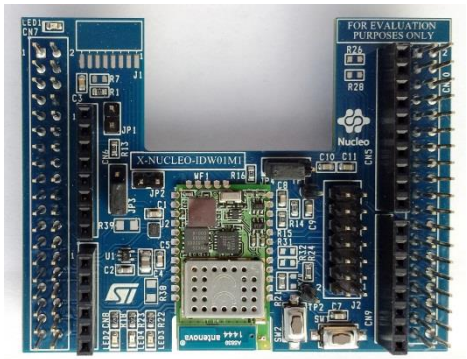
Quick Start Guide

Wi-Fi expansion board based on SPWF01SA module for STM32 Nucleo (X-NUCLEO-IDW01M1)



Version 1.0 (November 18, 2015)

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Overview

1. Introduction to the STM32 Open Development Environment
2. STM32 Nucleo Wi-Fi expansion board
   - Hardware overview
   - Software overview
3. Documents & related resources
4. Setup & demo examples

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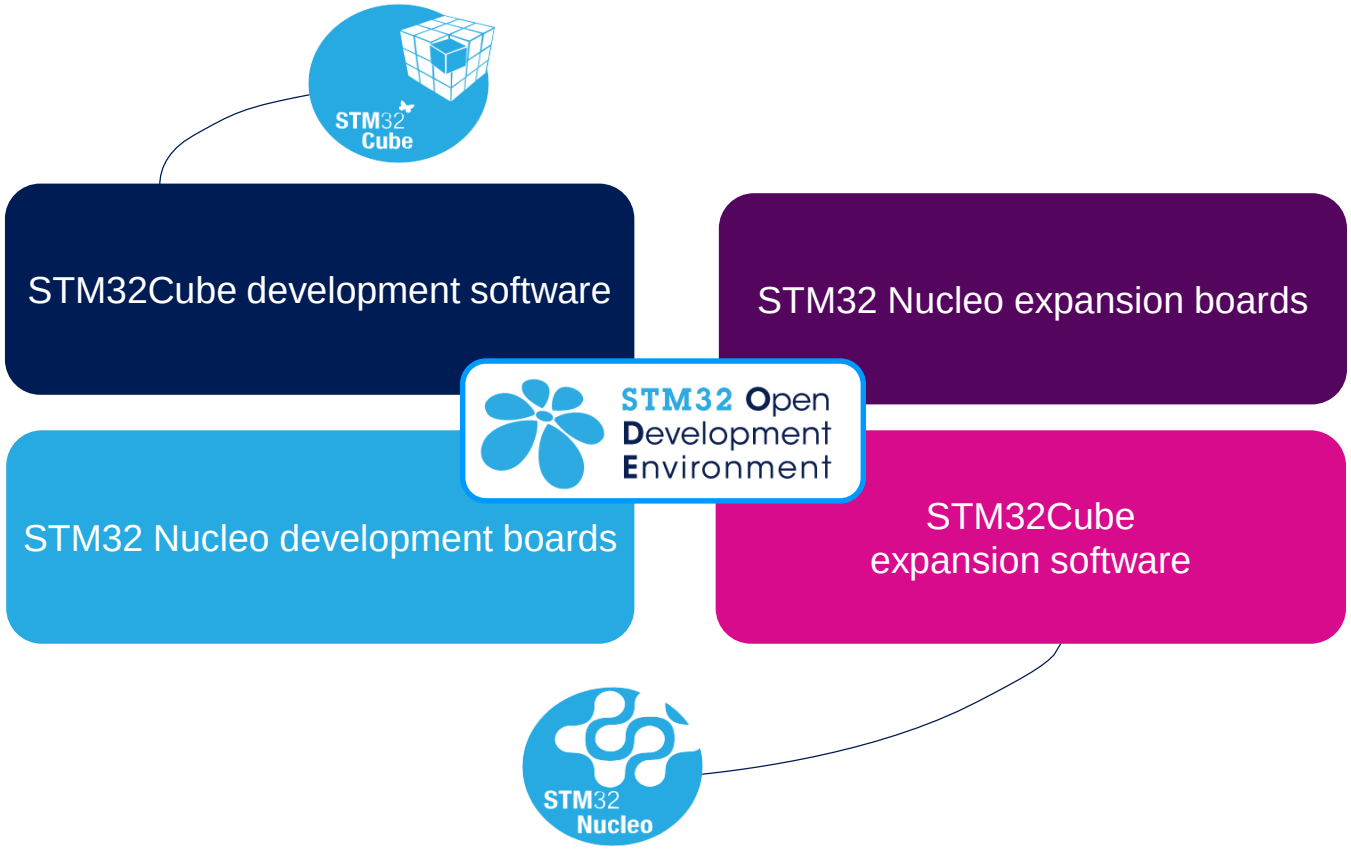
STM32 Open Development Environment
Fast, affordable Prototyping and Development

- 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.



