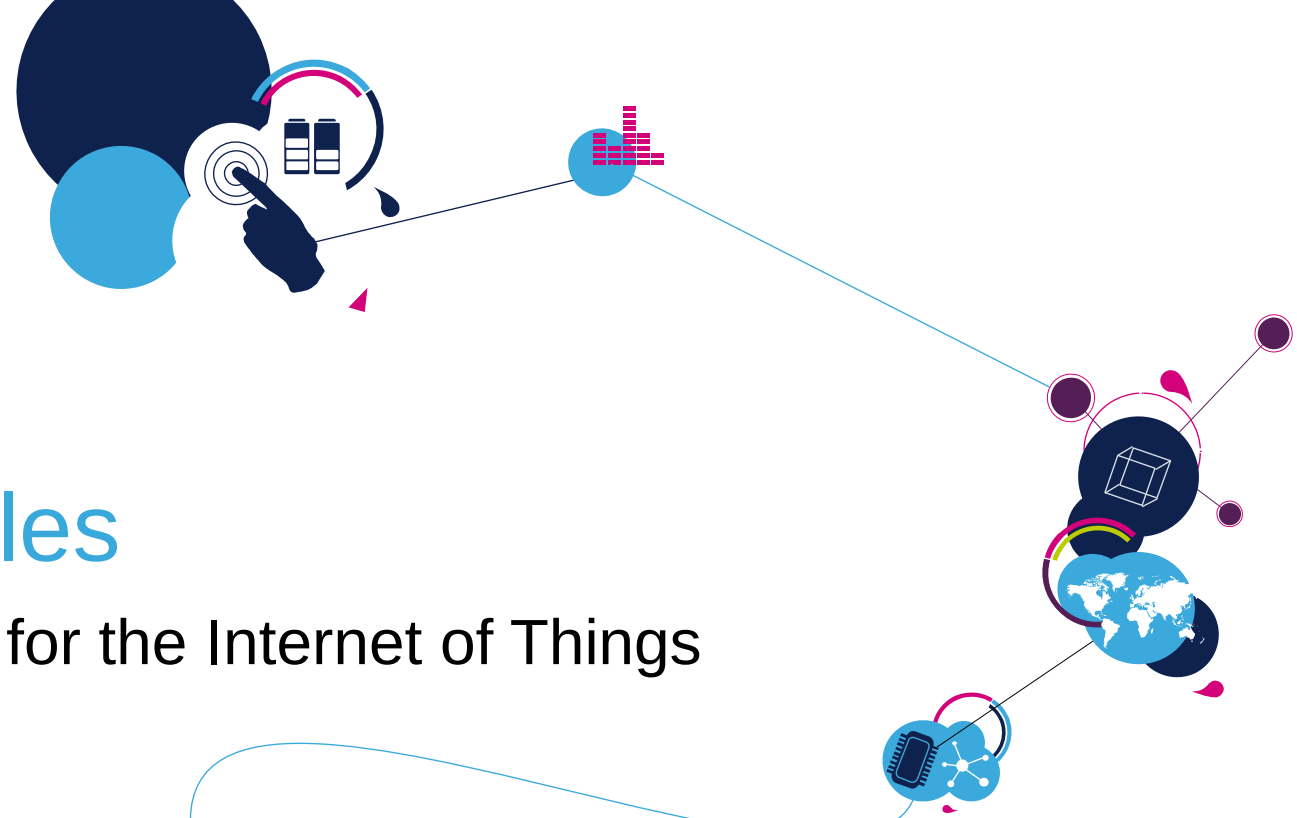


Wi-Fi Modules

Turnkey Solution for the Internet of Things

www.emcu.it - www.silica.com

life.augmented

Seamless Connectivity in the Internet of Things

Wi-Fi Enabled Consumer Devices

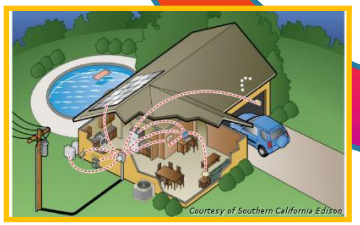
Home/Building Automation

Home life control: alarm, device remote control and monitoring

Smart Cities

Monitoring of parking spaces, waste management

Wi-Fi Enabled IoT Devices



Smart Energy/ Smart Grid

Connected Smart Meters

Industrial

Manufacturing control and management, machine to machine, data flow communication

