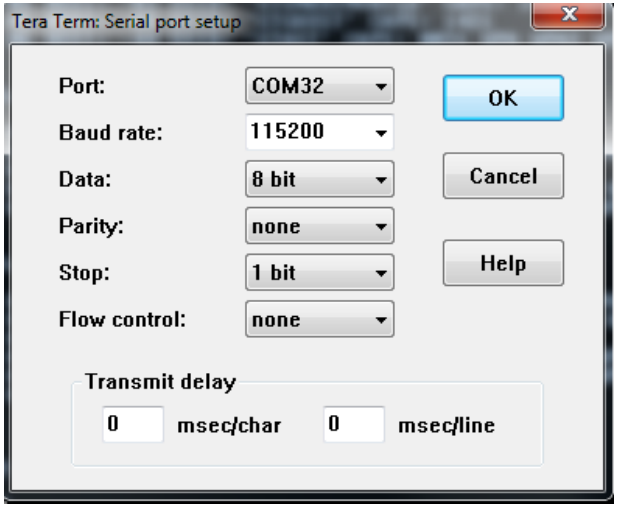
2



From X-CUBE-WIFI1 software resource package, drag and drop Project.bin on STM32 Nucleo drive.

3

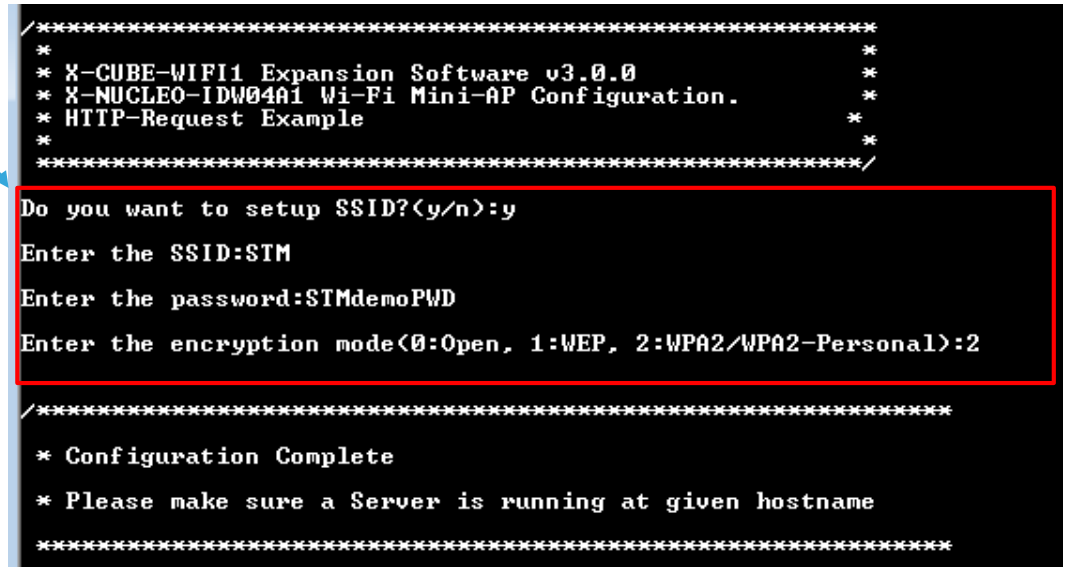
Open Tera Term or any other serial port terminal on the PC connected to the STM32 Nucleo board with the provided configuration settings



Evaluate using X-CUBE-WIFI1 (3/4)