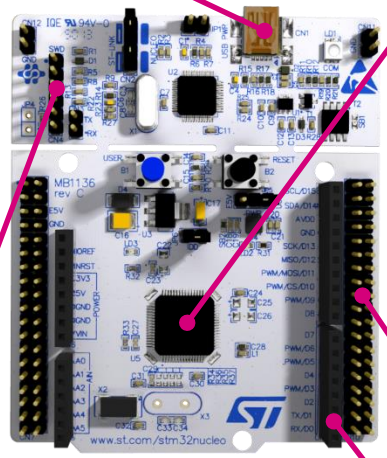
Compatibility with multiple Development environments

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.

Power supply through USB or external source

Integrated debugging and programming ST-LINK probe



STM32 Nucleo

STM32 microcontroller

STM32 F0 STM32 F1 STM32 F2 STM32 F3 STM32 F4 STM32 F7

STM32 L0 STM32 L1

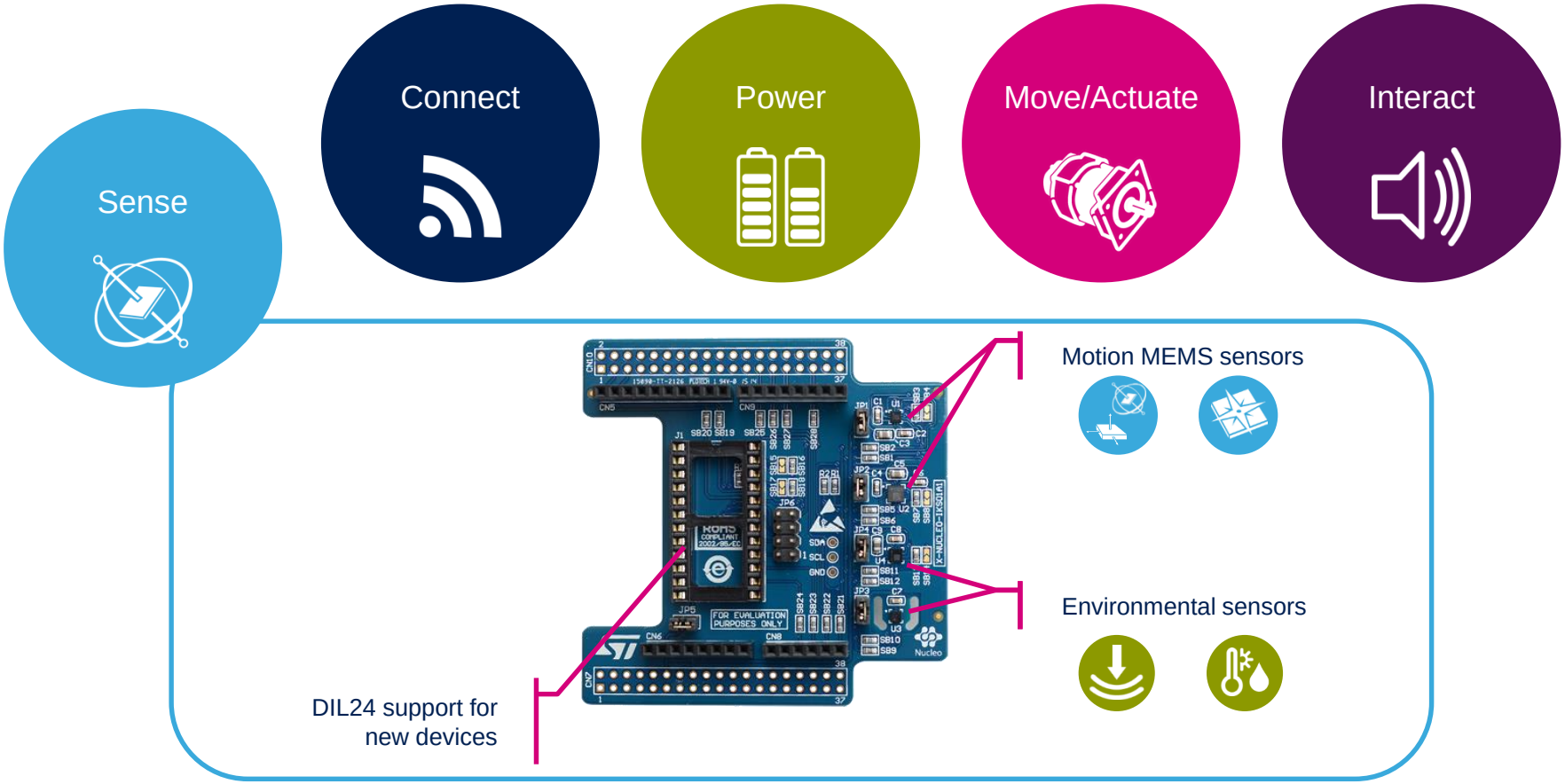
Complete product range
from ultra-low power to high-performance

ST morpho extension header

Arduino™ UNO R3 extension headers

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.

