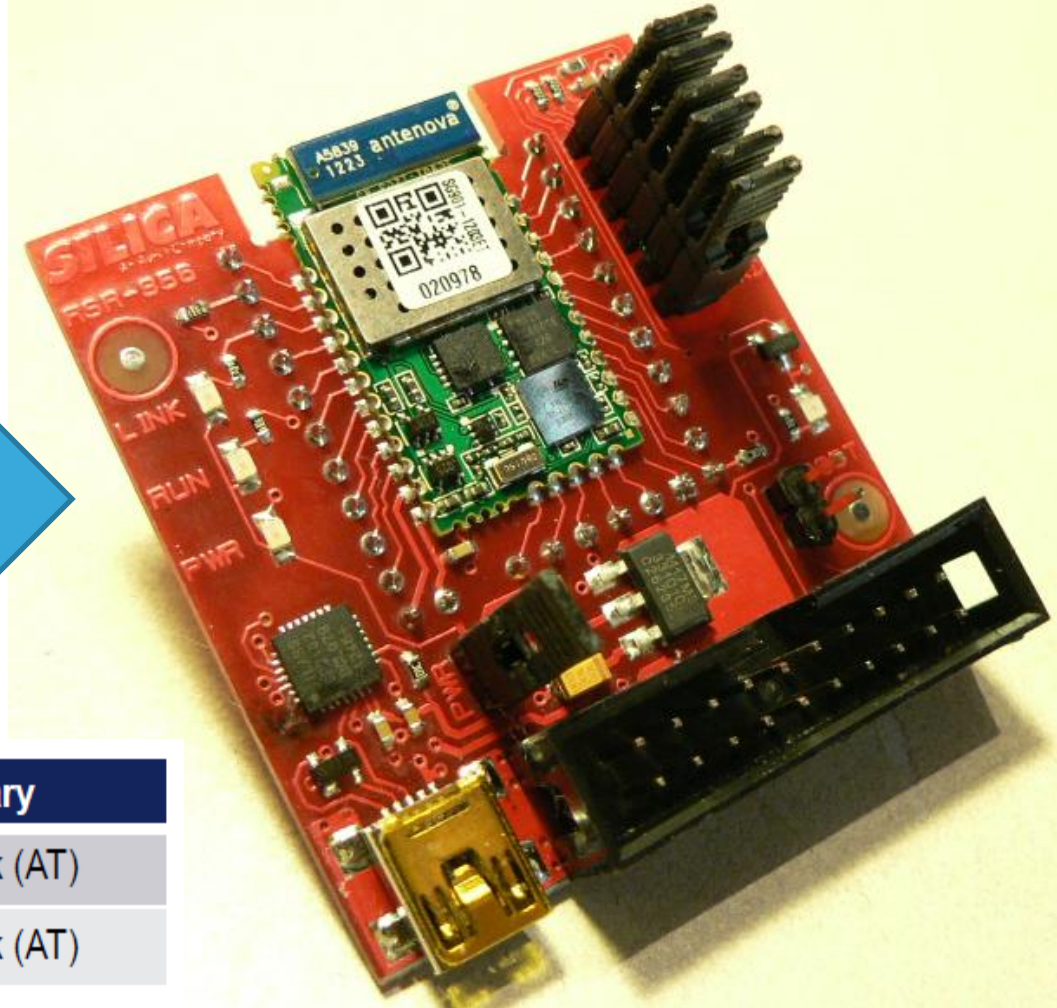
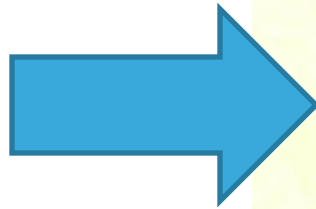


SILICA STM WiFi



SILICA STM WiFi EvaBoard

STM WiFi



Part Number	Antenna Options	SW Library
SPWF01SA.11	Chip Antenna	Full Stack (AT)
SPWF01SC.11	U.FL	Full Stack (AT)

SILICA - STM WiFi EvaBoard
Full doc will be available here:

www.emcu.it/wifi



STM32F0 + STM_WiFi = Web Server

All customers who want to perform practical tests on the Web Server, must install on their PC:

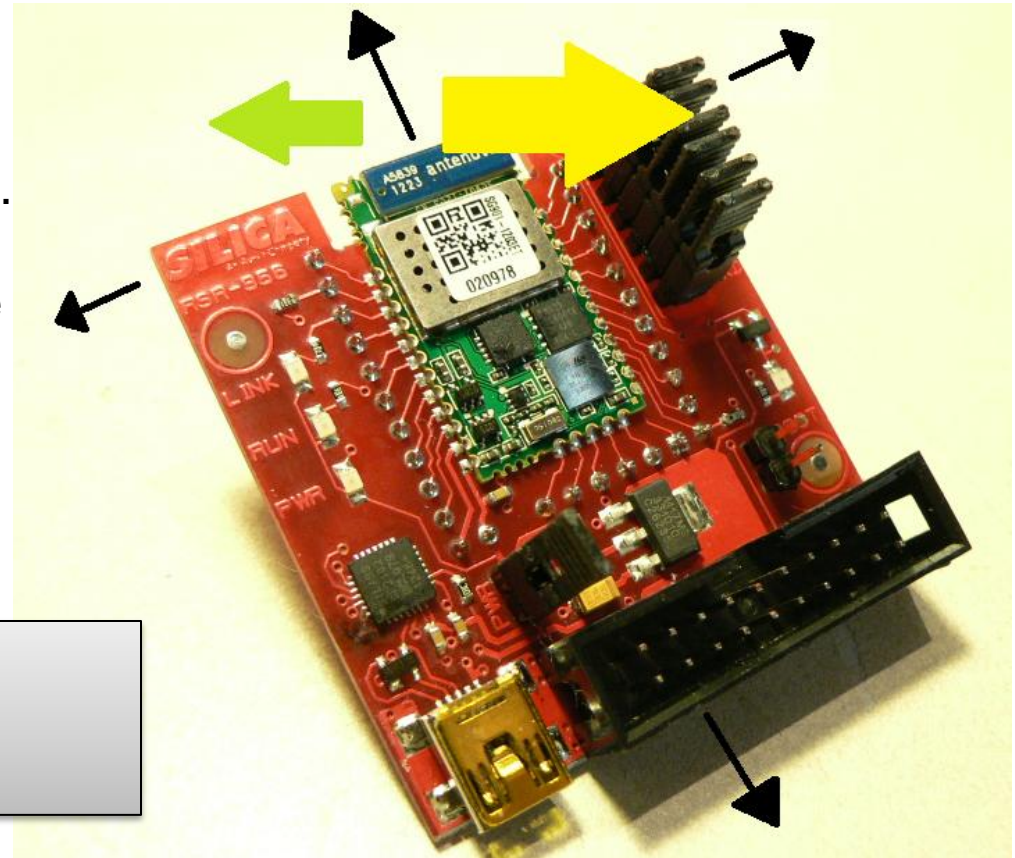
- **KEIL C Compiler** (MDK-ARM 32K free), get it here:
<http://www.keil.com/download/product/>
- For those who have **Windows7** we suggest to install **Tera Term** (http://en.wikipedia.org/wiki/Tera_Term) download it from this link:
<http://tssh2.sourceforge.jp/index.html.en>
- Install the driver for: **SILICON LABS CP2102** - VCP Driver Kit, download it from this link:
<http://www.silabs.com/products/mcu/Pages/USBtoUARTBridgeVCPDrivers.aspx>
- **Angry IP Scanner** is here: <http://sourceforge.net/projects/ipscan/?source=dlp>

Remind that

Keep in mind the directionality of the antenna mounted on the WiFi module.

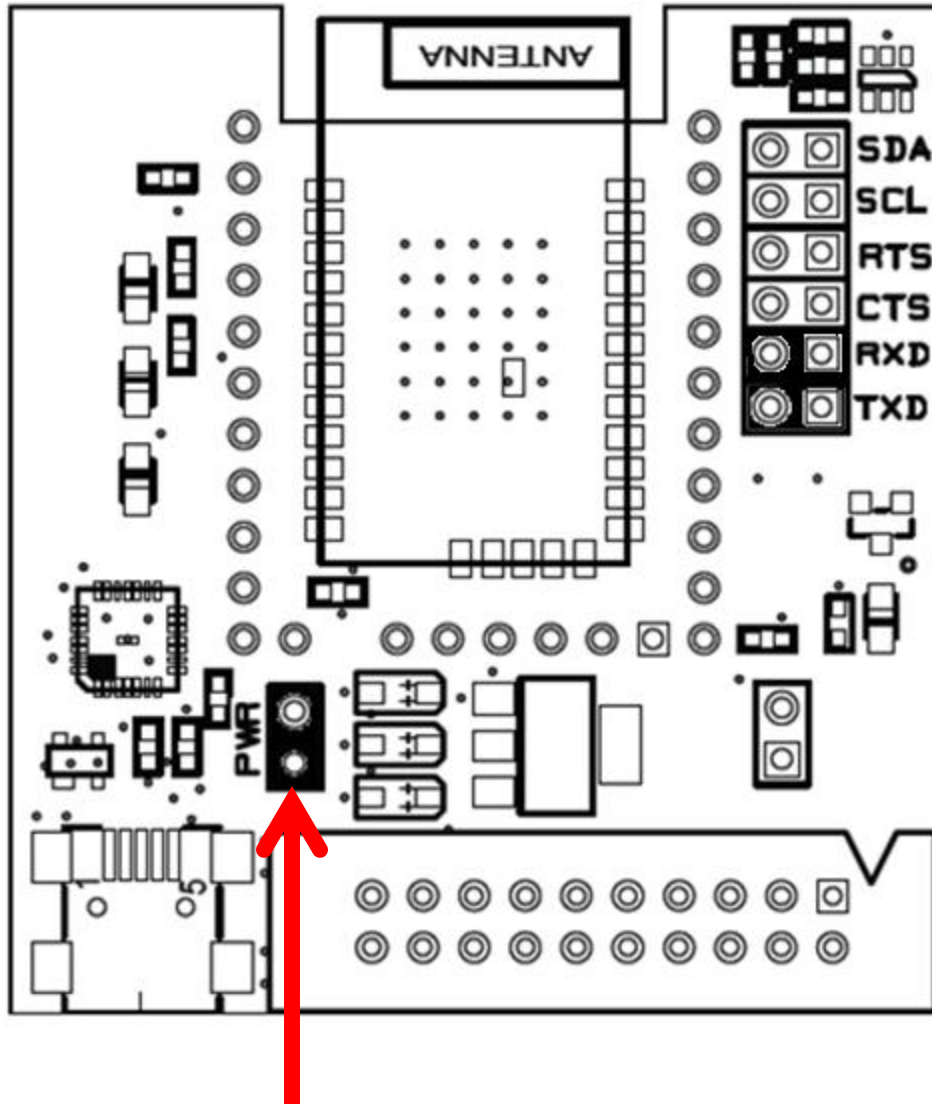
The arrows (see drawing) indicate the direction where the antenna is more sensitive.