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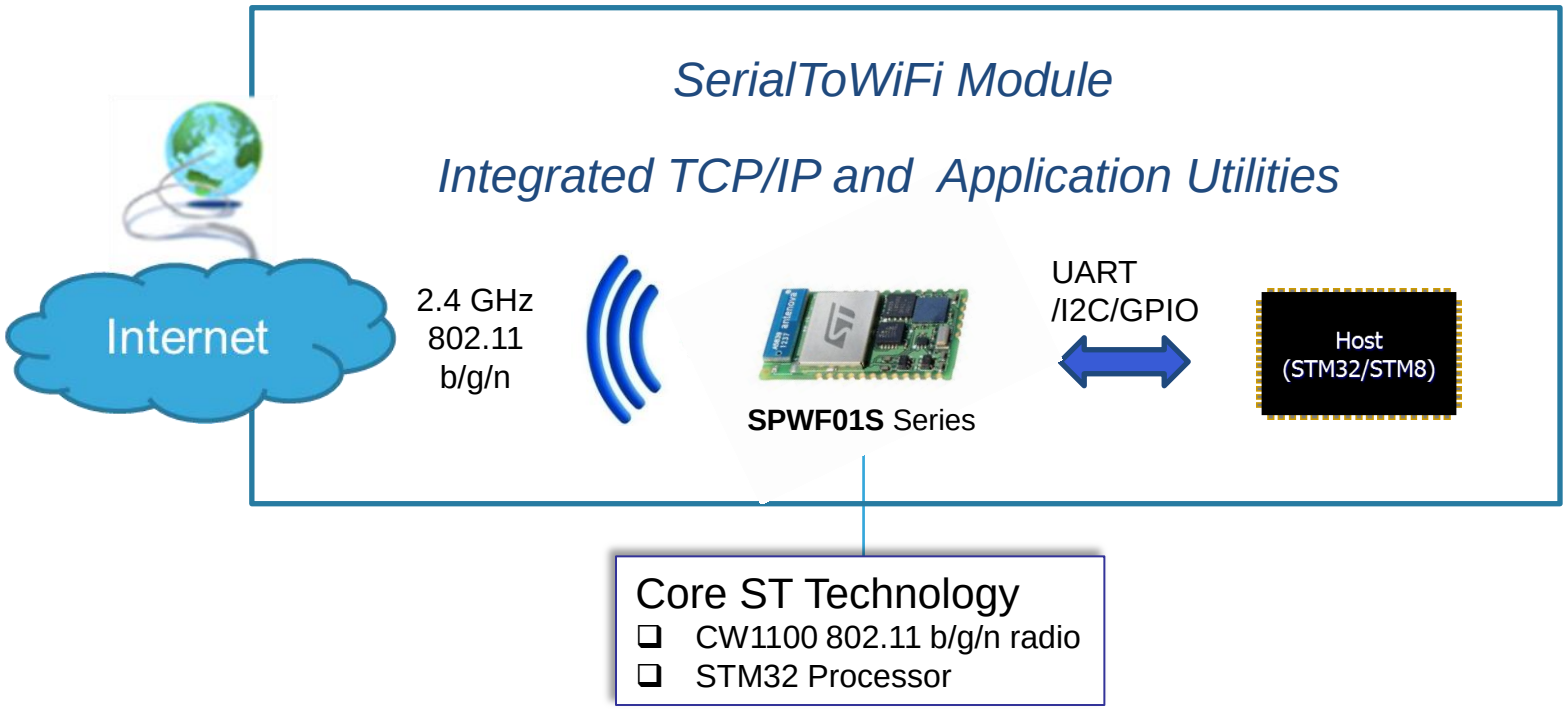
SPWF01S Series of Wi-Fi modules

The SPWF01S series of micro-sized Wi-Fi Modules offers a full HW/SW affordable solution for a Plug&Play integration in Internet of Things devices