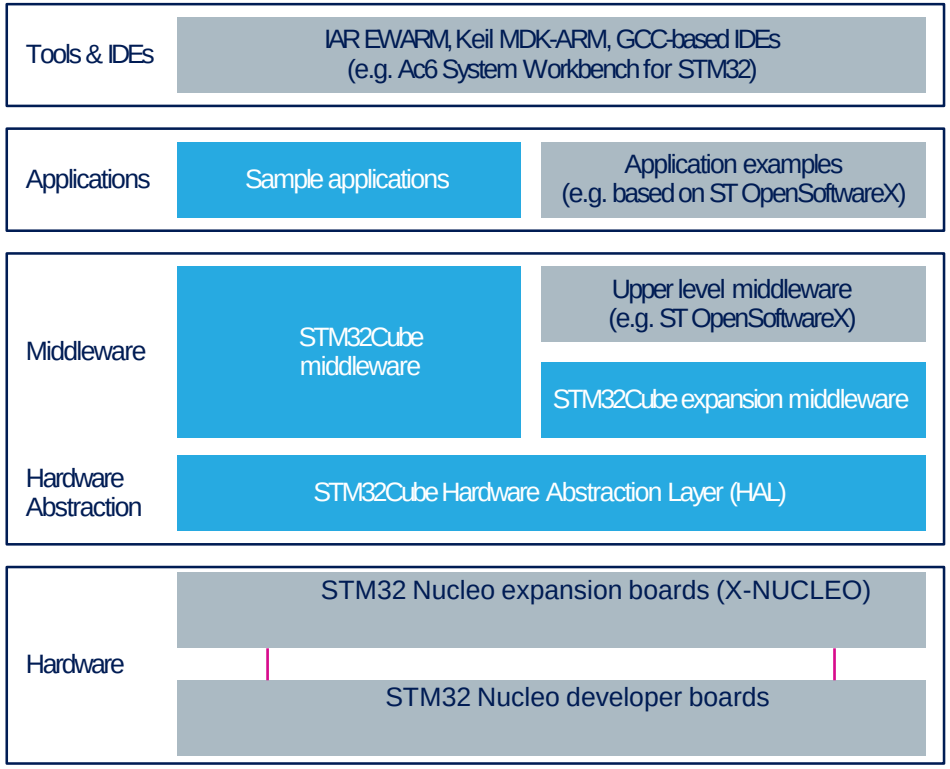


Example of STM32 expansion board (X-NUCLEO-IKS01A1)

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.

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

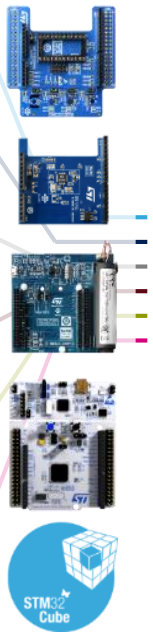
Energy management & battery

Power — POWER

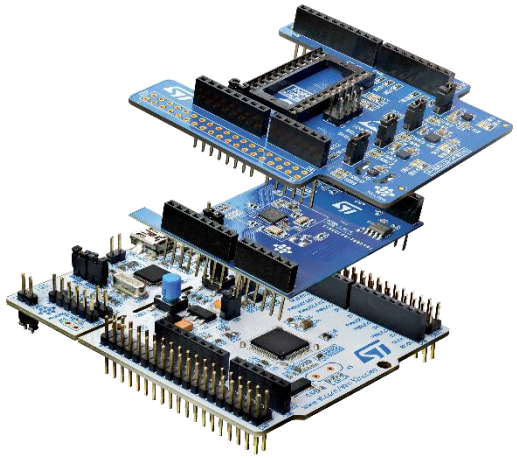
General-purpose microcontrollers
Secure microcontrollers

Process — PROCESS

Software



STM32 Open Development Environment



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www.st.com/stm32ode

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Wi-Fi expansion board
Hardware overview