Yellow arrow == Maximum sensitivity
Green arrow == Medium sensitivity
Black arrows == Low sensitivity



Connect to the PC the SILICA WiFi EvaBoard

TOP MOUNT



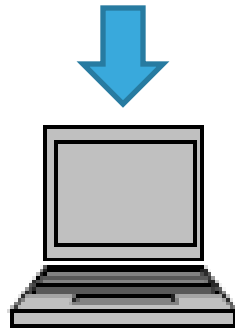
ATTENTION:

Only the jumpers: **PWR** , **TXD**, **RXD** must be present on SILICA STM WiFi EvaBoard

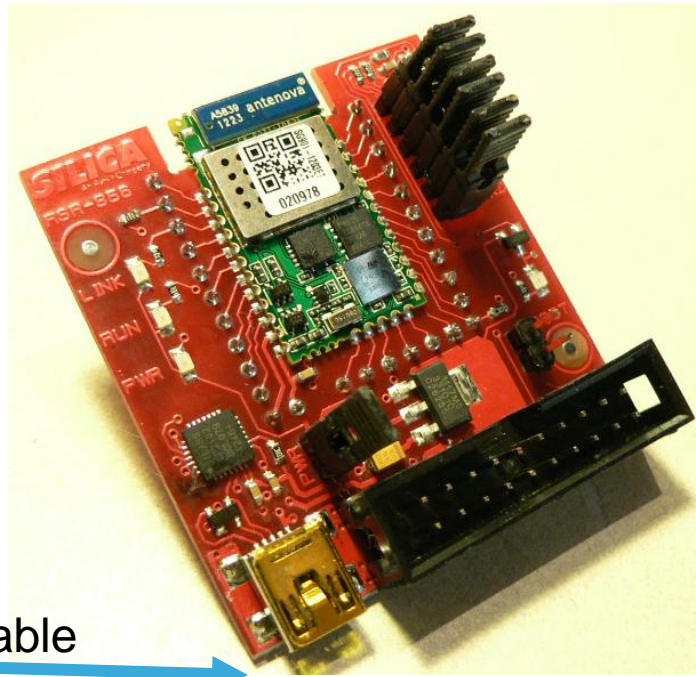
Connect to the PC the SILICA WiFi EvaBoard

For Windows7 we suggest to use: Tera Term

For Windows XP we suggest to use: Hyper Terminal



USB cable



The first time you connect the SILICA STM WiFi EvaBoard to PC probably it requests the driver (**SILICON LABS CP2102 - VCP Driver Kit**) that you get here.

<http://www.silabs.com/products/mcu/Pages/USBtoUARTBridgeVCPDrivers.aspx>

The USB/RS232 driver is available for:

Windows XP/Server 2003/Vista/7

WinCE

Macintosh OSX

Linux



SetUp Tera Term

Tera Term: New connection

TCP/IP Host: myhost.example.com

History TCP port#: 22

Service: Telnet SSH version: SSH2

SSH Protocol: UNSPEC

Other

Serial Port: COM26: Silicon Labs CP210x USB to

OK Cancel Help

Tera Term: Terminal setup

Terminal size: 78 X 37

Term size = win size

Auto window resize

New-line: Receive: CR Transmit: CR+LF

Terminal ID: VT100

Local echo

Answerback: Auto switch [VT<->TEK]

Coding (receive): UTF-8 Coding (transmit): UTF-8

locale: american CodePage: 65001

OK Cancel Help

Tera Term: Serial port setup

Port: COM26

Baud rate: 115200

Data: 8 bit

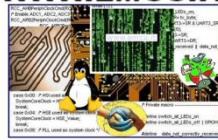
Parity: none

Stop: 1 bit

Flow control: none

Transmit delay: 0 msec/char 0 msec/line

OK Cancel Help



Connect the STM WiFi module to a WiFi A.P./Router

```
at+s.ssidtxt=name_router
```

```
// Connect to WiFi router.
```

```
// Substitute name_router with your WiFi-Router name
```

```
at+s.scfg=wifi_wpa_psk_text, network_password
```

```
// SetUp the network password
```

```
// Substitute network_password with your WiFi-Router password
```

```
at+s.scfg=wifi_priv_mode,2
```

```
// SetUp the protection mode used in your WiFi-router network
```

```
// 0 == OPEN
```

```
// 1 == WEP
```

```
// 2 == WPA/WPA2
```

```
at+s.scfg=wifi_mode,1
```

```
// Set radio mode to STA (client station)
```

```
at+s.scfg=ip_use_dhcp,1
```

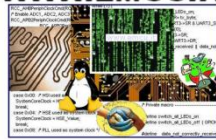
```
// Enable dhcp client. The WiFi-router give us the address.
```

```
at&w
```

```
// Save settings
```

```
at+cfun=1
```

```
// Soft reset
```



Connect the STM WiFi module to a WiFi A.P./Router

At the end of the command showed above the STM WiFi module is connected to WiFi network (see below).



```
COM26:115200baud - Tera Term VT
File Edit Setup Control Window Help
at+cfun=1
+WIND:2:RESET
+WIND:1:Poweron (1203-121023_01-44-ga4955ae-stm_demo)
+WIND:13:Sagrad IMM: Copyright (c) 2012 Sagrad, Inc. All rights Reserved.
+WIND:3:Watchdog Running
+WIND:0:Console active
+WIND:46:WPA: Crunching PSK...
+WIND:32:WiFi Hardware Started
+WIND:21:WiFi Scanning
+WIND:35:WiFi Scan Complete (0x0)
+WIND:39:FOUND: E0:46:9A:77:AF:1A FREQ: 2437 RSSI: -36 SSID: 'NETGEAR-3G' CAPS: 0411 WPA: 0 WPA2: 20
+WIND:19:WiFi Join: E0:46:9A:77:AF:1A
+WIND:25:WiFi Association to 'NETGEAR-3G' successful
+WIND:51:WPA Handshake Complete
+WIND:24:WiFi Up: 192.168.0.7
```

```
+WIND:33:WiFi BSS Lost
+WIND:41:WiFi Disassociation
+WIND:21:WiFi Scanning
+WIND:35:WiFi Scan Complete (0x0)
+WIND:21:WiFi Scanning
+WIND:35:WiFi Scan Complete (0x0)
+WIND:21:WiFi Scanning
+WIND:35:WiFi Scan Complete (0x0)
+WIND:39:FOUND: E0:46:9A:77:AF:1A FREQ: 2437 RSSI: -47 SSID: 'NETGEAR-3G' CAPS: 0411 WPA: 0 WPA2: 20
+WIND:19:WiFi Join: E0:46:9A:77:AF:1A
+WIND:25:WiFi Association to 'NETGEAR-3G' successful
+WIND:51:WPA Handshake Complete
+WIND:24:WiFi Up: 192.168.0.7
```

If WiFi network falls, the STM WiFi module highlights this (see the orange box above) and starts automatically a new scan for reconnecting the network. See above.