4 Reset the board by pressing the reset button on the STM32 Nucleo board.
Configure the Application at run-time.

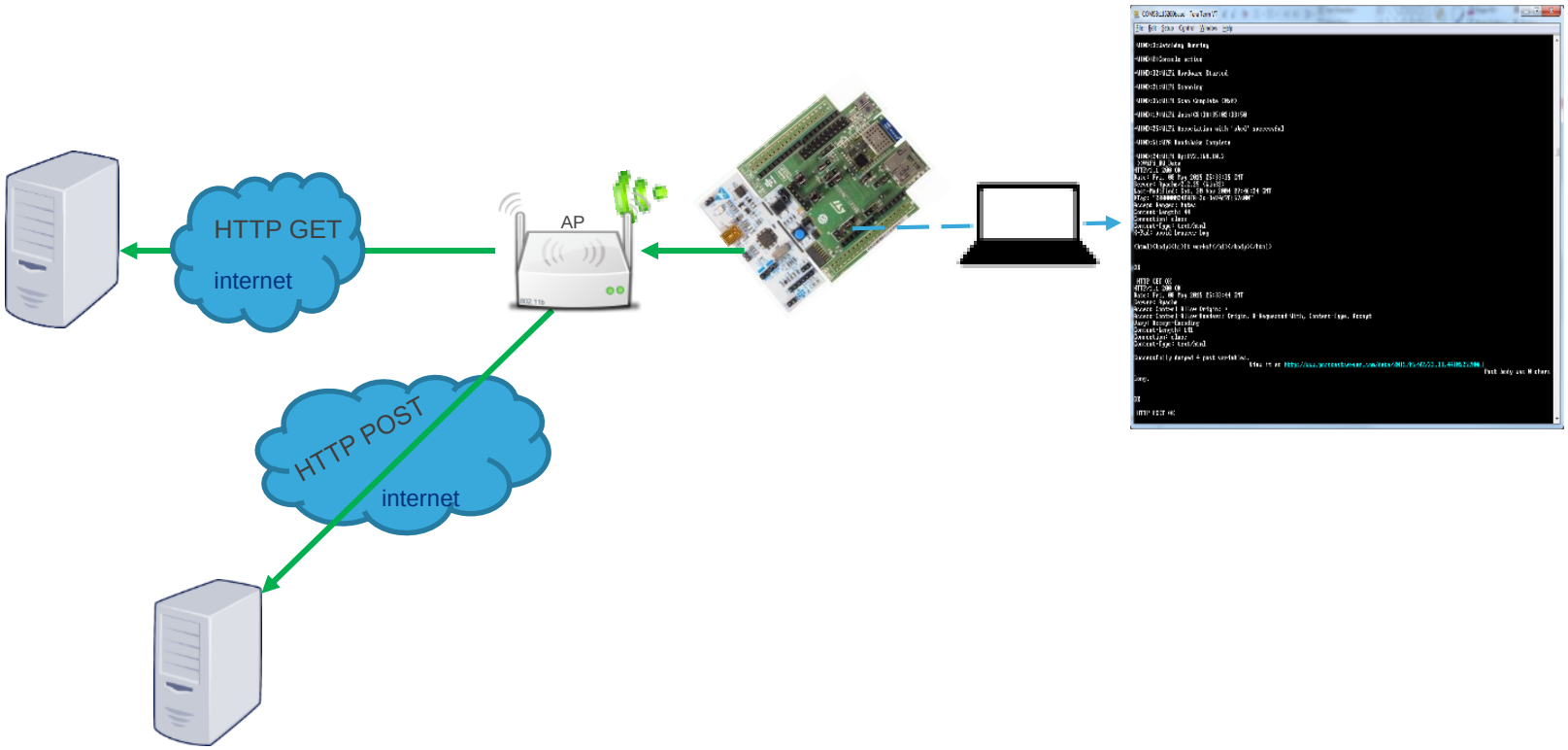
- The user will be prompted to enter the WI-FI settings.
- Change connection parameters of the application:
  - ssid: the ssid of the router
  - seckey: security key of the router if any
  - mode: security type (WEP, WPA2)



Wi-Fi expansion board
Evaluate using X-CUBE-WIFI1 (4/4)

5

View the results on the serial terminal window



Documents & related resources

All documents are available in the DESIGN tab of the related products webpage

X-NUCLEO-IDW04A1:

- Gerber files, BOM, and schematics
- **DB3229:** Wi-Fi expansion board based on SPWF04SA for STM32 Nucleo – **Data Brief**
- **UM2183:** Getting started with X-NUCLEO-IDW04A1, Wi-Fi expansion board based on SPWF04SA module for STM32 Nucleo – **User manual**

X-CUBE-WIFI1:

- **DB2732:** Wi-Fi software expansion for STM32Cube – **Data Brief**
- **UM1973:** Getting started with the X-CUBE-WIFI1; Wi-Fi functions and applications software expansion for STM32Cube – **User Manual**
- Software setup file