X-NUCLEO-IDW01M1 hardware description

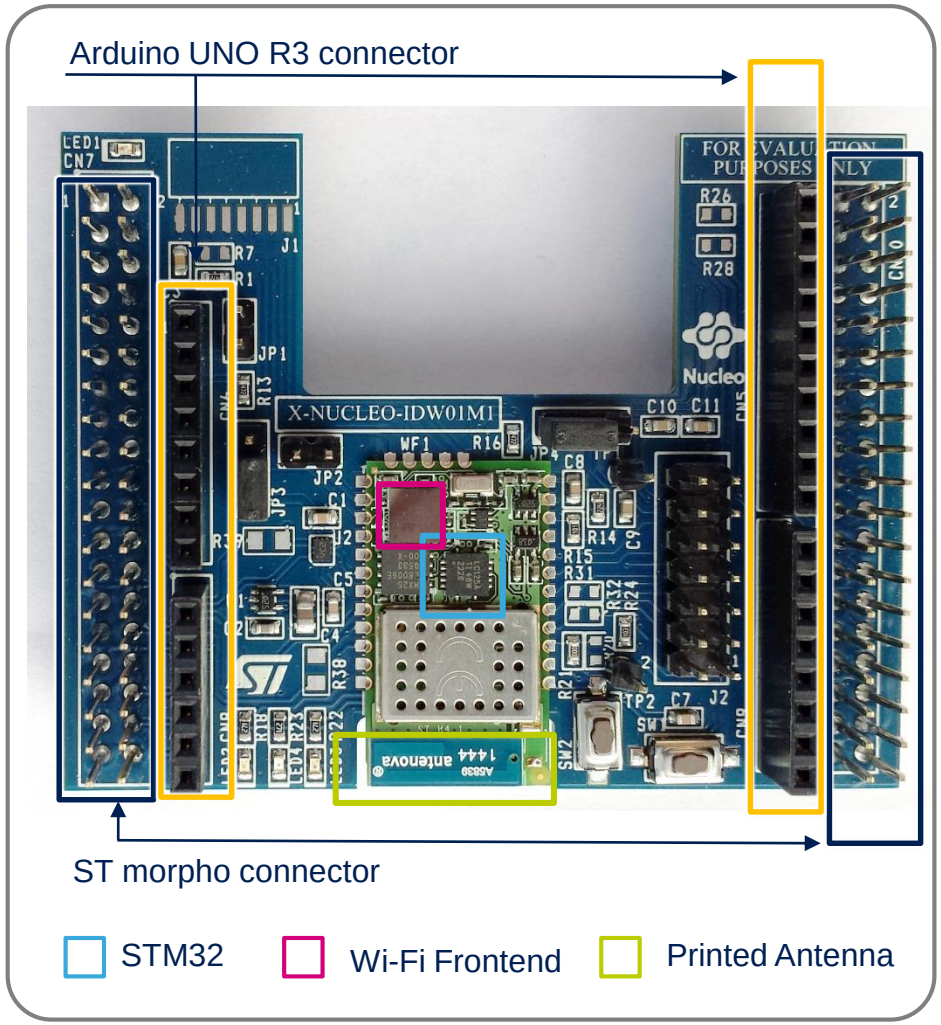
The X-NUCLEO-IDW01M1 is a Wi-Fi evaluation board based on the SPWF01SA module, which expands the STM32 Nucleo boards. The CE, IC and FCC certified SPWF01SA module has an embedded STM32 MCU, a low-power Wi-Fi b/g/n SoC with integrated power amplifier and power management and an SMD antenna.The SPWF01SA module communicates with the STM32 Nucleo developer board host microcontroller though an USART link available on the Arduino UNO R3 connector.

Main Features:

- X-NUCLEO-IDW01M1 hosts FCC, IC and CE certified SPWF01SA module (FCC ID: VRA-SG9011203, IC: 7420A-SG9011203 and ETSI compliant)
- SPWF01SA module major characteristics:
- compatible with STM32 Nucleo boards
- equipped both with ST morpho connector and Arduino UNO R3 connectors
- scalable solution; it can cascade multiple boards for larger systems
- free development firmware library and examples, compatible with STM32Cube
- RoHS compliant

Key products on board

SPWF01SA
ST SPWF01Sx module , 802.11 b/g/n compliant



Latest info available at
X-NUCLEO-IDW01M1

Order code: **X-NUCLEO-IDW01M1**

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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-IDW01M1 contains the FCC certified SPWF01SA module (FCC ID: VRASG9011203).