Some AT commands

*** List the current files set in your STM WiFi module or dongle.

AT+s.fsl

*** Dump all settings

AT&V

*** Report current status/statistics

AT+S.STS

*** Reset the WiFi

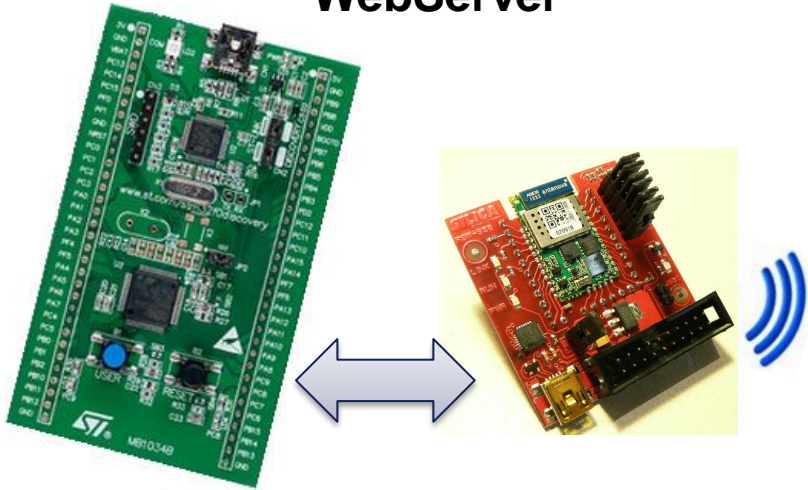
AT+CFUN=1

End first section

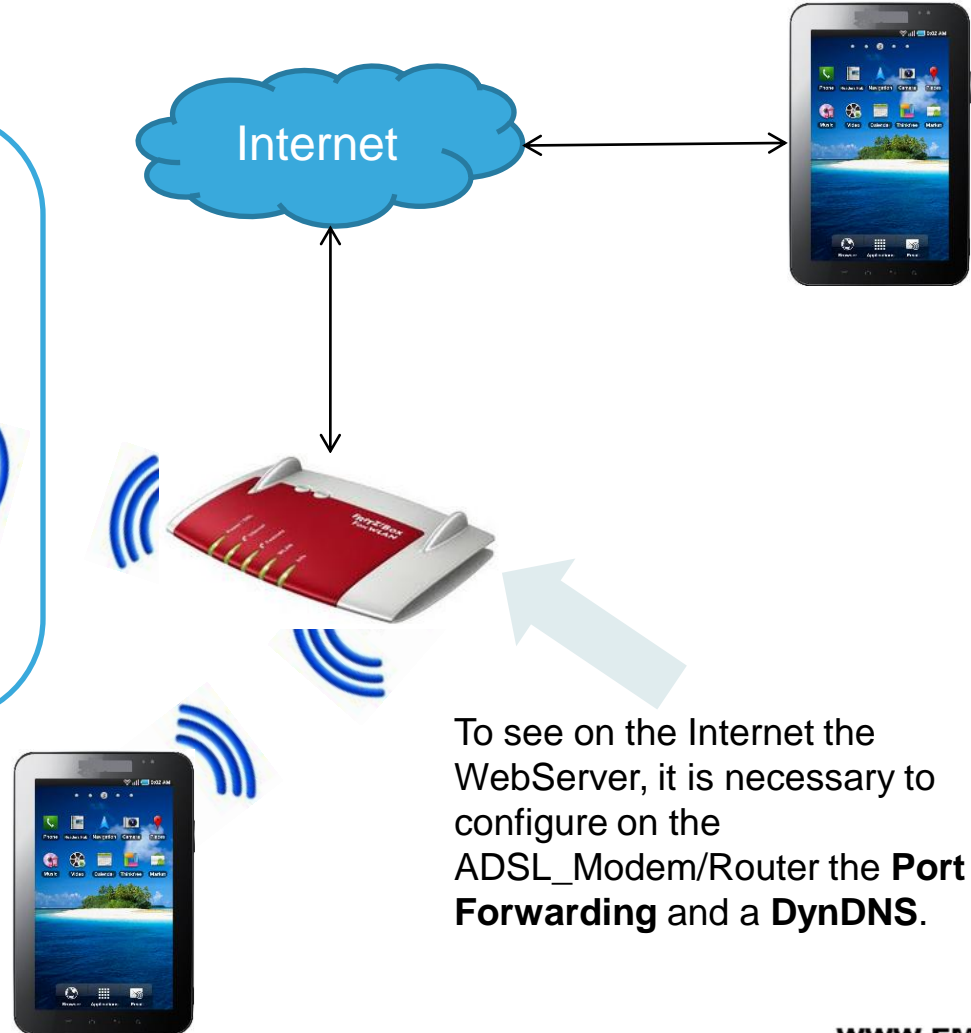
**Close Tera Term or Hyper Terminal
and disconnect the SILICA STM
WiFi EvaBoard from the PC**

STM32F0 + STM_WiFi = Web Server

WebServer



Internet

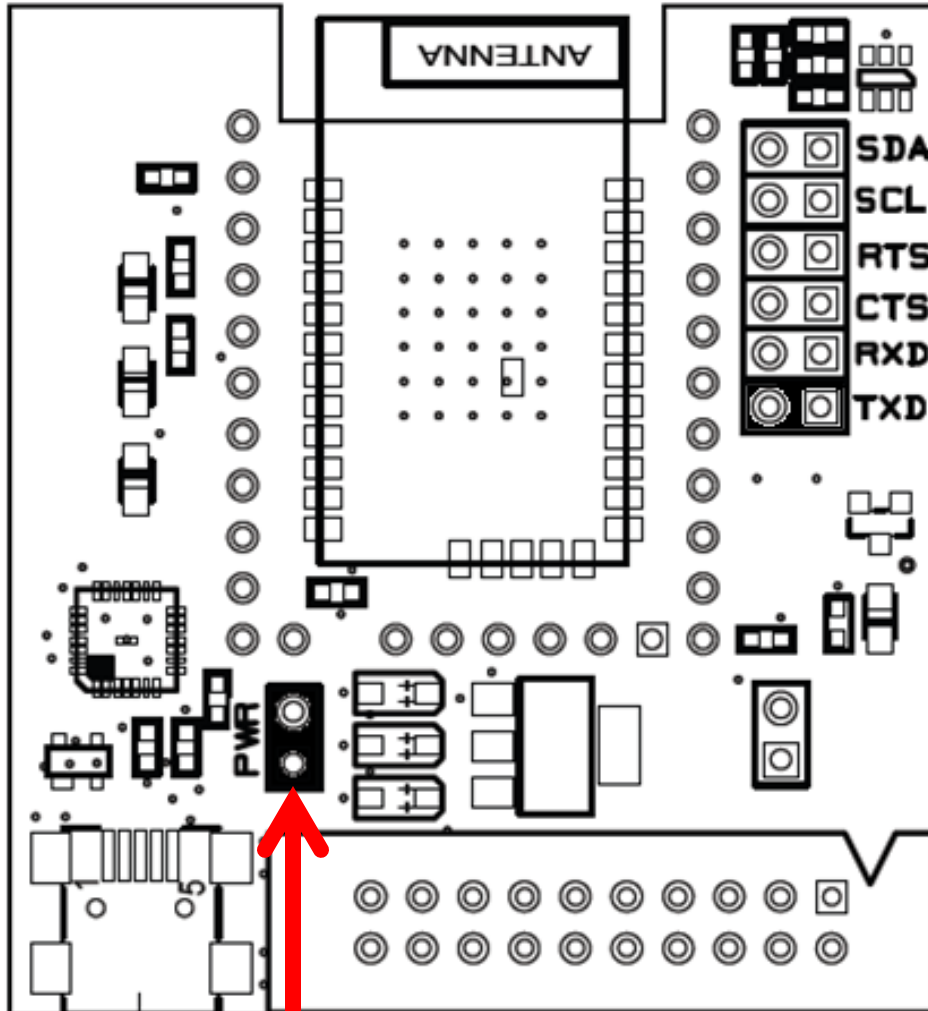


To see on the Internet the WebServer, it is necessary to configure on the ADSL_Modem/Router the **Port Forwarding** and a **DynDNS**.

STM32F0 + STM_WiFi = Web Server

Connect STM WiFi module to STM32F0-Discovery

TOP MOUNT



ATTENTION:

Only the jumpers: **PWR** and **TXD** must be present on SILICA STM WiFi EvaBoard

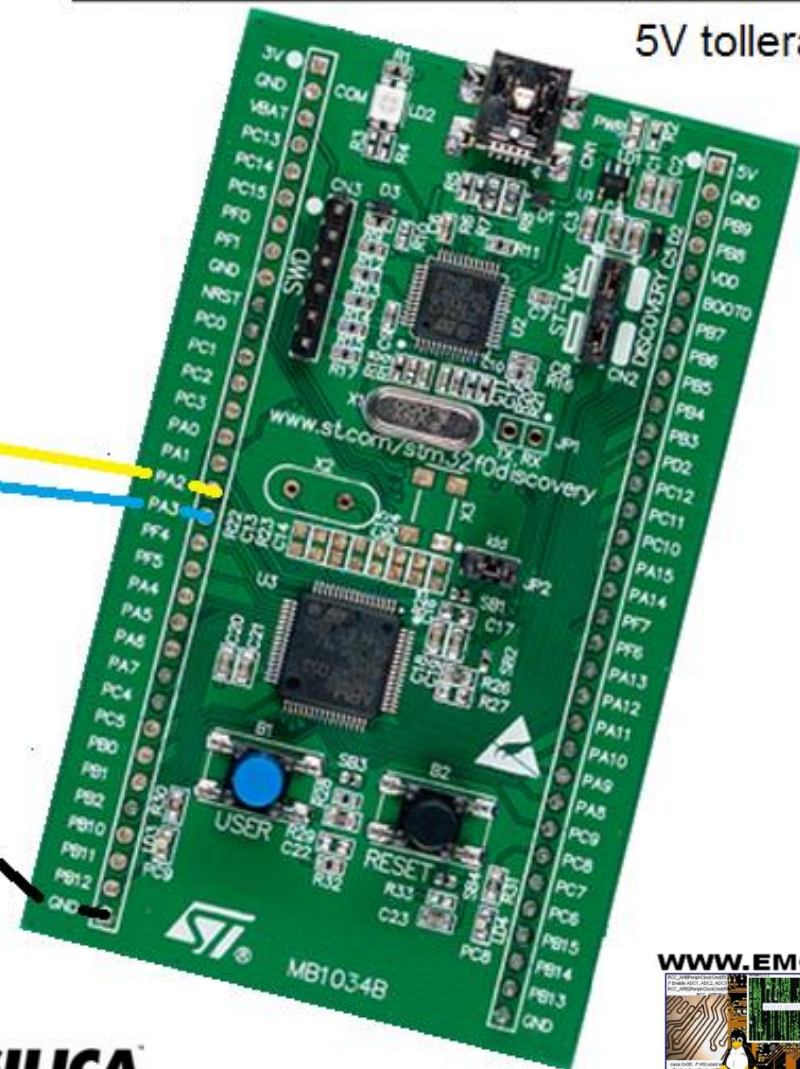
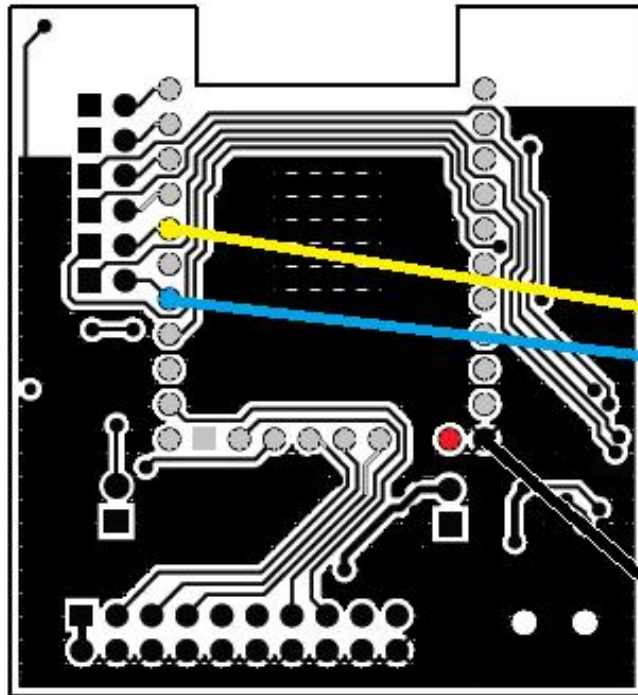
STM32F0 + STM_WiFi = Web Server