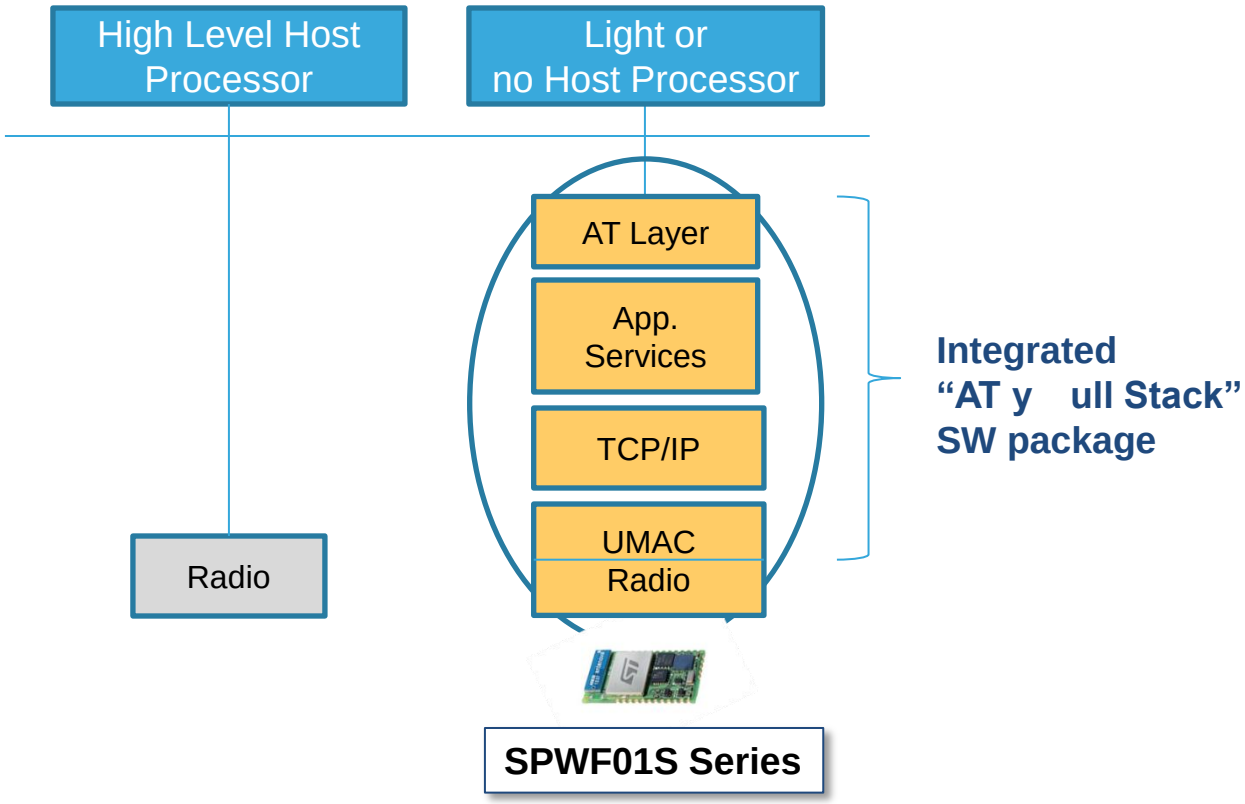


www.st.com/wifimodules

Why to use SPWF01S Series

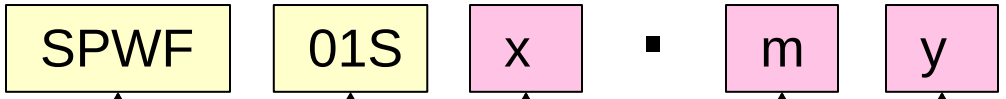
Key Factors	Key Benefits
Mass Market Positioning	An affordable solution for all volumes
802.11 b/g/n integrated radio	Easy integration in WLAN systems
Full integrated device	Reduces Development Times for Time To Market
Integrated antenna or u.fl connector	No RF knowledge is required for integration
CE, FCC, IC RF certified	Reduces Certification costs of the target application
No need of a driver or external protocol stack	Extended usability with any host processor
Micro-sized form factor	SMD-like component to fit miniaturized devices
Integrated TCP/IP and Application Layer Functions	Allows an easy integration at the application level
Industrial Temperature Range	Allows integration in many different industrial applications

Market Positioning



Position	Product	Placement
High value (benefits/cost) **Plug&Play** solution for Wi-Fi connectivity in IoT market	Dual Chip (processor + radio) **Serial WiFi Module with integrated SW**	**Mass Market**

SPWF01S Series Options



Product Family Codification
SPWF → Wi-Fi Modules

Design Codification
01S → CW1100 + STM32F103

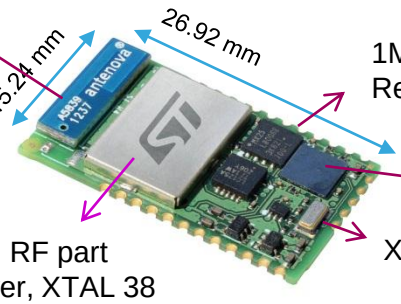
Antenna Options
x→A: Integrated Antenna
x→C: Integrated UFL Connector
x→P: Antenna Output Port

Integrated Flash Memory Options
m→1: 1.5 MB
m→2: 0.5 MB

SW Compatibility Flag
y→1: Delivered with integrated ‘AT y u Stack’ SW

SPWF01S HW Architecture

Antenna (SPWF01SA.xy)
or U.Fl connector (SPWF01SC.xy)
or 50 ohm port (SPWF01SP.2x)



1MB flash (SPWF01Sx.1x)
Removed on SPWF01Sx.2x)

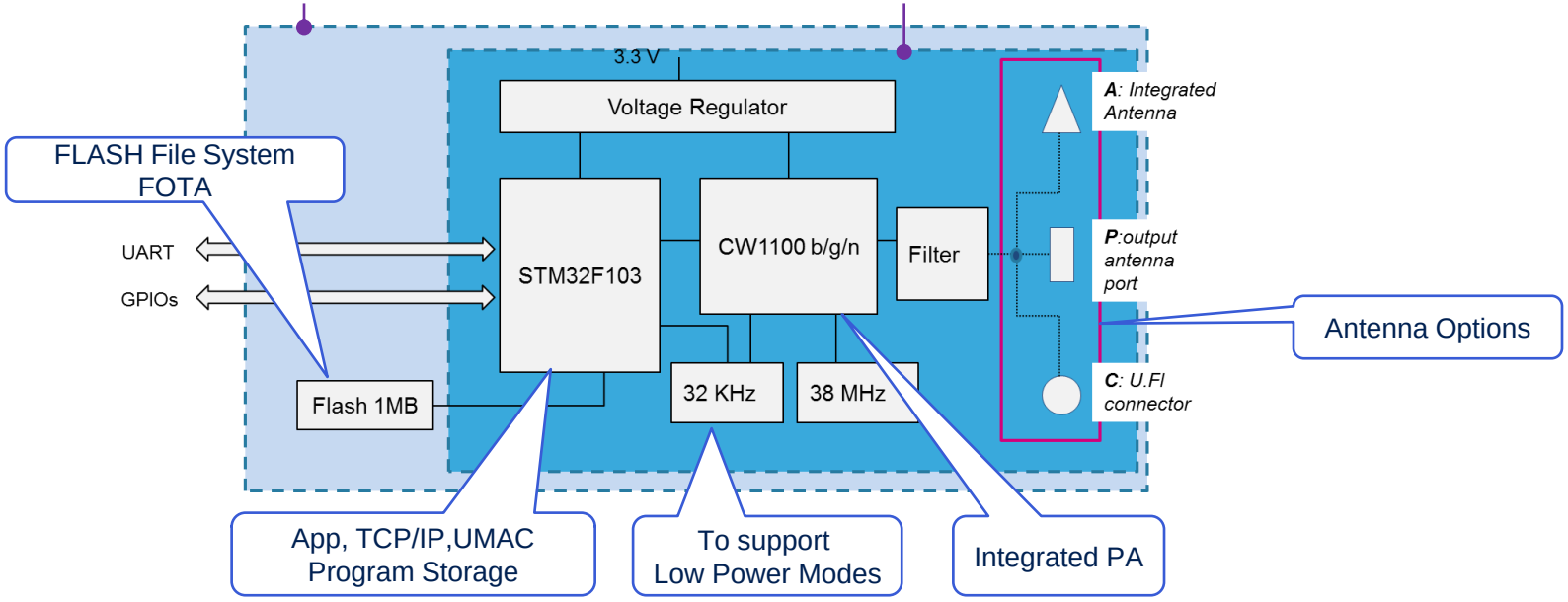
STM32F103REY6

XTAL 32.768 kHz

Shielded RF part
(tranceiver, XTAL 38
MHz …)