- **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-IDW01M1 contains the IC certified SPWF01SA module (IC: 7420ASG9011203)

- **Formal notices required by the ETSI (CE).** This module complies with the following European EMI/EMC and safety directives and standards:
  - ETSI EN 300 328 V1.8.1:2012
  - EN 301 489-1 V1.9.2:2011 + EN 301 489-17 V2.2.1:2009
  - 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

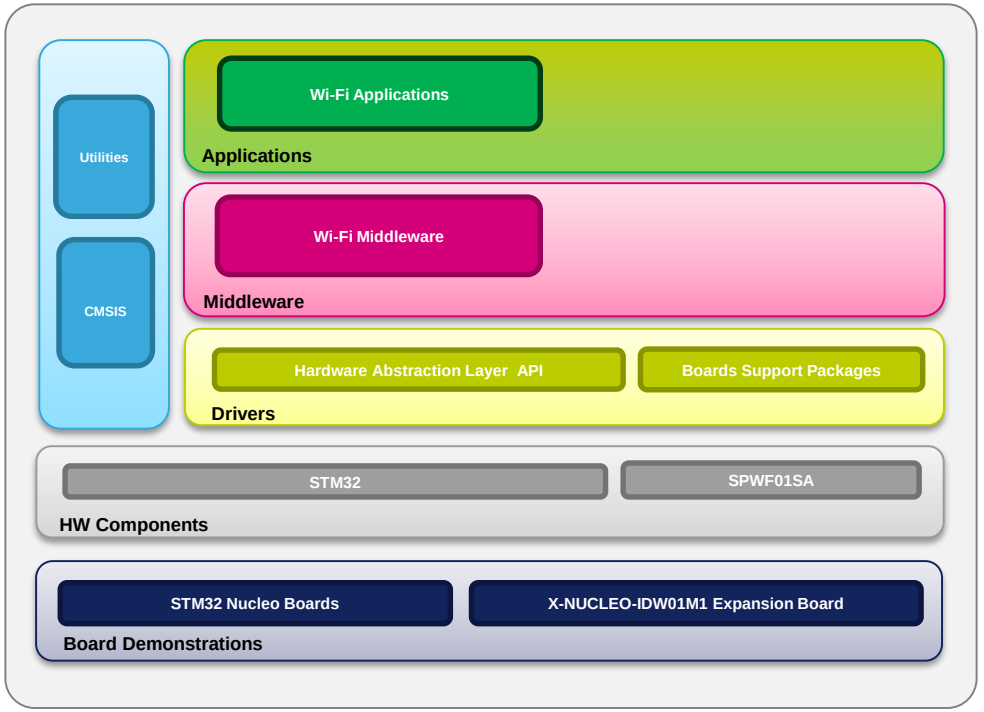
- X-CUBE-WIFI1 is an expansion software package for STM32Cube. The software runs on STM32 and can be used for building Wi-Fi applications with the SPWF01SA module. It is built on top of the STM32Cube software technology, which eases portability across different STM32 microcontrollers.
- The X-CUBE-WIFI1 software comes with sample applications, running on the X-NUCLEO-IDW01M1 when plugged to a NUCLEO-F103RB, NUCLEO-F401RE or NUCLEO-L053R8 board.

Key features:

- Complete middleware to build applications using the SPWF01SA Serial-to-Wi-Fi module
- Easy to use abstract APIs to configure and use SPWF01SA
- Easy portability across different MCU families, thanks to STM32Cube
- Free user-friendly license terms
- Sample implementations available on X-NUCLEO-IDW01M1 board when plugged to NUCLEO-F103RB, NUCLEO-F401RE or NUCLEO-L053R8 boards

Latest software available at
X-CUBE-WIFI1

Overall system architecture



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Documents & related resources

All documents are available in the Design Resources tab of the STM32 Wi-Fi expansion board webpage

X-NUCLEO-IDW01M1: Product webpage (Link)

- Gerber files, BOM, and schematics
- **DB2726**: Wi-Fi expansion board based on SWPF01SA module for STM32 Nucleo – **Data brief**
- **UM1975**: Getting started with X-NUCLEO-IDW01M1 Wi-Fi expansion board based on SPWF01SA module for STM32 Nucleo – **User manual**

X-CUBE-WIFI1: Product webpage (Link)