Connect STM WiFi module to STM32F0-Discovery

TX	UART Transmit line	PA2	USART2_TX
RX	UART Receive line	PA3	USART2_RX

5V tollerant

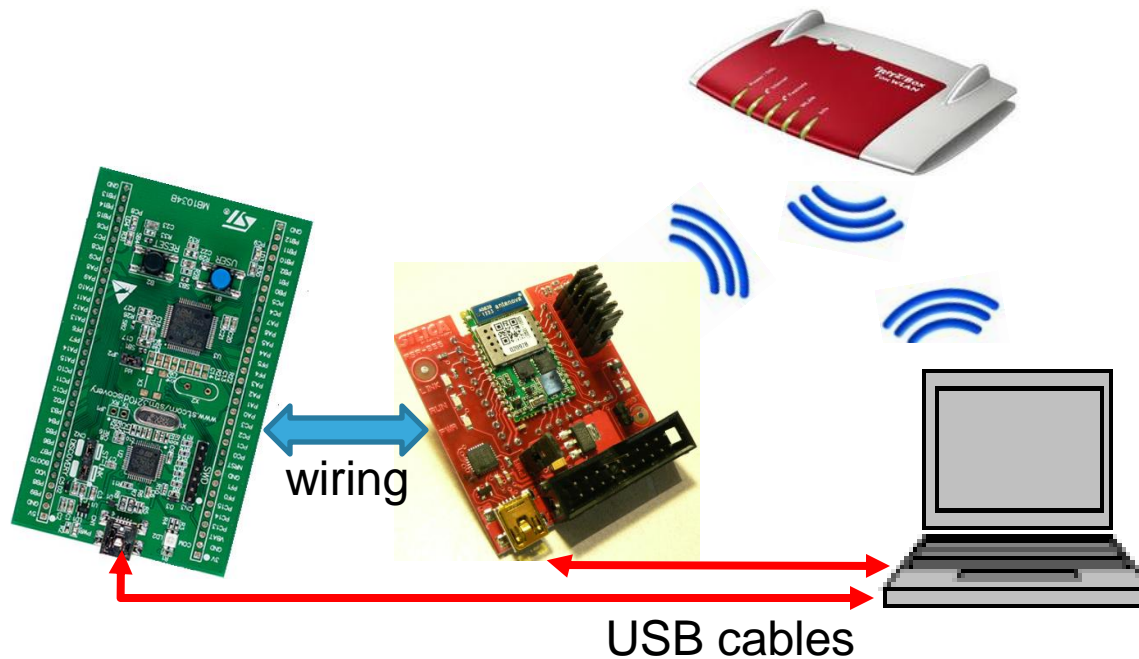
SOLDER SIDE



RXD1	8	UART1 Receive data input	5V tolerant
TXD1	6	UART1 Transmit data output	5V Tolerant



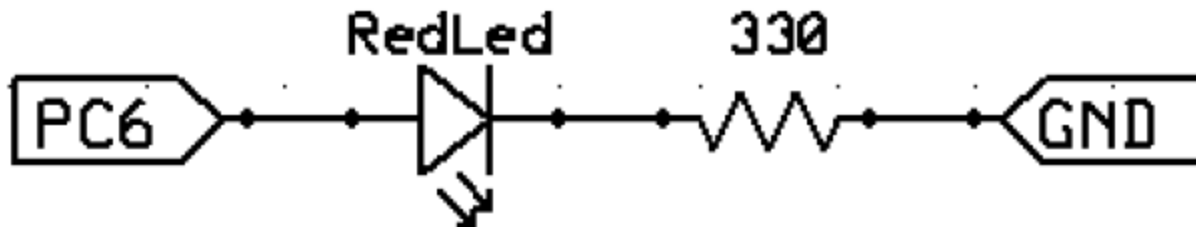
STM32F0 + STM_WiFi = Web Server



Remember:

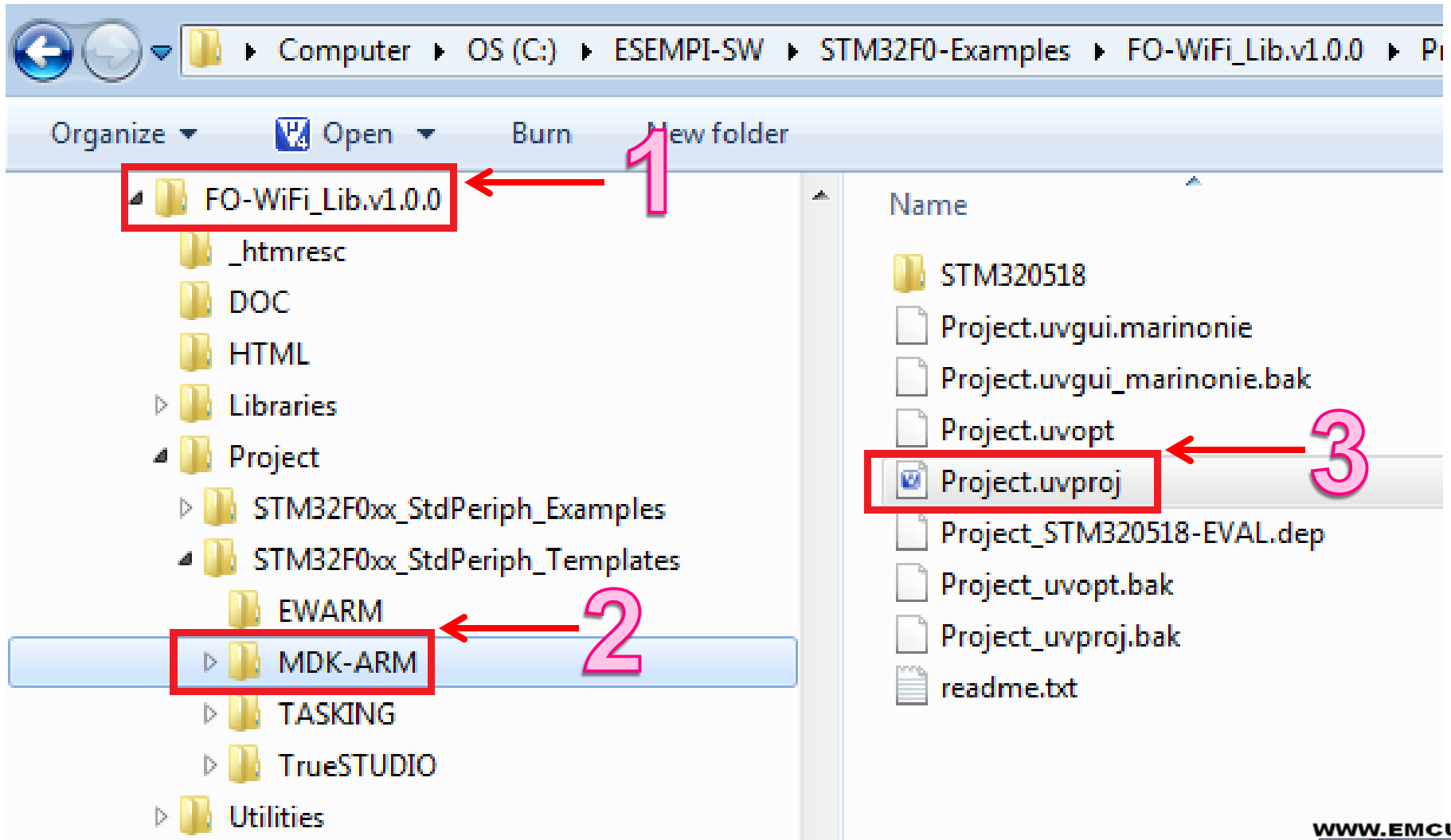
- Connect your PC WiFi to the classroom A.P./Router
- Connect Silica STM WiFi EvaBoard and STM32F0-Discovery to your PC

Optionally: if you connect a led (see schematic below) on STM32F0-Discovery from **PC6** and **GND**, you have the possibility to monitor the waiting from the answer from STM WiFi module.