Models:
- **SPWF01SA.11 / SPWF01SC.11**

Models:
- **SPWF01SA.21 / SPWF01SC.21 / SPWF01SP.21**



SPWF01S HW Features

Key Features	SPWF01SA/C.11	SPWF01SA/C.21	SPWF01SP.21
Core Devices	STM32 ARM-Cortex M3 + CW1100 Wi-Fi radio		
Wi-Fi standard	802.11 b/g/n (2.4 GHz)		
Antenna/U.Fl. Connector	Integrated		Not integrated
Small Form Factor	15 x 27 mm		15 x 23 mm
Supply Voltage	3.3 V typ.		
Voltage Regulator	Integrated		
LPO (32kHz)	Integrated		
Operating Temp.	-40:+85 C		
Max Output Power	+18 dBm		
Flash	1.5 MB	0.5 MB	
Interfaces	UART, 16 Reconfigurable GPIOs		
			Antenna Output Port

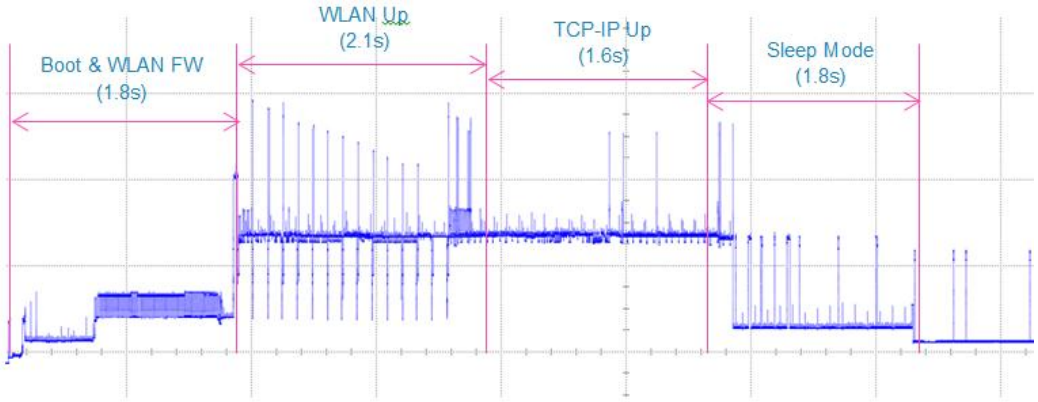
SPWF01S Power Management

Multiple power states and fast reconnection time for power consumption constrained devices

Duty Cycle Use Mode

802.11 Legacy Power Management Use Modes

Module Power State	STM32	WLAN	Current Consumption (typ)	Enter	Exit
Standby	Standby	Standby	~5 µA	AT command	Wakeup Pin / RTC Alarm
Sleep	Stop	PS or Fast PS	<1 mA	AT command	Interrupt from WLAN / Wakeup Pin
Power Save	Run	PS or Fast PS	5~10 mA	AT command / Remote CGI	AT command / Remote CGI
Active Rx	Run	Rx Idle Rx Active	~80 mA	-	-
Active Tx	Run	Tx Active	~ 250 mA	-	-



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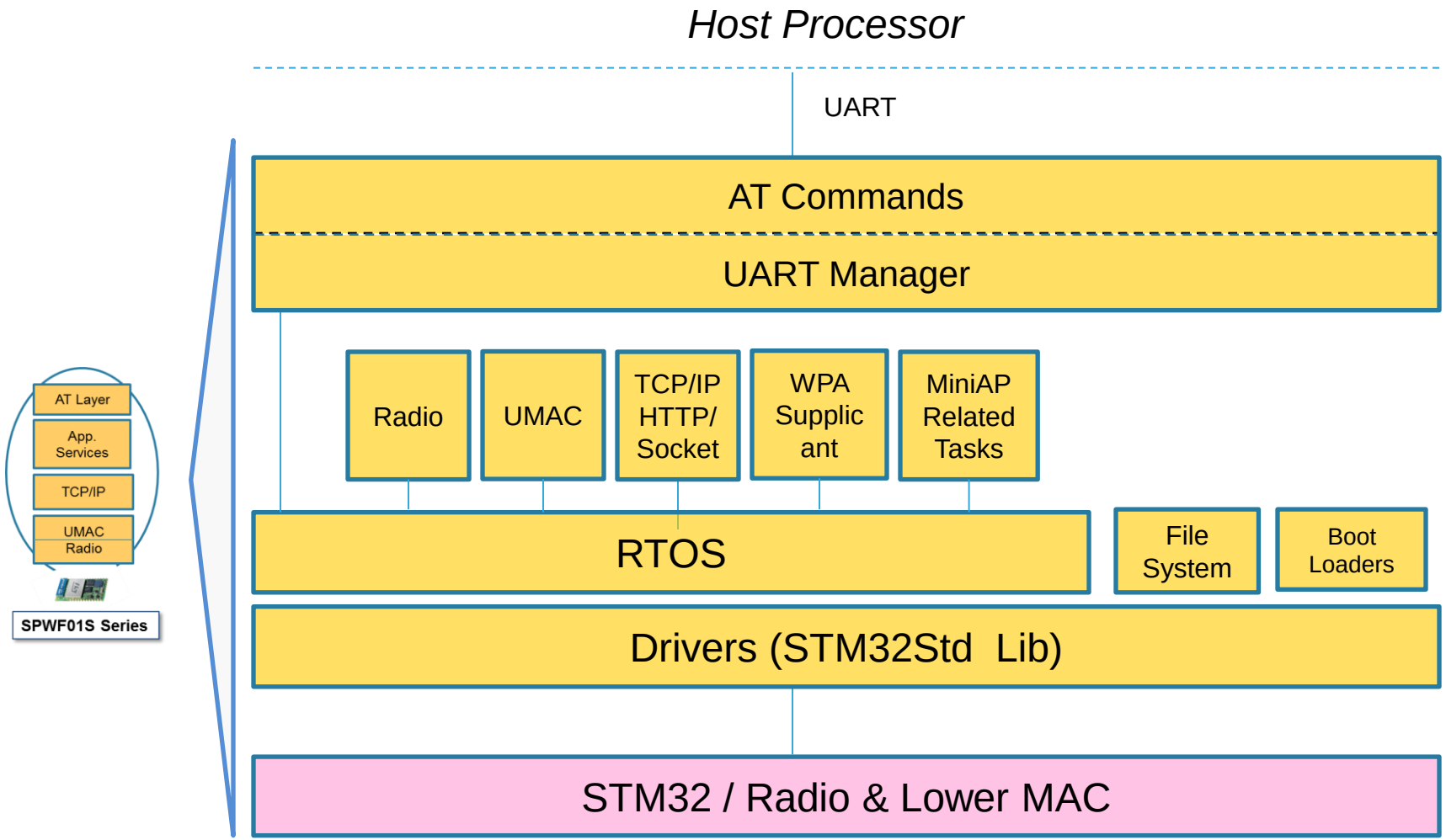
“AT y I Stack” Software Architect