- **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

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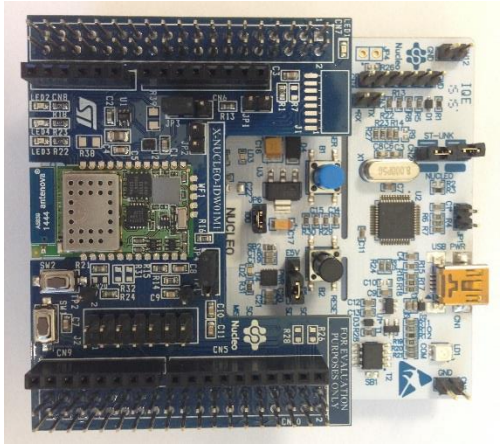
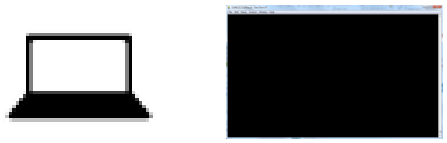
Setup & demo examples
Hardware prerequisites

- 1 x STM32 Nucleo Wi-Fi expansion board (X-NUCLEO-IDW01M1)
- 1 X STM32 Nucleo development board (NUCLEO-F401RE or NUCLEO-F103RB or NUCLEO-L053R8)
- 1 x USB type A to Mini-B USB cable



Additional below requirements:

PC (*)

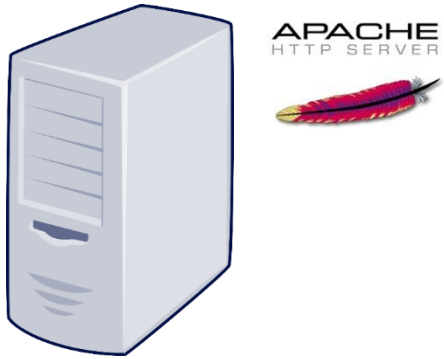


Tera Term terminal running on PC

Router

Router with internet connection

Web-Server-remote PC



Web server running on local remote PC

(*) Microsoft Windows 7 or 8

Setup & demo examples
Software prerequisites

- STSW-LINK008: ST-LINK/V2-1 USB driver (Link)
- STSW-LINK007: ST-LINK/V2-1 firmware upgrade (Link)
- X-CUBE-WIFI1 (Link)
  - 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-F401RE or NUCLEO-F103RB or NUCLEO-L053R8
- Apache Server (Link)
  - On a Windows machine, URL to download Apache Server: http://httpd.apache.org/docs/2.2/install.html#download

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

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

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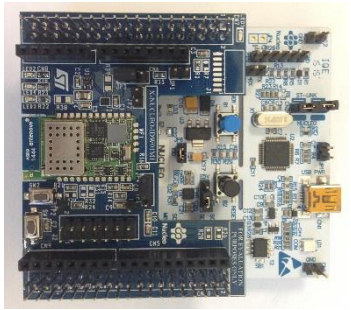
2 Select X-NUCLEO-IDW01M1

3 Download and unpack X-CUBE-WIFI1

X-CUBE-WIFI1 package

- _htmresc
- Documentation ← **Package documentation**
- Drivers ← Wi-Fi 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



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

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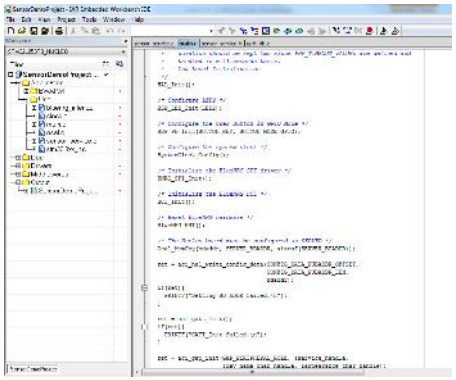
Open STM32 Tools

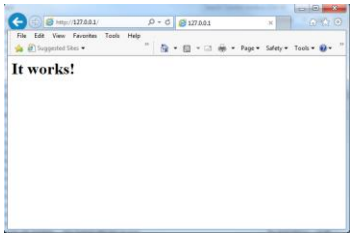
6 Modify and build application



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

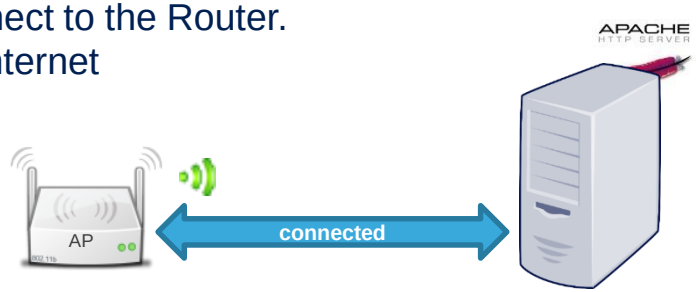
1 Setup and Start the Apache Server on the local remote machine