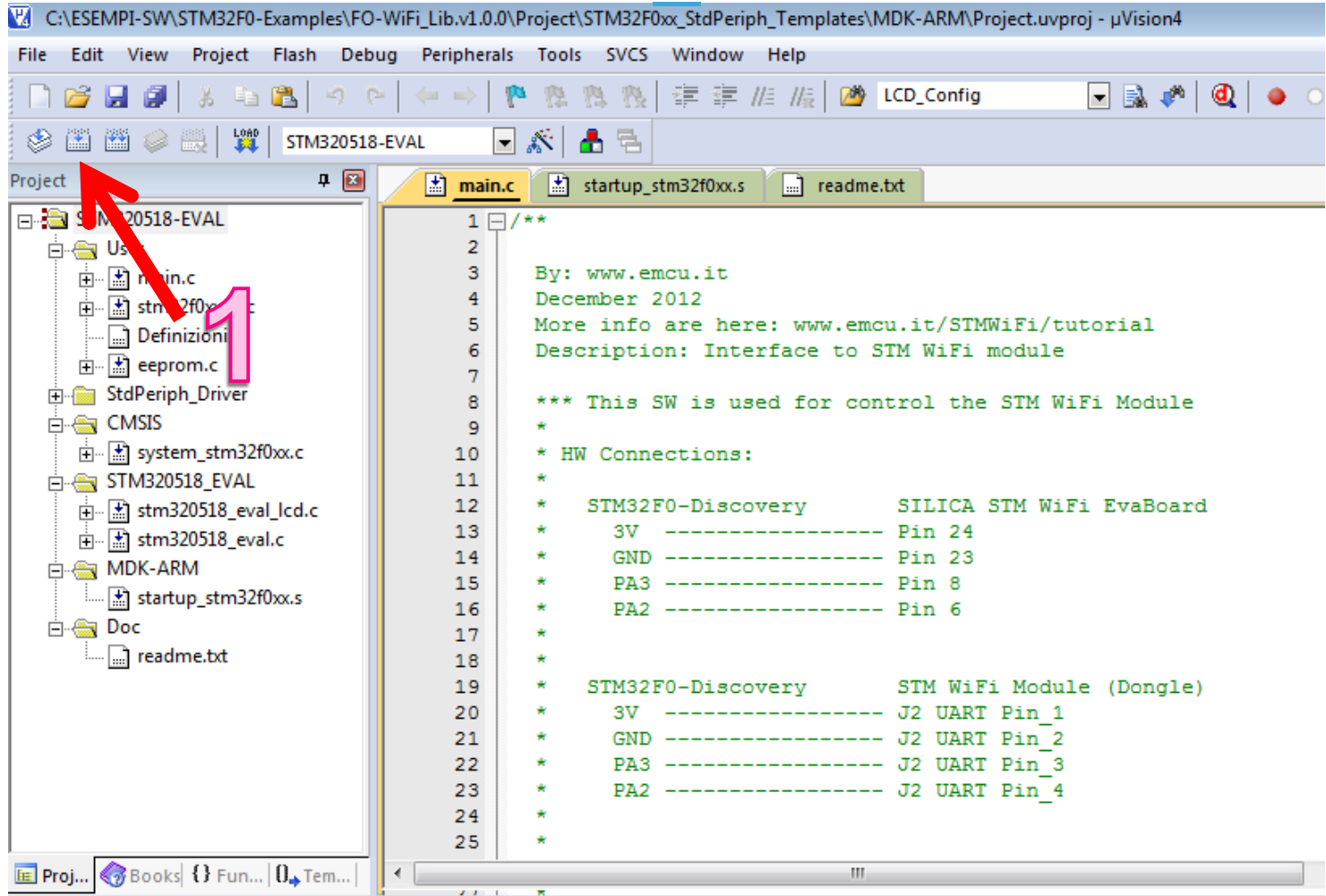


STM32F0 + STM_WiFi = Web Server

Run KEIL and open the file shown below (n.3)



STM32F0 + STM_WiFi = Web Server



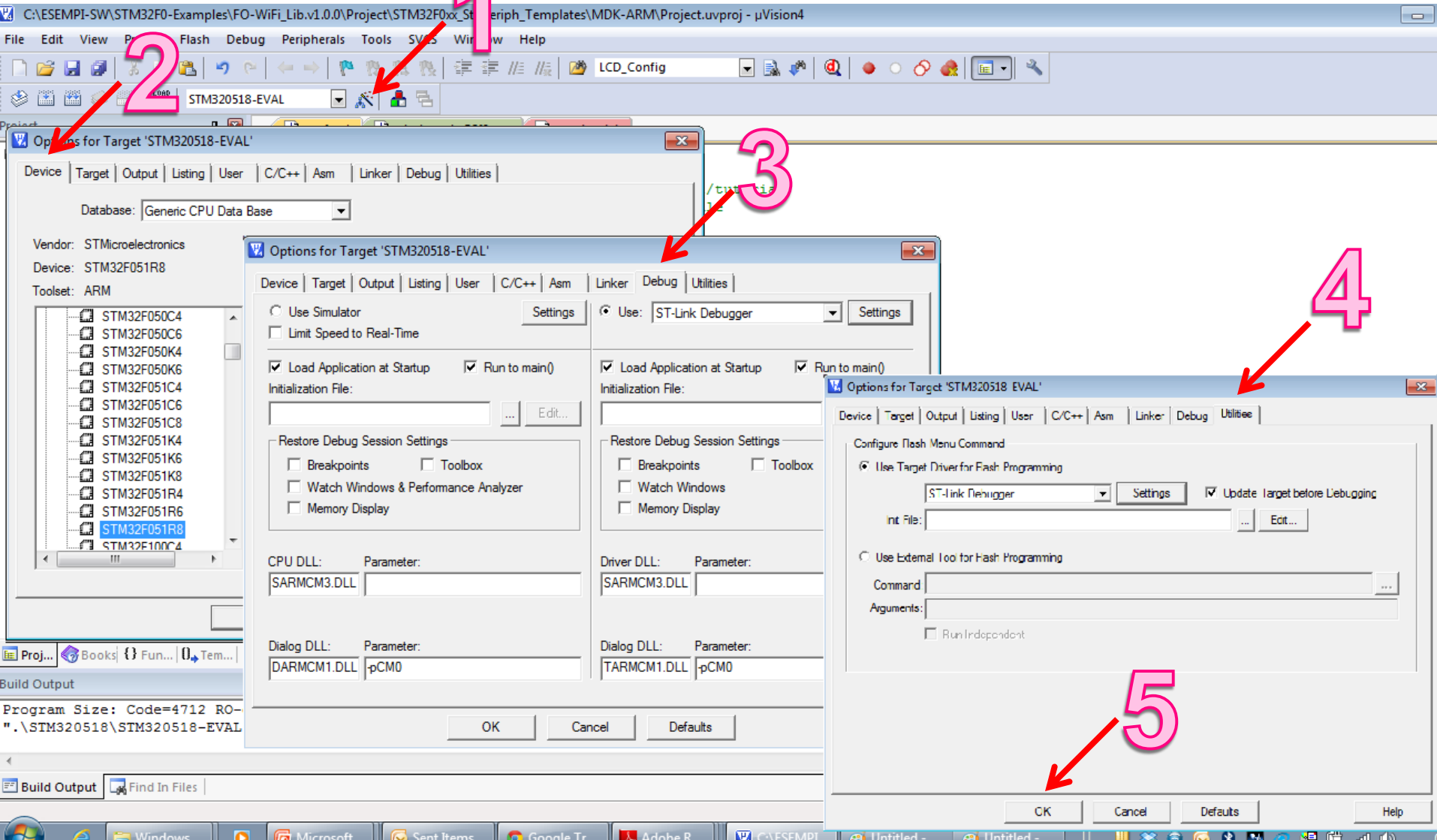
Compile the example

Build Output

```
Build target 'STM320518-EVAL'  
compiling main.c...  
linking...  
Program Size: Code=4712 RO-data=372 RW-data=1212 ZI-data=3100  
".\STM320518\STM320518-EVAL.axf" - 0 Error(s), 0 Warning(s).
```