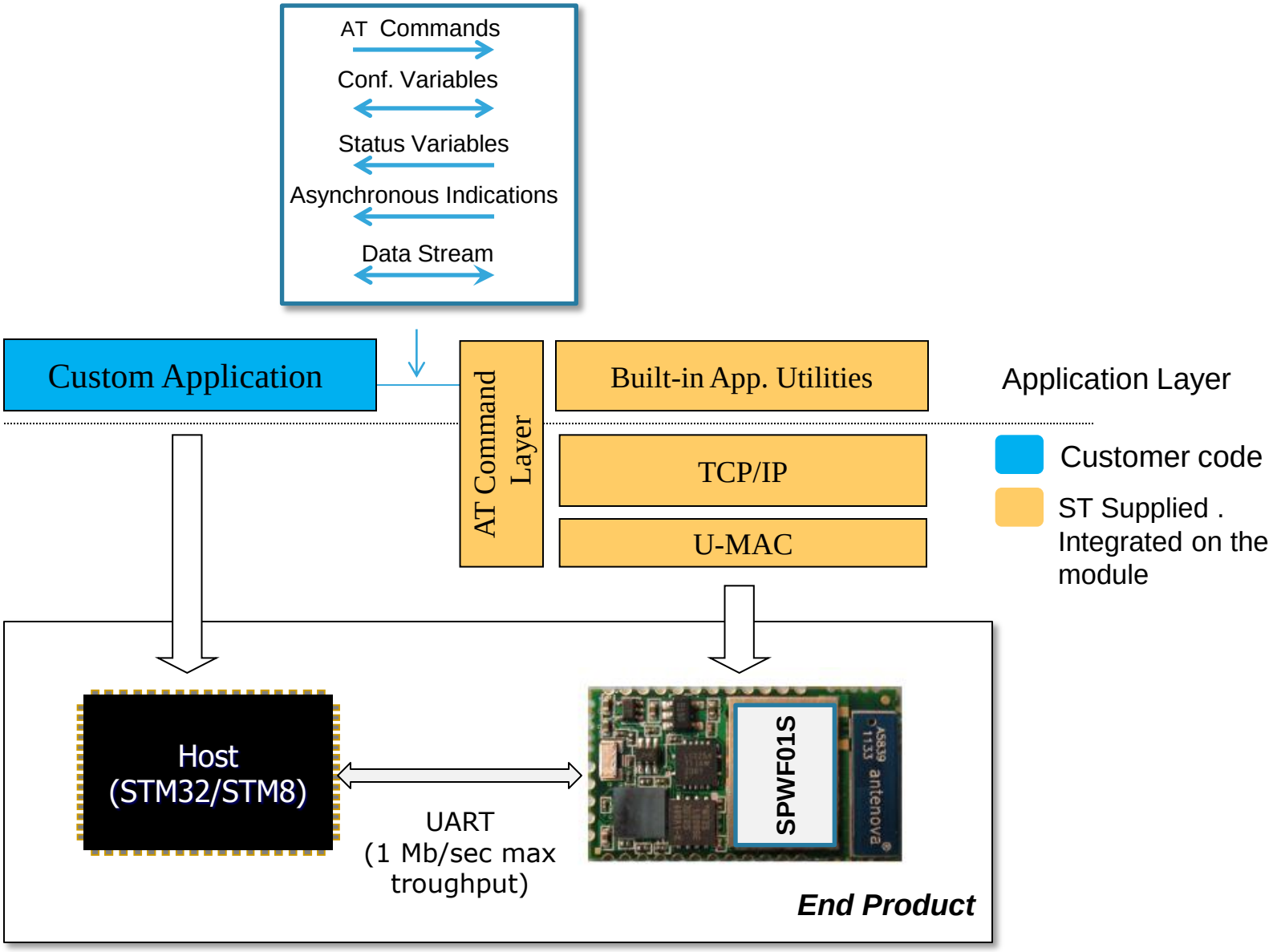
“AT Full Stack” Software Features

New June 2014

Key Features	Release 1.0	Release 2.1	Release 3.1
AT command set	Enabled on UART		
Configuration Setup	Via UART	+ Remote OTA Connection	
Wireless Security Modes	None, WEP, WPA/WPA2-PSK		
IP Stack - Transport Layers	IPv4 – TCP/UDP		
Integrated DHCP	Client	+ Server	
Integrated DNS	Client	+ Server	
SW Update	UART/ OTA(*)		
TCP/UDP Socket	Up to 8 Contemporary Socket Client		+ 1 Socket Server
Remote Commands		+GPIO Conf.	+ Power Modes Conf.
File System Update RAM	Run Time via UART		
File System Update Flash (*)	Over the air		
Built in Application Utilities	Web Server/http client		+ http post (client) + cgi builtin scripts
System Integration Modes	STA	+ MiniAP	
Power Modes	Active		+Standby/Sleep/Power Save