- The Apache version used in testing is Apache/2.2.22 on a Ubuntu machine.
- User can install Apache by using the command “sudo apt-get install apache2".
- When using a Windows machine, user can install Apache from the url: http://httpd.apache.org/docs/2.2/install.html#download
- To test if the Apache Server is working, enter http://127.0.0.1 on your browser
- *Please make sure that there is no firewall running which could prevent the application from accessing the web server. If there is a firewall, make sure to disable the firewall.*



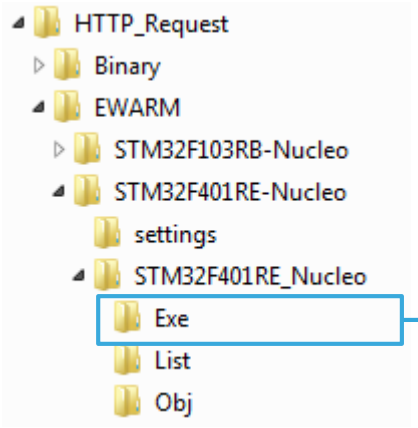
2 Setup Router and remote machine connection

- Please setup the Router by powering it on.
- Setup and configure the local remote PC to connect to the Router.
- Check that the Router is also connected to the internet

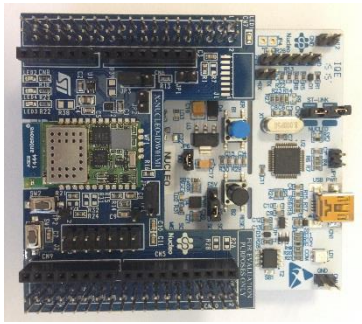


Wi-Fi expansion board
Evaluate using X-CUBE-WIFI1 (2/4)

3

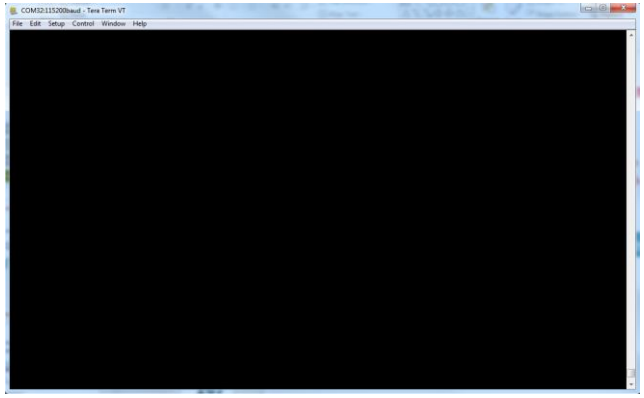


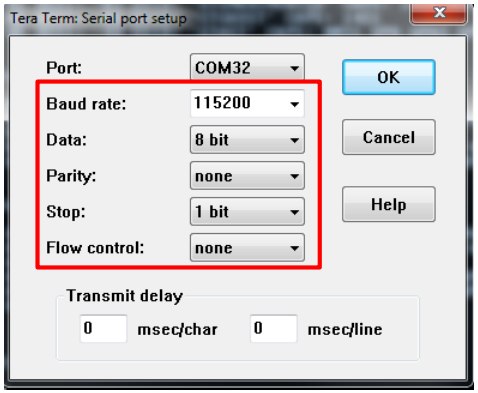
From X-CUBE-WIFI1 software resource package, drag and drop Project.bin on Nucleo drive.



4

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

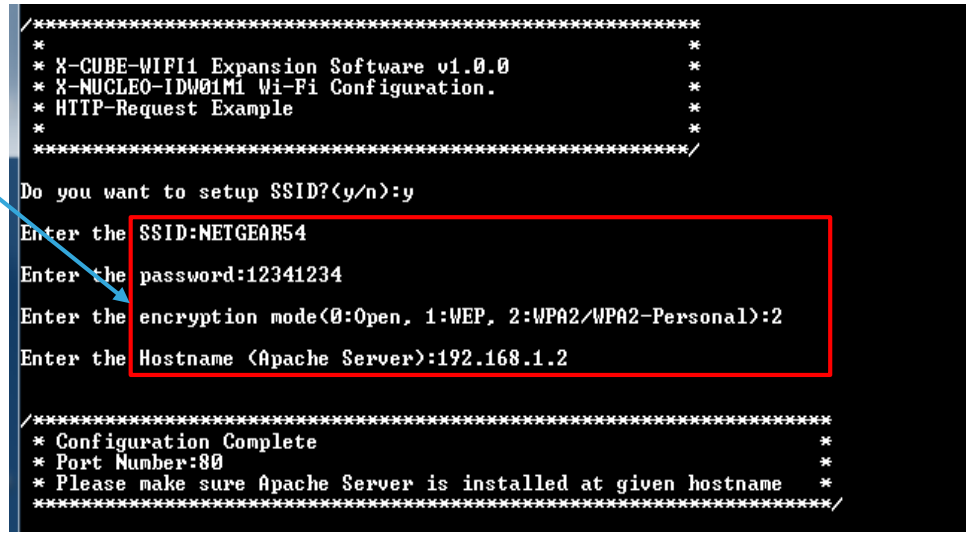




Evaluate using X-CUBE-WIFI1 (3/4)