2

STM32F0 + STM_WiFi = Web Server

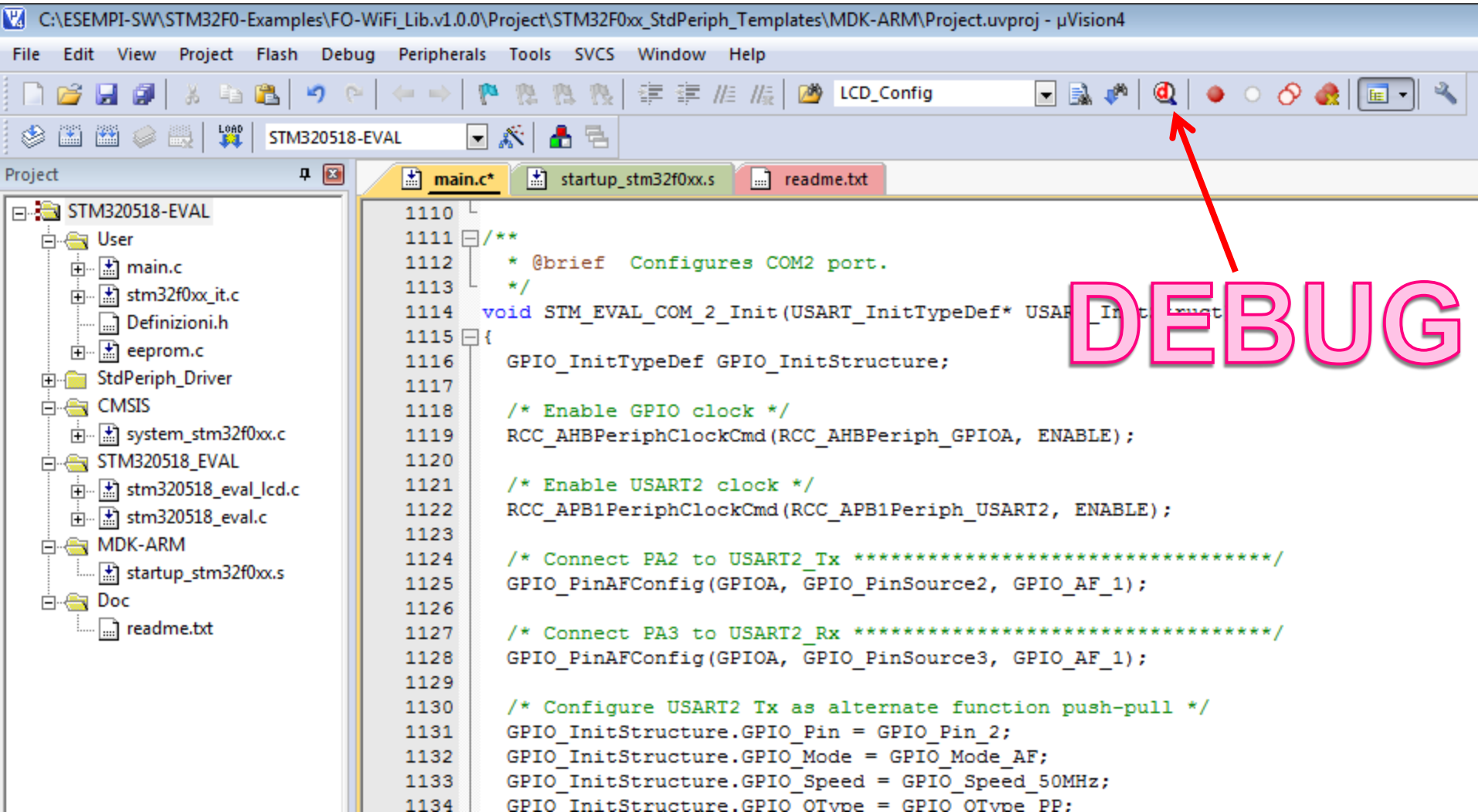


The screenshot displays the Keil uVision IDE interface with several configuration dialog boxes open for the target 'STM320518-EVAL'. The steps are numbered as follows:

- 1**: Target selection in the 'Options for Target' dialog.
- 2**: Device selection in the 'Options for Target' dialog.
- 3**: Debugger selection (ST-Link Debugger) in the 'Options for Target' dialog.
- 4**: Flash programming options (Use Target Driver for Flash Programming) in the 'Options for Target' dialog.
- 5**: Update target before debugging checkbox in the 'Options for Target' dialog.

Control the configuration

STM32F0 + STM_WiFi = Web Server

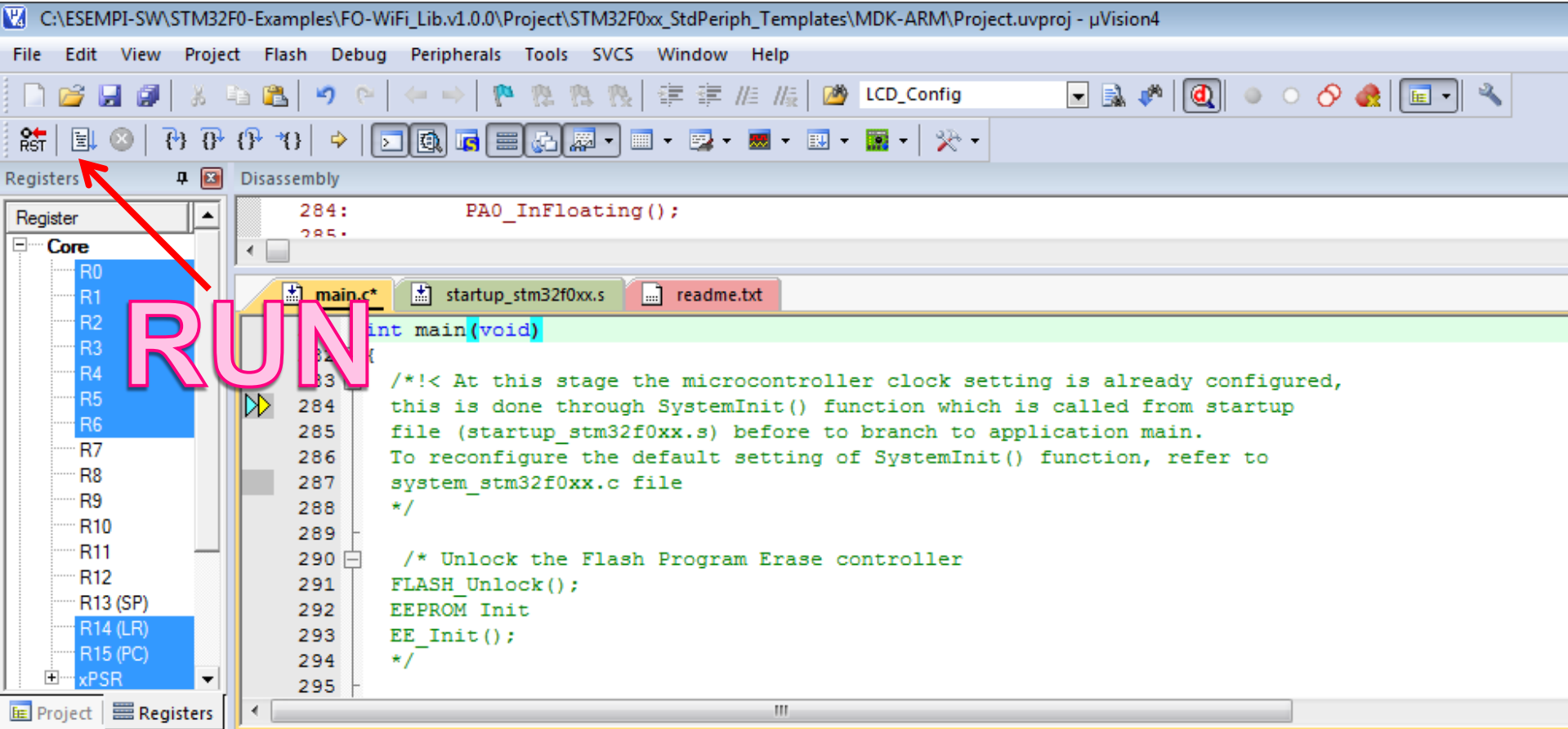


The screenshot shows the µVision4 IDE interface. The title bar indicates the project path: C:\ESEMPI-SW\STM32F0-Examples\FO-WiFi_Lib.v1.0.0\Project\STM32F0xx_StdPeriph_Templates\MDK-ARM\Project.uvproj - µVision4. The menu bar includes File, Edit, View, Project, Flash, Debug, Peripherals, Tools, SVCS, Window, and Help. The toolbar contains various icons, with a red arrow pointing to the 'Debug' icon (a magnifying glass with a red 'D'). The project tree on the left shows the directory structure for STM320518-EVAL, including folders like User, StdPeriph_Driver, CMSIS, and STM320518_EVAL, and files like main.c, stm32f0xx_it.c, and startup_stm32f0xx.s. The main editor window displays the code for main.c, showing the initialization of the USART2 peripheral. The code includes comments and function calls for enabling clocks and configuring the GPIO pins for USART2 Tx and Rx.

```
1110
1111 /**
1112  * @brief Configures COM2 port.
1113  */
1114 void STM_EVAL_COM_2_Init(USART_InitTypeDef* USART_InitStructure)
1115 {
1116     GPIO_InitTypeDef GPIO_InitStructure;
1117
1118     /* Enable GPIO clock */
1119     RCC_AHBPeriphClockCmd(RCC_AHBPeriph_GPIOA, ENABLE);
1120
1121     /* Enable USART2 clock */
1122     RCC_APB1PeriphClockCmd(RCC_APB1Periph_USART2, ENABLE);
1123
1124     /* Connect PA2 to USART2_Tx *****/
1125     GPIO_PinAFConfig(GPIOA, GPIO_PinSource2, GPIO_AF_1);
1126
1127     /* Connect PA3 to USART2_Rx *****/
1128     GPIO_PinAFConfig(GPIOA, GPIO_PinSource3, GPIO_AF_1);
1129
1130     /* Configure USART2 Tx as alternate function push-pull */
1131     GPIO_InitStructure.GPIO_Pin = GPIO_Pin_2;
1132     GPIO_InitStructure.GPIO_Mode = GPIO_Mode_AF;
1133     GPIO_InitStructure.GPIO_Speed = GPIO_Speed_50MHz;
1134     GPIO_InitStructure.GPIO_OTvpe = GPIO_OTvpe_PP;
```

DEBUG

STM32F0 + STM_WiFi = Web Server



C:\ESEMPI-SW\STM32F0-Examples\FO-WiFi_Lib.v1.0.0\Project\STM32F0xx_StdPeriph_Templates\MDK-ARM\Project.uvproj - µVision4

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

Registers Disassembly

Register

Core

R0
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13 (SP)
R14 (LR)
R15 (PC)
xPSR