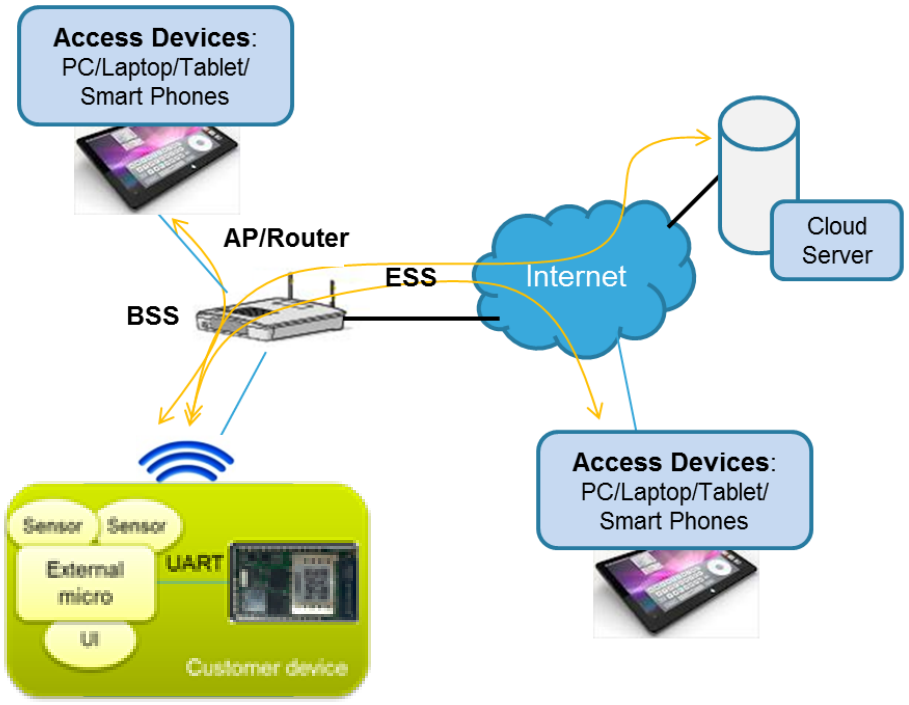
(*) Only enabled on SPWF01Sx.11 models

Integration in the Target Device



Integration in the System

Station Mode *allows integration in Infrastructured Networks*

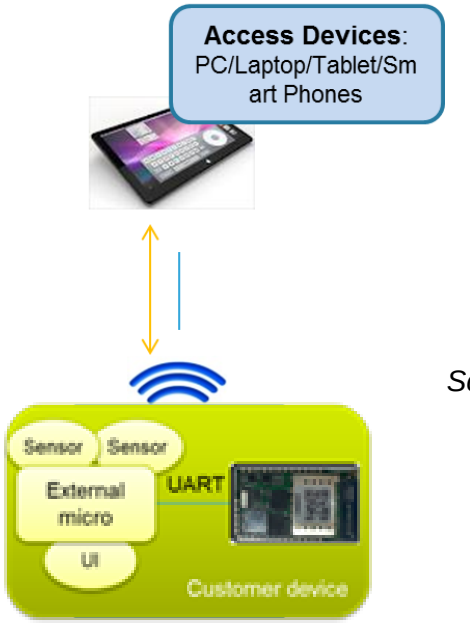


ST Wi-Fi Module Configured in ***Station Mode***

Scan Result from the module

```
FOUND:  BSS 14:D6:4D:24:36:00 CHAN: 01 RSSI: -28 SSID: 'ENG-WPA' CAPS: 0431 WPA: 18 WPA2: 20
FOUND:  BSS 00:18:0A:31:EA:78 CHAN: 11 RSSI: -82 SSID: 'ZyckoItalyWireless' CAPS: 0531 WPA: 22 WPA2: 24
FOUND:  BSS 06:18:0A:31:EA:78 CHAN: 11 RSSI: -84 SSID: 'ZyckoItalyGuest' CAPS: 0531 WPA: 22 WPA2: 24
FOUND:  BSS 06:18:0A:31:E7:E2 CHAN: 11 RSSI: -85 SSID: 'ZyckoItalyGuest' CAPS: 0531 WPA: 22 WPA2: 24
OK
```

MiniAP Mode *allows Direct PointToPoint Connections*



The ST Wi-FI Module Configured in ***MiniAP Mode***

Scan Result on the remote device

Up To 5 Stations
Can be connected at a time

How to Communicate with a Remote Device - Options

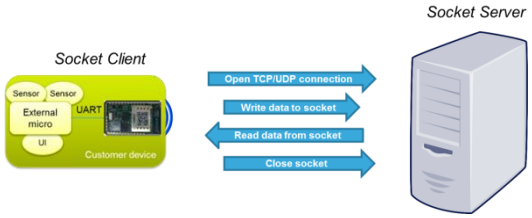
*In **Station and MiniAP Modes,***
three ways can be used for communication with a remote device

Sockets

SPWF01S can be used as a **socket client or server**

➔

To open a connection to stream datas with a remote device



Web Server

The SPWF01S integrates a **web server**

➔

A remote device can access the web pages that are saved in the memory (RAM and Flash) of the module

A **file system** is integrated to manage files in the RAM and in the Flash (*) .
Large set of Built-In html pages →