Consult www.st.com for the complete list

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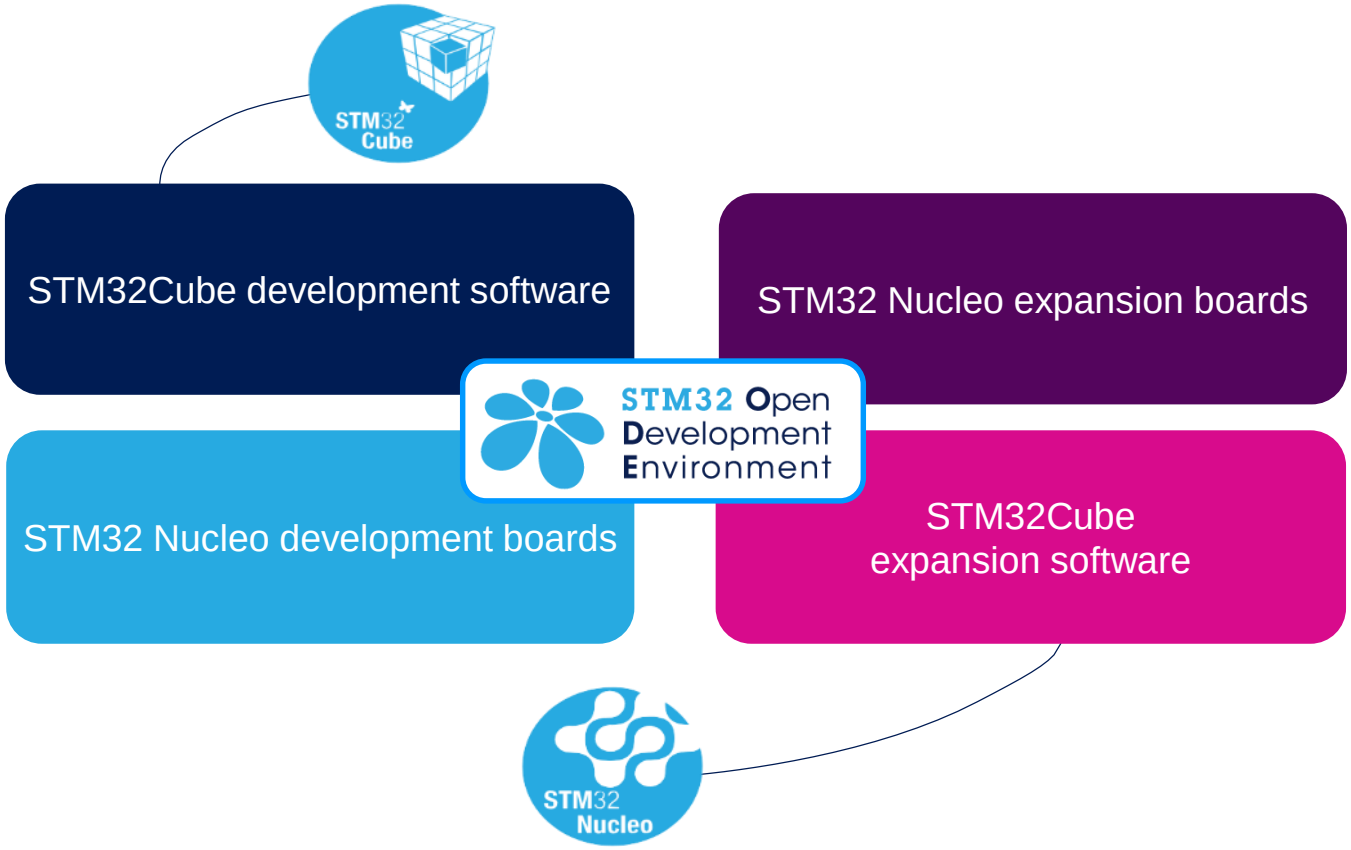
STM32 Open Development Environment: Overview