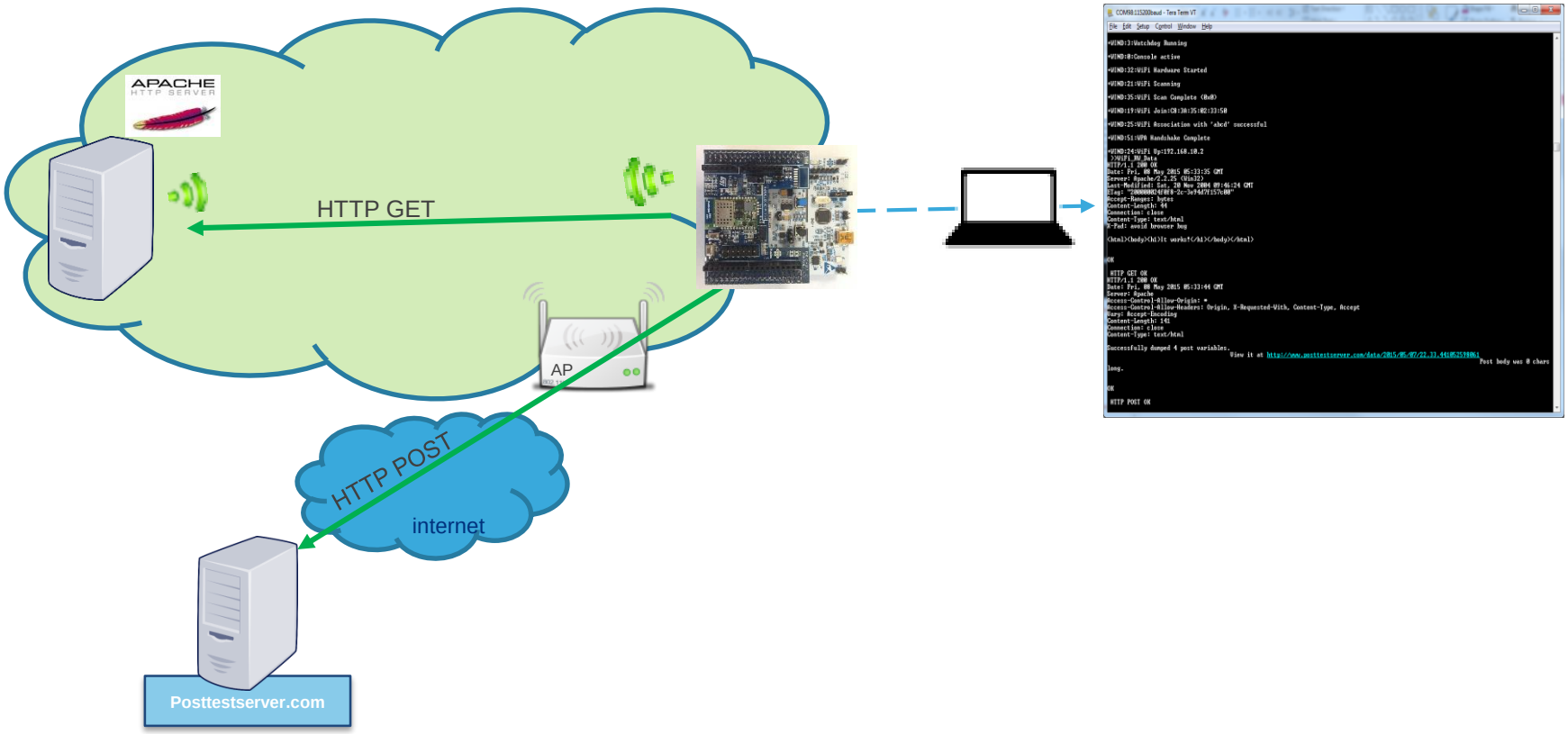
5 Reset the board by pressing the reset button on the STM32 Nucleo board.
Configure the Application at run-time.

- The user will be prompted to enter the WI-FI settings and host name.
- 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)
- Change server side parameters of the application:
  - hostname: IP address of local remote machine



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

6 View the results on the serial terminal window



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