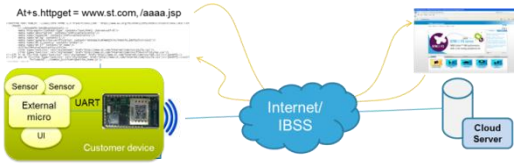
```
AT+S.FSL

 I 461 /input_demo.shtml
 I 180 /message.shtml
 I 384 /output_demo.html
 I 614 /index.html
 I 157 /peers.shtml
 I 193 /config.shtml
 I 174 /status.shtml
 I 212 /404.html
 I 2022 /firstset.html
 I 2898 /remote.html

OK
```

REST API

AT commands implementing **http post and http get** are available

➔

remote pages can be read over the serial port or data can be posted on a remote server

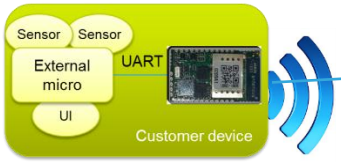


*only for SPWF01Sx.1x models

Remote Commands

*An extended set of remote configurations is enabled by **Built-In html pages***

First Config (via MiniAP)



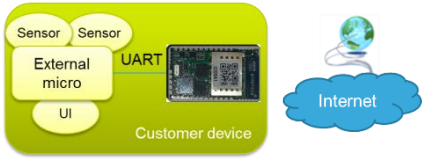
Module in Wi-Fi AP mode

Web Server

CaptivePortal.net/First_set.html

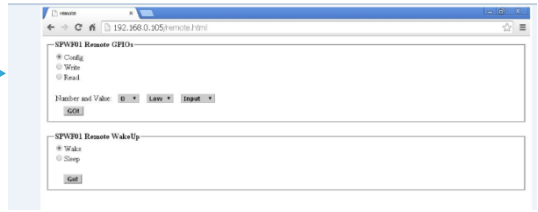
Built-in html page used to remotely setup the "station" configuration parameters

Remote Configuration

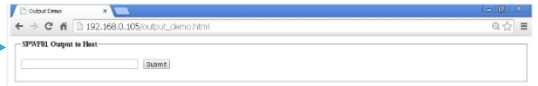


Module in Wi-Fi Station w/AP mode

Web Server



Remote.html



Output_Demo.html

Built-in html pages used for remote configuration of GPIO, power state setup or to transfer datas to the UART

Over The Air (*) Updates

The **HTTPDFSUPDATE** command allows to update the Flash File System content

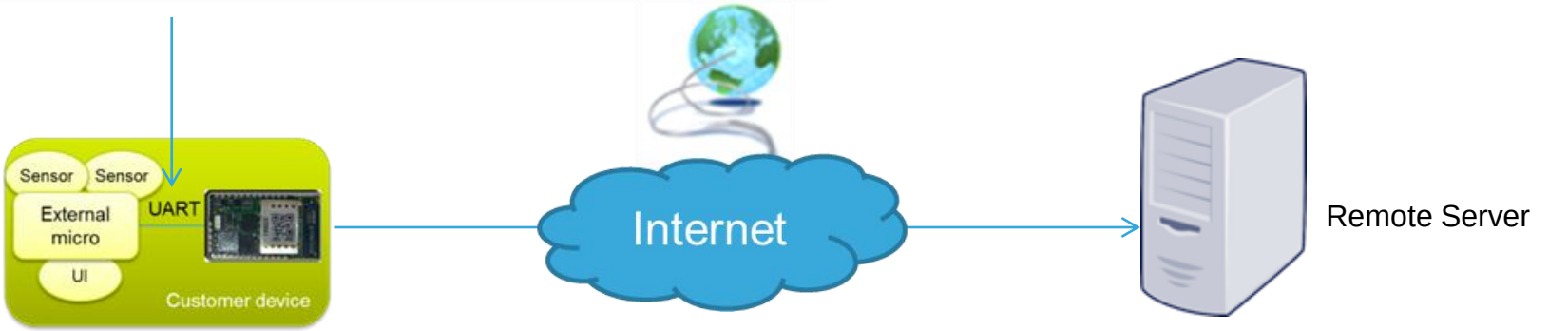
AT+S.HTTPDFSUPDATE=<hostname>,<path>, port>

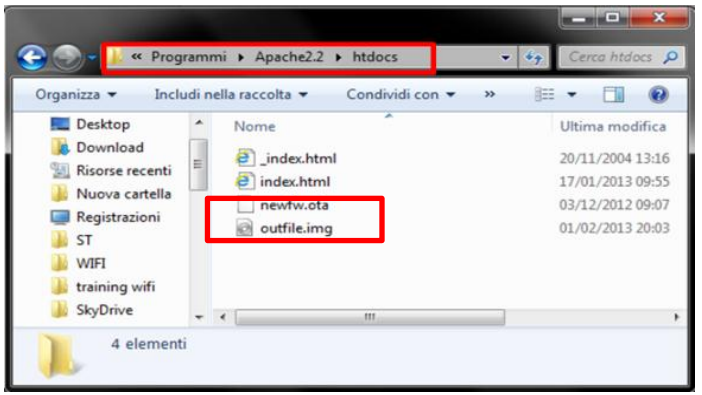
→ To Update the Flash File System

The **FWUPDATE** command allows to perform a Firmware Over-the-air update via a single HTTP GET.