STM32 Open Development Environment
Fast, affordable Prototyping and Development

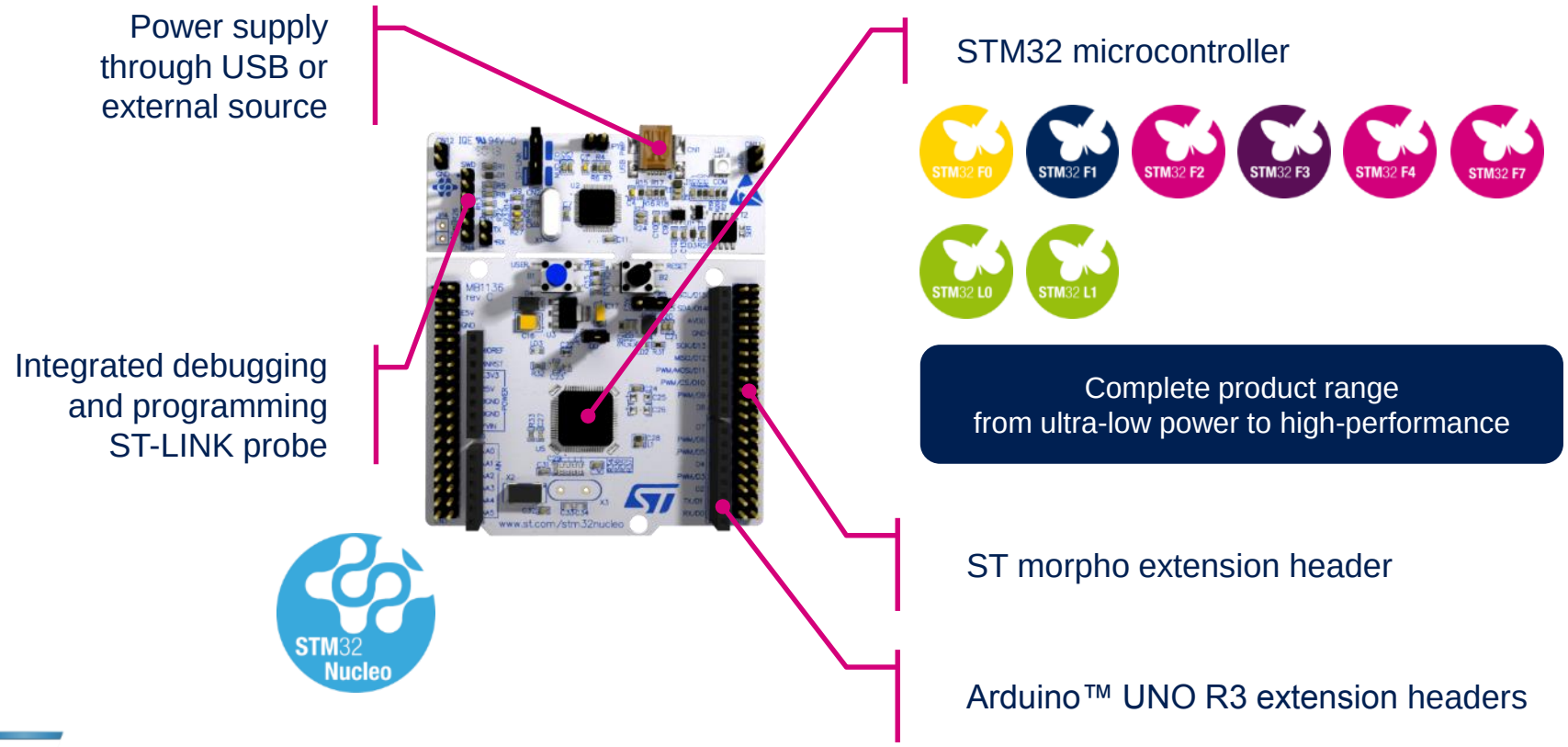
- The STM32 Open Development Environment (ODE) consists of a set of stackable boards and a modular open SW environment designed around the STM32 microcontroller family.