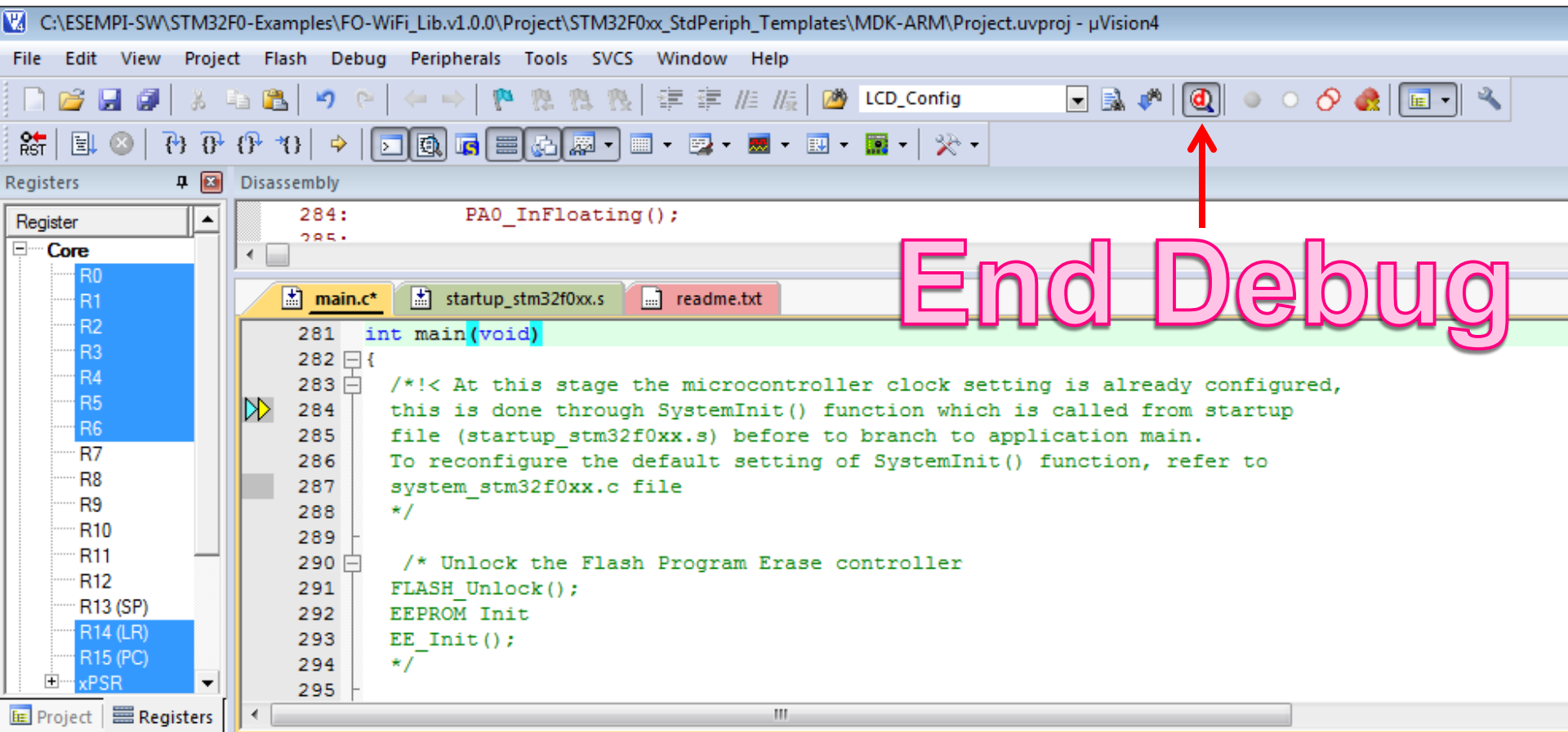
284: PA0_InFloating();
285:

main.c* startup_stm32f0xx.s readme.txt

```
int main(void)  
  
/*!< At this stage the microcontroller clock setting is already configured,  
this is done through SystemInit() function which is called from startup  
file (startup_stm32f0xx.s) before to branch to application main.  
To reconfigure the default setting of SystemInit() function, refer to  
system_stm32f0xx.c file  
*/  
  
/* Unlock the Flash Program Erase controller  
FLASH_Unlock();  
EEPROM Init  
EE_Init();  
*/
```

Project Registers

STM32F0 + STM_WiFi = Web Server



End debug and close KEIL

STM32F0 + STM_WiFi = Web Server

- Now run **Tera Term** or **Hyper Terminal** and **press and release the black button** on the STM32F0-Discovery
- For doing the connection just **press and release the blue button** on the STM32F0-Discovery.

At this point you see the **Blue led** that **flashing** and the **Red led** that **changes from OFF to ON**.

After some seconds, **Blue** and **Green** leds are **flashing** and **this means that the STM WiFi module is trying to connect to the WiFi Router**.

After 20/60 sec, **Blue** and **Green** leds go **OFF** and **this means that the connection is done**.

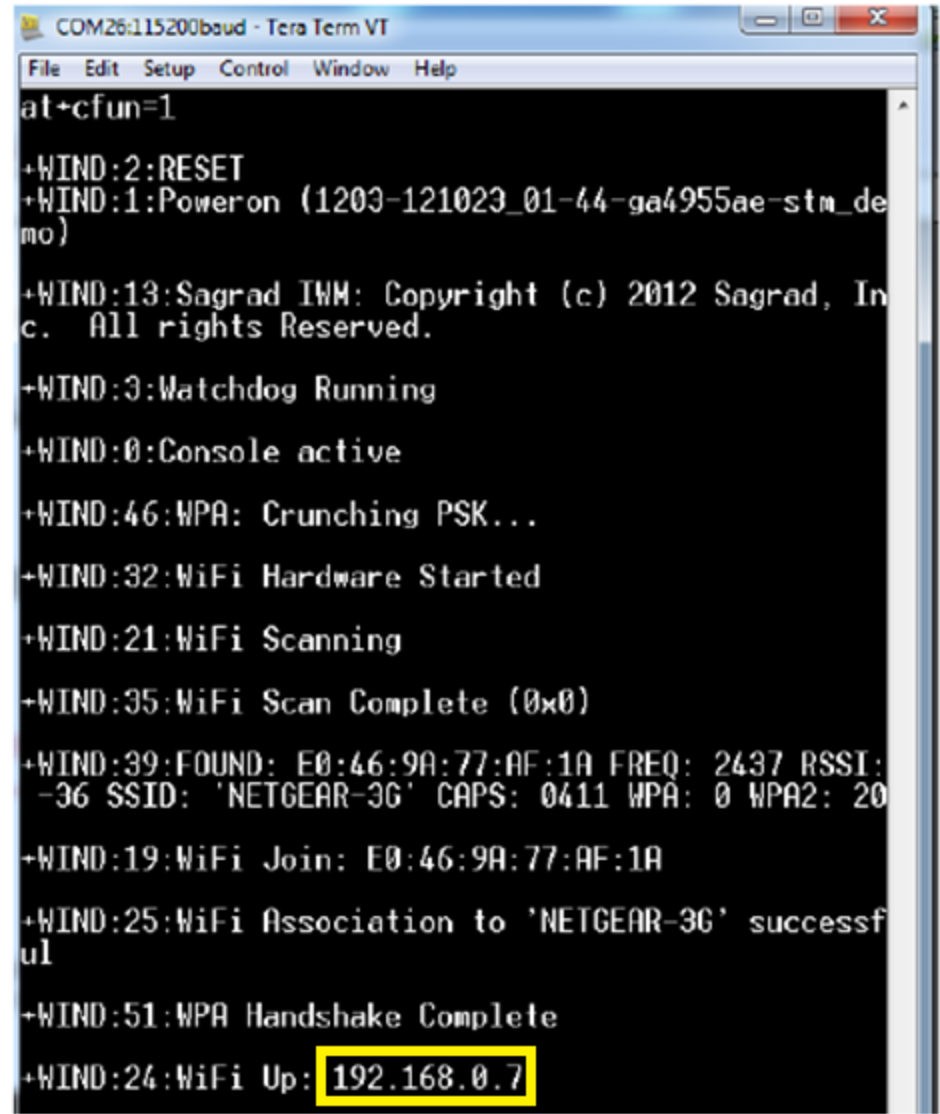
- Also, the led LED2 must be ON (LED2 is on the SILICA STM WiFi EvaBoard), this means that the WiFi connection is active.
- At this point, it is also loaded on the STM WiFi module, the html page named: **led.html**

This page shows the status of the LEDs mounted on the STM32F0-Discovery.

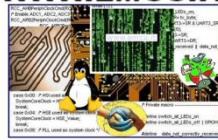
STM32F0 + STM_WiFi = Web Server

WiFi Sniffing

In the terminal **Tera Term** or **Hyper Terminal** you will see something similar to the image showed here. In the yellow box there is the address that the access point and/or router have assigned to our WiFi card.



```
COM26:115200baud - Tera Term VT
File Edit Setup Control Window Help
at+cfun=1
+WIND:2:RESET
+WIND:1:Poweron (1203-121023_01-44-ga4955ae-stm_demo)
+WIND:13:Sagrad IMM: Copyright (c) 2012 Sagrad, Inc. All rights Reserved.
+WIND:3:Watchdog Running
+WIND:0:Console active
+WIND:46:WPA: Crunching PSK...
+WIND:32:WiFi Hardware Started
+WIND:21:WiFi Scanning
+WIND:35:WiFi Scan Complete (0x0)
+WIND:39:FOUND: E0:46:9A:77:AF:1A FREQ: 2437 RSSI: -36 SSID: 'NETGEAR-3G' CAPS: 0411 WPA: 0 WPA2: 20
+WIND:19:WiFi Join: E0:46:9A:77:AF:1A
+WIND:25:WiFi Association to 'NETGEAR-3G' successful
+WIND:51:WPA Handshake Complete
+WIND:24:WiFi Up: 192.168.0.7
```



STM32F0 + STM_WiFi = Web Server

Scan your local network to find the IP of the SILICA STM WiFi EveBoard

To scan your local network I suggest to use: **Angry IP Scanner**

that is here: <http://sourceforge.net/projects/ipscan/?source=dlp>

Below there are two scans.