AT+S.FWUPDATE=<hostname>,<path>,<port>

→ To Update the “AT y Stack” firm

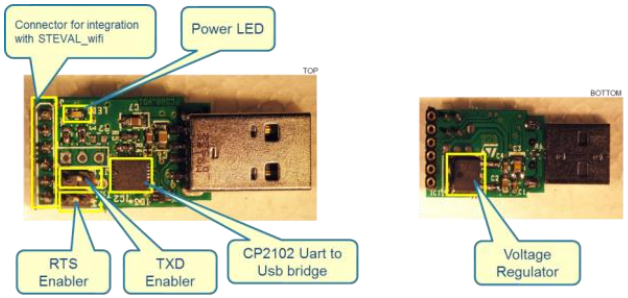




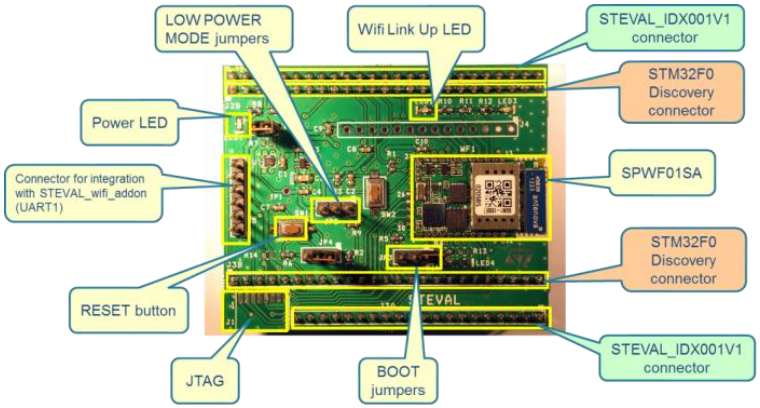
*only available for SPWF01Sx.1x models

SPWF01S Evaluation Kit

STEVAL-PCC018V1
USB Serial Bridge



STEVAL-IDW001V1
STM32F0-Discovery Daughter Board



Use Modes

USB Dongle

Use STEVAL-PCC018V1 in combination with STEVAL-IDW001V1

- Allow the use of Teraterm or equivalent application on the PC
- Require to install the USB Driver on the PC

Wi-Fi Network Coprocessor

Use STEVAL-IDW001V1 in combination with STM32F0-Discovery

- Do not require any driver
- Application Example (STSW-IDW001) for STM32F0 available on the web

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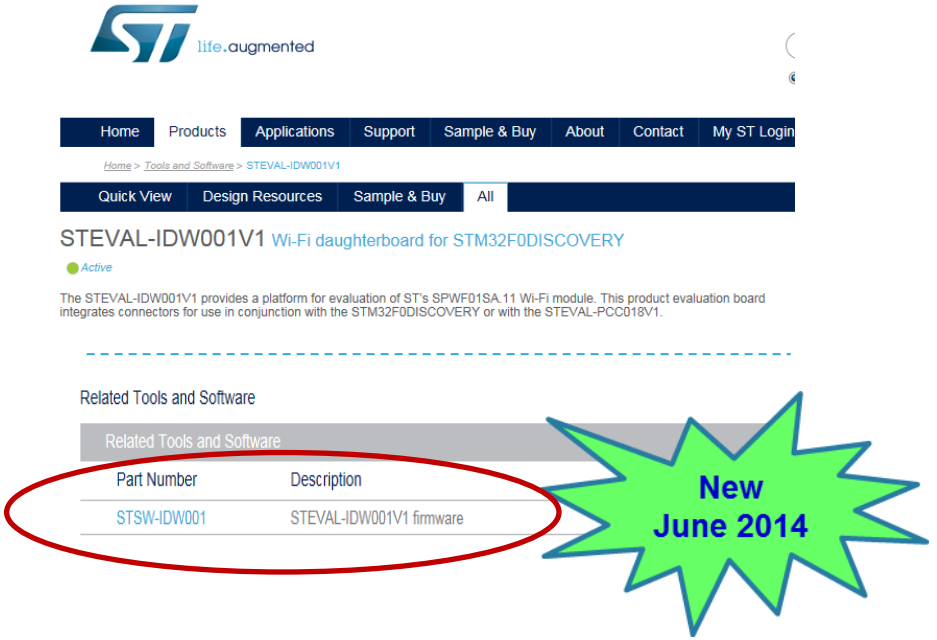
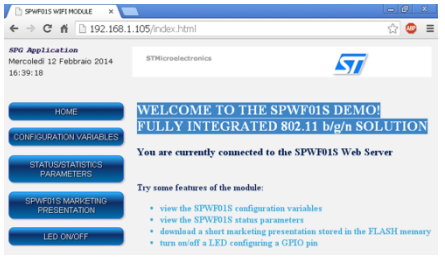
Design Resources - Simple Demo

STSW-IDW001 SW Package Includes

- A complete step-by-step guide to integration of STEVAL-IDW001V1 together with STM32F0-Discovery
- Source Code for the STM32F0-Discovery
- A complete outfile.img for the Flash File System Update that includes an web page index.html demo



STM32F0-Discovery



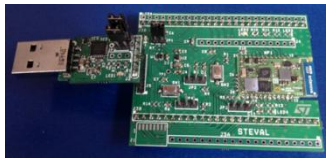
Much More Coming …

Order Codes Summary

Modules

Order Code	Description	Production Status
SPWF01SA.11	Extended Flash, Integrated Antenna, AT Full Stack	Full Production
SPWF01SC.11	Extended Flash, Integrated U.Fl. connector, AT Full Stack	Full Production
SPWF01SA.21	Integrated Antenna, AT Full Stack	Full Production
SPWF01SC.21	Integrated U.Fl. connector, AT Full Stack	Full Production
SPWF01SP.21	Antenna Output Port, AT Full Stack	Q3 2014 - Samples

Evaluation Boards



Order code	Description
STEVAL-IDW001V1	Daughter Board usable with STEVAL-PCC018V1 or with the STM32F0-Discovery
STEVAL-PCC018V1	USB-UART Bridge

Technical Documentation Available on
www.st.com/wifimodules

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