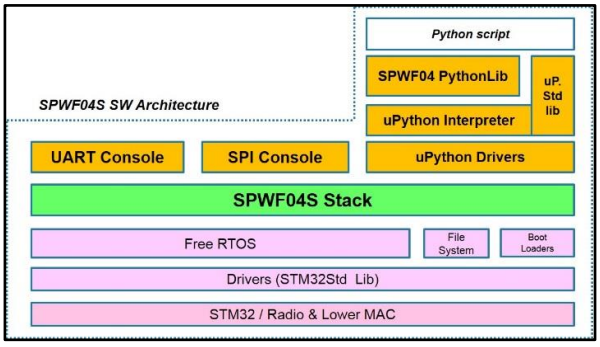
STSW-WIFI004

TCP/IP protocol stack FW package for the SPWF04Sx Wi-Fi modules

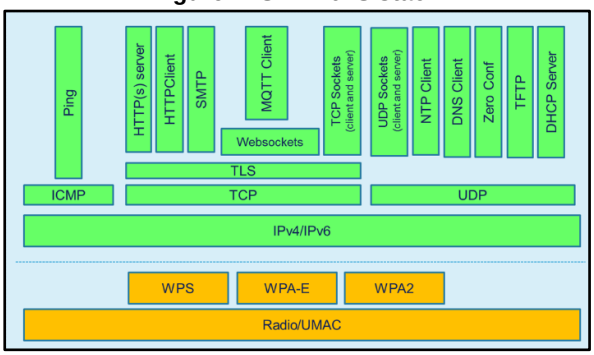
Data brief



Features

- AT-like command interface through UART and SPI
- Integrated TCP/IPv6, TCP/IPv4 protocol stacks
  - 8 simultaneous TCP or UDP clients and 2 socket servers (supporting up to 8 clients each)
  - Secured socket and upper layers (i.e. HTTPS) supporting up to TLS 1.2, including X.509 Certicates AES (128, 256), hash (MD5, SHA-1, SHA-256, SHA-384) and public key algorithms for key exchange (RSA, DH, ECDH) and digital signature (RSA, ECDSA).
  - Web server supporting SSI and dynamic web pages.
- RESTful API to GET & POST web content
- Open, WEP, WPA2 PSK, WPA2 enterprise
- System modes: Station, IBSS, and miniAP (supporting up to 5 STA)
- miniAP easily provisioned (SSID, PWD)
- Fast Wi-Fi re-association after reset
- Secure firmware and file-system update over-the-air (FOTA)
- Application subsystem
- Embedded real-time MicroPython environment for customer applications and on-board development
- MicroPython API library for easy access to Wi-Fi subsystem capabilities and device peripherals (i.e. UART, SPI, I^2C)

Figure 1: SPWF04S stack



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www.st.com

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Description

The STSW-WIFI004 package integrates the TCP/IP protocol stack FW binary files (.hex and .fota) compatible with the SPWF04Sx Wi-Fi module with embedded 2 MB Flash.

The TCP/IP protocol stack FW supports both direct links with Wi-Fi-enabled devices and infrastructure communication modes with an access point.

Application utilities such as an HTTP client, a web server, RESTful API for accessing files on servers in the cloud, and support for dynamic web pages with SSI functions are also featured to allow easy integration with many Internet-based applications. See also application note AN4965 for further details on HTTP server capabilities.

Multiple higher level protocols over TCP are supported by the module, including: HTTP, MQTT, SMTP, and WebSockets to easily connect applications to the cloud. Multiple protocols supported over UDP include: TFTP, SNTP and mDNS. The module also includes IPv6 networking capabilities.

For secure end-to-end communication with the cloud, a TLS stack is embedded in every module with no licensing charge. See application note AN4963 for details.

The FW package also includes an AT command layer interface for user-friendly access to the stack functionalities via the UART serial port and an SPI slave interface, supporting messages from and to the host processor.

A complete description of the TCP/IP protocol stack FW interface is provided in user manual UM2114.

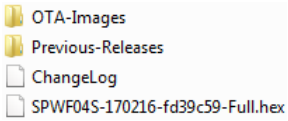
The SPWF04Sx module’s firmware can be securely upgraded via UART and over-the-air (FOTA).

ST may update the FW provided with the modules at any time. ST recommends that users regularly check for documentation and the current FW version, which is available at www.st.com/wifimodules.

1 STSW-WIFI004 package contents

The contents of the STSW-WIFI004 zip-formatted package are as follows:

stsw-wifi004 root directory



ChangeLog: Highlights, new features, and bug fixes for the firmware, and optionally backward-compatibility changes or known anomalies.