Compatibility with multiple Development environments

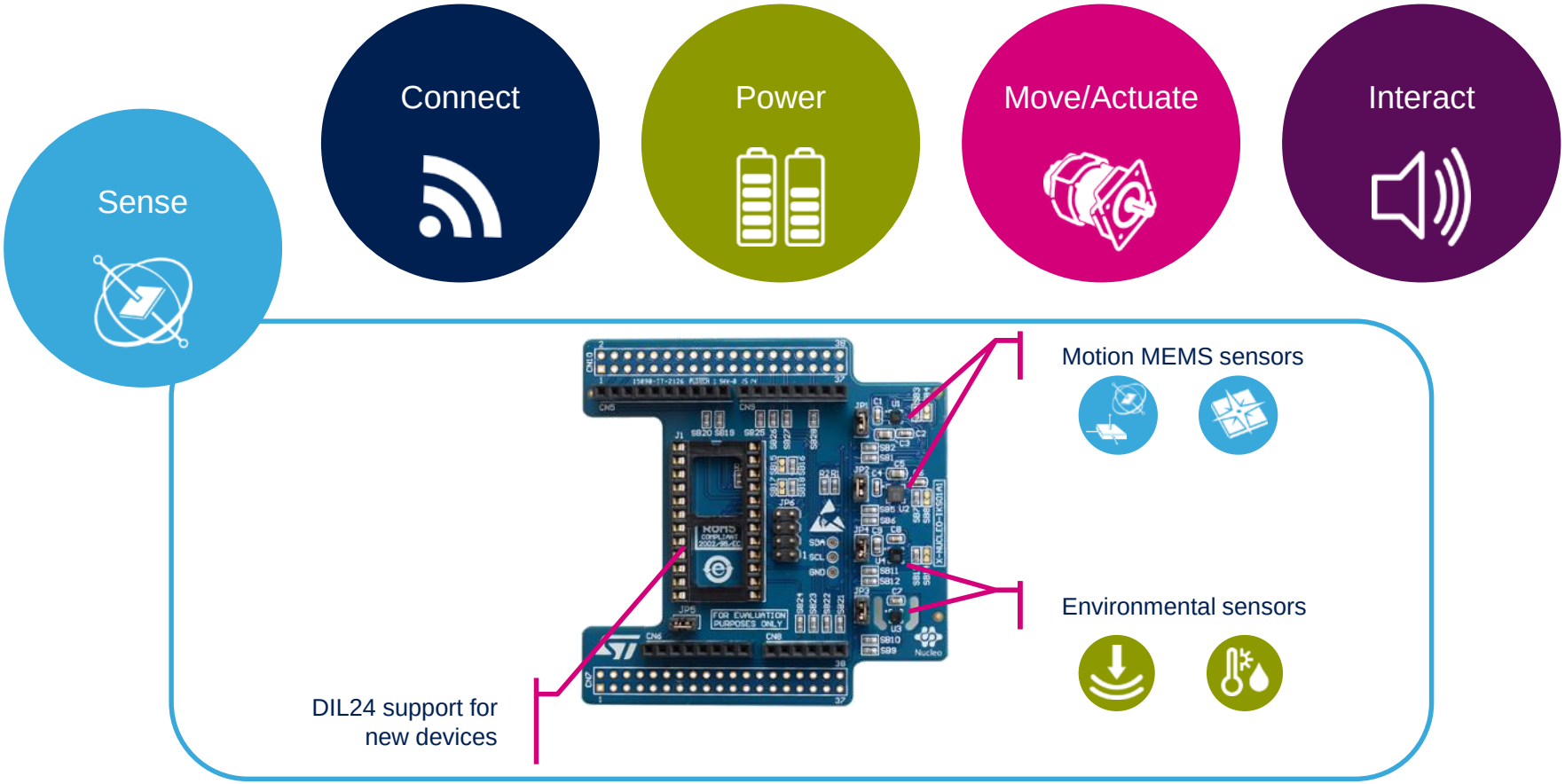
Development Boards (NUCLEO)

- A comprehensive range of affordable development boards for all the STM32 microcontroller series, with unlimited unified expansion capabilities and integrated debugger/programmer functionality.



Expansion Boards (X-NUCLEO)

- Boards with additional functionality that can be plugged directly on top of the STM32 Nucleo development board directly or stacked on another expansion board.