In the left window, the STM WiFi module is not connected to the WiFi network.

In the right window, the STM WiFi module is connected to the WiFi network.

The image displays two screenshots of the Angry IP Scanner application. Both windows show the IP Range set to 192.168.0.1 to 192.168.0.10 and the Hostname set to ITCUSZ1NB07852I. The left window shows a scan where the host at 192.168.0.5 is not connected (ping [n/a]). The right window shows a scan where the host at 192.168.0.5 is connected (ping 29 ms).

IP	Ping	Hostname	Ports [0+]
192.168.0.1	6 ms	[n/a]	[n/s]
192.168.0.2	2 ms	[n/a]	[n/s]
192.168.0.3	4 ms	[n/a]	[n/s]
192.168.0.4	0 ms	ITCUSZ1NB07852I.em...	[n/s]
192.168.0.5	[n/a]	[n/s]	[n/s]
192.168.0.6	[n/a]	[n/s]	[n/s]
192.168.0.7	35 ms	[n/a]	[n/s]
192.168.0.8	4 ms	[n/a]	[n/s]
192.168.0.9	[n/a]	[n/s]	[n/s]
192.168.0.10	[n/a]	[n/s]	[n/s]

Ready | Display: All | Threads: 0

Ready | Display: All | Threads: 0

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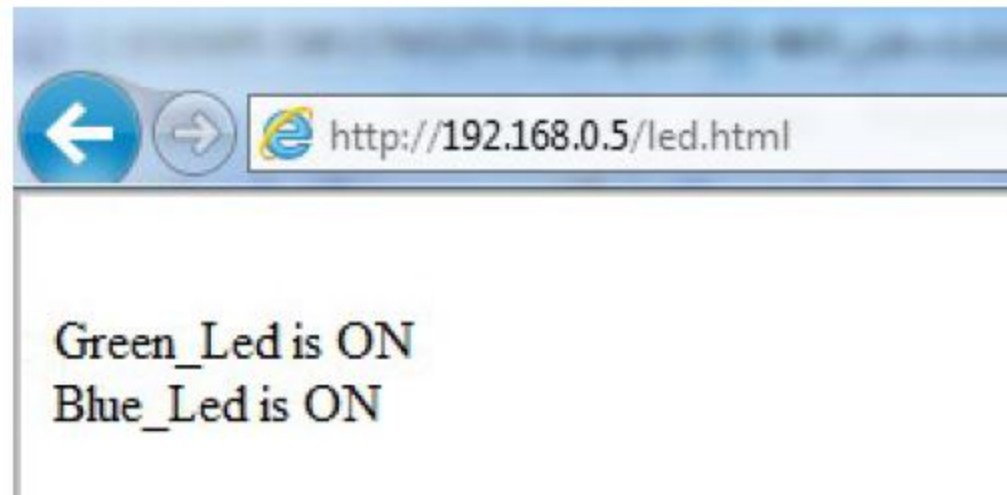
STM32F0 + STM_WiFi = Web Server

Now open the html page (use Windows Internet Explorer):

led.html

this page show the status of the Green and Blue LEDs mounted on your STM32F0-Discovery.

- **Suppose that the STM WiFi IP is: 168.169.0.5**
- Open your browser and type:
192.168.0.5/led.html



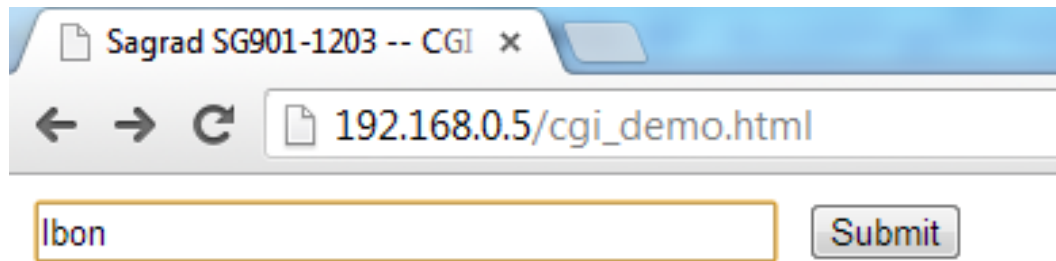
STM32F0 + STM_WiFi = Web Server

Now open the html page (use Windows Internet Explorer):

cgi_demo.html

this page is used to send commands to STM WiFi Module.

- **Suppose that the STM WiFi IP is: 168.169.0.5**
- Open your browser and type:
192.168.0.5/cgi_demo.html



STM32F0 + STM_WiFi = Web Server

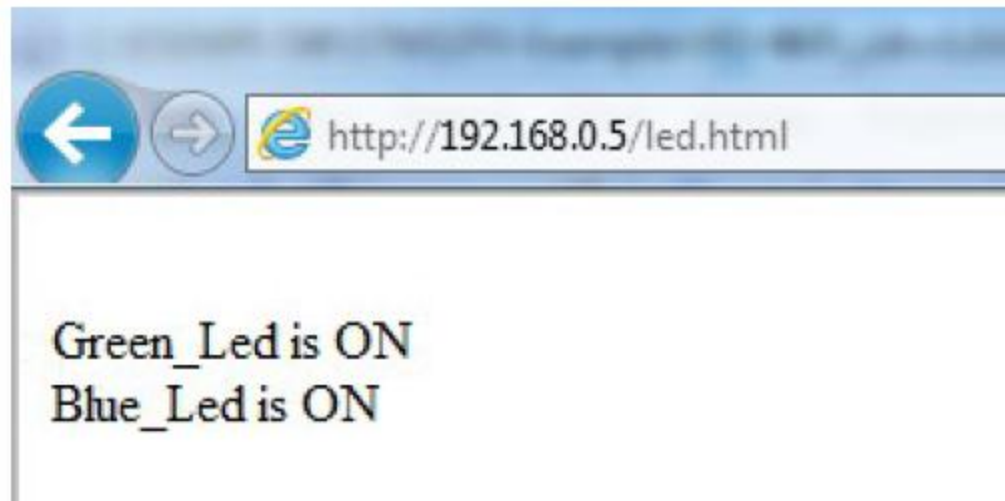
The custom commands (implemented on STM32F0-Discovery) to control the SILICA STM WiFi EvaBoard are:

- **Igon** – TurnON the green LED
- **Igoff** – TurnOFF the green LED
- **Ibon** – TurnON the blue LED
- **Iboff** – TurnOFF the blue LED
- **X** – Clear RxBuffer
- **reset** – reset the STM WiFi module, it reloads the WiFi configuration received from STM32F0-Discovery.

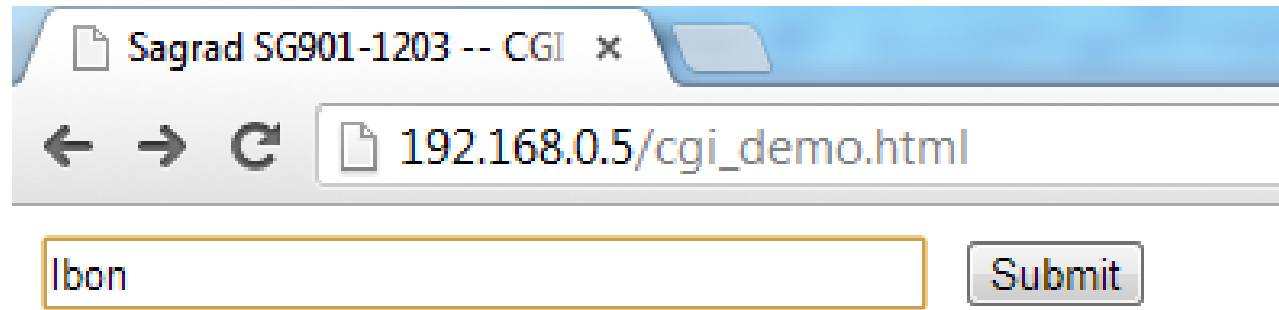
During the reset the Blue and Green Leds are flashing.

You have the possibility to **see the LEDs status** in the page: **led.html**

Remember: you must reload the **led.html** page after every command sent by using the **cgi_demo.html** page.



STM32F0 + STM_WiFi = Web Server



Try the commands:

- **lgon** – TurnON the green LED
- **lgooff** – TurnOFF the green LED
- **lbon** – TurnON the blue LED
- **lboff** – TurnOFF the blue LED

and see the results,
remember to reload
the page after any
command.



**Close Tera Term or Hyper Terminal
and disconnect the boards from the
PC.**

**Please give me back the:
SILICA STM WiFi EvaBoard
The TWO USB cables**

What we offer

- **A complete source code for STM32F0xx** family that is very easy to transfer on other STM32 families (Cortex Mx).
- **A complete manual that covers the topics below.**
 - Resource, available via STM WiFi pins
 - Firmware update
 - HTML pages
 - How to use the SILICA STM WiFi EvaBoard
 - AT Commands
 - AT SetUp commands (for connect STM WiFi module to WiFi network)
 - AT GPIO commands
 - AT General Commands
 - Create a filename.html (a complete HTML example)
 - NotePad++
 - How to use Tera Term
 - How to connect STM WiFi module to STM32F0-Discovery (Web Server), **C source code**
 - How to scan your local network
 - How to use **PYTHON** on **LINUX** to drive STM WiFi module
 - How to use **PYTHON** on **Windows 7** to drive STM WiFi module

What we offer

- **A complete manual that explains the SW implementation and that covers the topics below**
 - How to connect STM WiFi module to STM32F0-Discovery
 - The Web pages
 - The definitions
 - The variables
 - The principal functions

END

More info are available here:
www.emcu.it/wifi

enrico.marinoni@silica.com FAE