SPWF04S–yymmdd-zzzzzzz-Full.hex: Binary image of the SPWF04Sx module's internal firmware, including TCP/IP protocol stack and internal Flash file system. "*yymmdd*" is the date code, and "*zzzzzzz*" is the tracking number. For example, SPWF04S-170216-fd39c59-Full.hex was created on the 16th of February, 2017. The starting address for the binary image in the module's MCU is 0x08000000. Since the file is in hex format, the starting address should be handled directly from the Flashing utility.

Free PC utility software that communicates through the RS232 with the STM32 system memory bootloader is available. A description of the SPWF04Sx boot pin is provided in the datasheet.

For Windows users, there is an STMicroelectronics tool called "STM32 Flash loader demonstrator" available at the following link: *http://www.st.com/en/development-tools/flasher-stm32.html*. Users of other platforms can download the tool source code (called "stm32flash") at: *https://sourceforge.net/projects/stm32flash*.

OTA-Images subdirectory

The OTA-Images folder and subfolders contain all the files and utilities to create files for over-the-air update, even for protected OTA. In particular, this is where you can find the firmware (FW) and file system (FS) subfolders containing the binary files and utilities needed to generate the required OTA files.

Previous-Releases subdirectory

The Previous-Releases folder contains a set of subfolders, each named as a previous release name: e.g. "v1_0_0". Every subfolder release contains 3 files: SPWF04S–yymmddzzzzzzz- Full.hex, SPWF04S-yymmdd-zzzzzzz-Release.hex, and SPWF04S-yymmddzzzzzzz- Release.fota

OTA-Images\FS subdirectory

Contains all the main resources for the SPWF04x module file system.

FatVolume_LOCK.img and ULOCK files

Pre-built file system binary images for locked and unlocked working mode, ready to be Flashed to the SPWF04Sx module. For more details, refer to the SPWF04x user manual: UM2114.

APP_Disk subdirectory

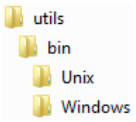
Contains files and resources available in the binary image files described in the previous section.

Unzipped subdirectory

Here you can find all html files in a non-zipped format. To optimize the filesystem footprint, they are normally used in a compressed format.

utils subdirectory

provides all of the required utilities (utils) to create filesystem binary images on Unix and Windows.



Windows subdirectory

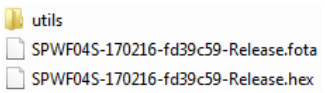
dir2img.bat: PC batch file to create an image filesystem for the SPWF04Sx Wi-Fi module. This file illustrates the proper syntax for the CreateFS.exe command, and can be viewed with a text editor.

Unix subdirectory

makefilesystem.sh: Bash script to create an image filesystem for the SPWF04Sx Wi-Fi module.

OTA-Images\FW subdirectory

Provides all required utilities (utils) to create over-the-air files on Linux and Windows.



Also included are:

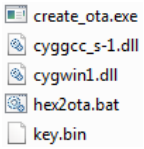
- utils: directory containing software for Windows and Unix platforms to create OTA files starting from the provided hex file. For a more detailed description of this directory, please refer to the relevant subsection.
- SPWF04S-*yymmdd-zzzzzzz*-Release.fota: OTA file for firmware update over-the-air.
- SPWF04S-*yymmdd-zzzzzzz*-Release.hex: Main application firmware in hex format.

OTA utils subdirectory

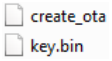
Here you can find all resources required to create OTA files.

bin: this folder contains pre-built images for Unix and Windows, all required libraries and the ***key.bin*** file, which can be used to create protected OTA files.

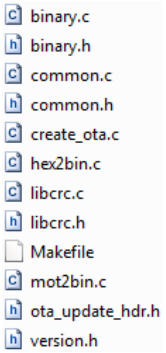
- Windows: for windows PC, the application is provided with required DLL in order to render it portable. To execute it, please refer to the ***hex2ota.bat*** file.



- Unix: create_ota binary file statically linked for Linux machines. In order to see the command syntax, run the command without any argument.



src: a directory that contains the source code and makefile to build the FOTA generator application. Please note that OpenSSL library is required to build and link this source code.



2 Revision history

Table 1: Document revision history

Date	Version	Changes
17-Mar-2017	1	Initial release.
13-Sep-2017	2	Updated *Features* in cover page. Updated image stsw-wifi004 root directory. Updated OTA-images subdirectory. Minor text changes.

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