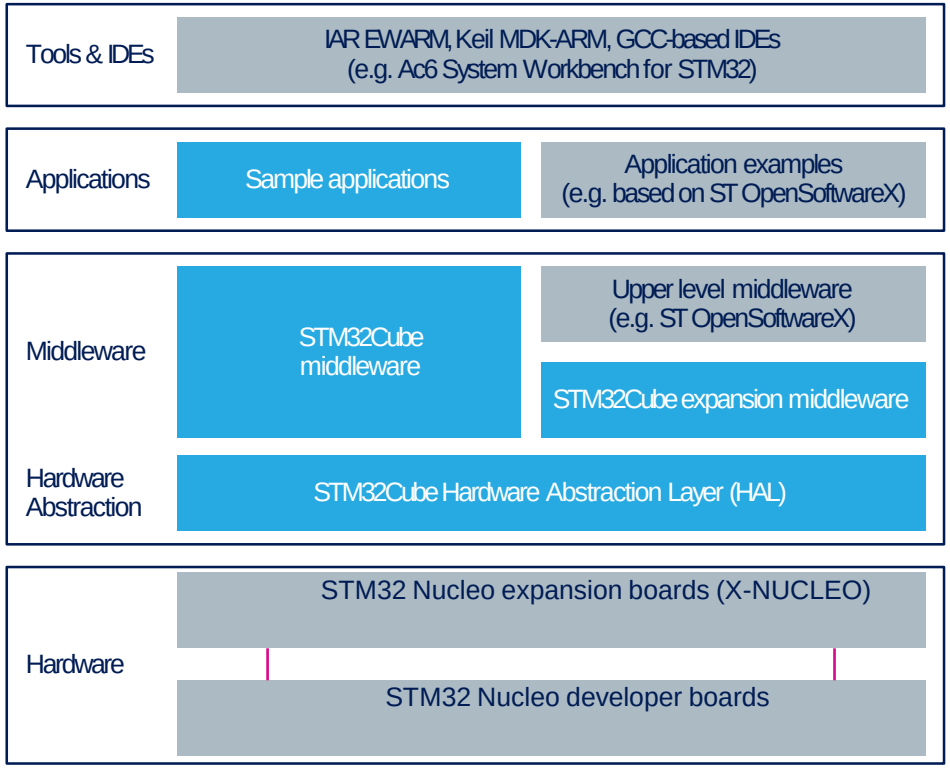


Example of STM32 expansion board (X-NUCLEO-IKS01A1)

STM32 Open Development Environment
Software components

- **STM32Cube software (CUBE)** - A set of free tools and embedded software bricks to enable fast and easy development on the STM32, including a Hardware Abstraction Layer and middleware bricks.

- **STM32Cube expansion software (X-CUBE)** - Expansion software provided free for use with the STM32 Nucleo expansion board and fully compatible with the STM32Cube software framework. It provides abstracted access to expansion board functionality through high-level APIs and sample applications.



- **Compatibility with multiple Development Environments -** The STM32 Open Development Environment is compatible with a number of IDEs including IAR EWARM, Keil MDK, and GCC-based environments. Users can choose from three IDEs from leading vendors, which are free of charge and deployed in close cooperation with ST. These include Eclipse-based IDEs such as Ac6 System Workbench for STM32 and the MDK-ARM environment.

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OPEN LICENSE MODELS: STM32Cube software and sample applications are covered by a mix of fully open source BSD license and ST licenses with very permissive terms.

STM32 Open Development Environment

Building block approach

The building blocks	Your need	Our answer

Accelerometer, gyroscope
Inertial modules, magnetometer
Pressure, temperature, humidity
Proximity, microphone

Sense — COLLECT

Bluetooth LE, Sub-GHz radio
NFC, Wi-Fi, GNSS

Connect — TRANSMIT

Audio amplifier
Touch controller
Operation Amplifier

Translate — ACCESS

Stepper motor driver
DC & BLDC motor driver
Industrial input / output

Move / Actuate — CREATE

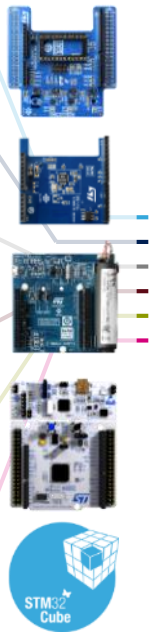
Energy management & battery

Power — POWER

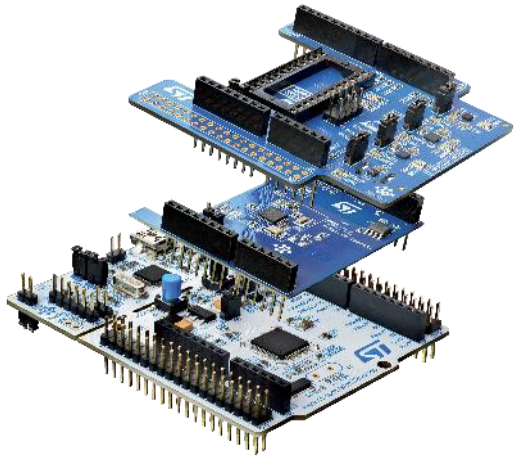
General-purpose microcontrollers
Secure microcontrollers

Process — PROCESS

Software



STM32 Open Development Environment



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www.st.com/stm32ode