

# Adafruit ATWINC1500 WiFi Breakout

Created by lady ada



https://learn.adafruit.com/adafruit-atwinc1500-wifi-module-breakout

Last updated on 2022-12-01 02:40:39 PM EST

#### Table of Contents

Overview	3
Pinouts	5
Power Pins	
SPI Pins	
Other SPI Interface Pins	
Assembly	7
Prepare the header strip:	
Add the breakout board:	
And Solder!	
Wiring & Test	9
Install the Library	
Check Connections & Version	
Scanning WiFi	
Connect & Read Webpage	
Updating Firmware	15
Updating SSL Certificates	19
Downloads	24
Datasheets & Files	

• Schematic

• Fabrication Print

#### Overview



Connect your Arduino to the Internet with this fine new FCC-certified WiFi module from Atmel. This 802.11bgn-capable WiFi module is the best new thing for networking your devices, with SSL support and rock solid performance - running our adafruit.io MQTT demo for a full weekend straight with no hiccups (it would have run longer but we had to go to work, so we unplugged it). We like these so much, they've completely replaced the CC3000 module on all our projects.



The ATWINC1500 uses SPI to communicate, so with about 5 or 6 wires, you can get your wired up and ready to go. Right now the Atmel-supplied library works great with Arduino M0 & M4, but won't work with 328P, or 32u4 and may not work on other Arduinos. You can clock it as fast as 12MHz for speedy, reliable packet streaming. Communication is done through the standard Client & Server interface so all your Ethernet & older WiFi code is easy to adapt. Scanning/connecting to networks is very fast, a few seconds.



This module works with 802.11b, g, or n networks & supports WEP, WPA and WPA2 encryption. The datasheet says it can do Soft-AP mode but we don't have any code to actually use that.

Since this is our new favoritest SPI-protocol WiFi module we've decided to make a little breakout for it. The breakout comes with level shifting on all the input pins so you can use it with 3V or 5V logic. A 3.3V voltage regulator that can handle the 300mA spikes lets you power from 3-5.5VDC. There's also 3 LEDs that you can control over the SPI interface (part of the library code) or you can have controlled by the Arduino library. They'll light up when connected to an SSID, or transmitting data.



Comes with a stick of header you can solder on, to plug into a breadboard and a set of tutorials & code so you can follow along!

## Pinouts



The ATWINC1500 module does have a bunch of pins, but they're pretty easy to understand. Lets check it out!

## **Power Pins**

- Vin this is the power-in pin. Connect to 3.3 5.5VDC
   The wifi module can draw up to 300mA during transmit (for small blips of time)
   So make sure that your power supply can supply it.
- GND ground for signal and power

## SPI Pins

This is how you send and receive data from the module

- SCK SPI clock input, 3V or 5V compliant
- MISO SPI data out from module, 3.3V line level
- MOSI SPI data into module, 3V or 5V compliant
- CS SPI chip select, pull down when transmitting to/from the ATWINC. By default this is pulled to Vin with a 100K resistor

#### Other SPI Interface Pins

- EN Enables the entire module, by default tied low with a 100K resistor. Tie to 3-5V to keep the module on all the time, connect to a ground signal to disable the module
- IRQ Interrupts from the module, connect to your microcontroller's INT input line. 3.3V logic level
- RST Module reset, by default tied low with a 100K resistor. Pull high to bring out of reset.
- Wake wake input signal, used to wake up the module (not used in existing code, but available if you can figure it out!) 3-5V logic in
- CFG allows you to select between SPI (default) or UART data transport. Since we don't have any UART code, keep disconnected
- RXD/TXD UART data transport pins. Since we don't have any UART code, keep disconnected

#### Assembly





#### Prepare the header strip:

Cut the strip to length if necessary. It will be easier to solder if you insert it into a breadboard - long pins down



#### Add the breakout board:

Place the breakout board over the pins so that the short pins poke through the breakout pads



#### And Solder!

Be sure to solder all pins for reliable electrical contact.

(For tips on soldering, be sure to check out our Guide to Excellent Soldering ()).



You're done! Check your solder joints visually and continue onto the next steps

## Wiring & Test



For this initial demo we'll be using an Arduino UNO to connect. You can also use an Arduino Zero, but you'll have to use the ICSP 6-pin header not pins 11,12,13

- Vin connect this to 3.3V or 5V, whichever is the logic voltage of the microcontroller you're using. For UNO this will be 5V, for Zero its 3.3V
- GND connect to common ground
- SCK Connect to SPI clock. On UNO this is pin #13 on Zero its on the <u>6-pin ISP</u> header ()
- MISO Connect to SPI MISO. On UNO this is pin #12 on Zero its on the <u>6-pin ISP</u> header ()

MOSI - Connect to SPI MOSI. On UNO this is pin #11 on Zero its on the <u>6-pin ISP</u> header ()

For the remaining pins, you can be a little flexible:

- CS Connect to any digital I/O pin, we use #8 by default
- EN connect this to 3.3V or 5V, whichever is the logic voltage of the microcontroller you're using. For UNO this will be 5V, for Zero its 3.3V; later on if you want to enable/disable the module, connect it to a digial I/O pin
- IRQ Connect to any digital I/O pin, preferrably one with an interrupt capability. We use #7 by default
- RST Connect to any digital I/O pin. We use #4 by default

You can change these pins later but for now use them, so you can verify your setup!

#### Install the Library

We will start by installing the official Arduino WiFi101 library ().

🥯 Blink   Arc	duino 1.6.9		Δ
File Edit Sk	etch Tools Help		Manage Libraries
00	Verify/Compile Upload	Ctrl+R Ctrl+U	Add .ZIP Library
Blink /*	Upload Using Programmer Export compiled Binary	Ctrl+Shift+U Ctrl+Alt+S	Arduino libraries AudioZero
Blink Turns	Show Sketch Folder Include Library	Ctrl+K	Bridge Esplora
This /	Add File		Ethernet Firmata
// Pin 11	has an LED connected o has the LED on Teensy	2.0	i HID Keyboard
	has the LED on Teensy+ has the LED on Teensy t a name:		Mouse RTCZero
int led =	13;		Robot Control Robot IR Remote
void setu	tup routine runs once w p() { ialize the digital pin		SAMD ApplesCorrection

We want the latest version so visit the Library Manager

Type in wifi101 and when the library comes up, click Install or Update to make sure its the most recent one!

If you're not familiar with installing Arduino libraries, please visit our tutorial: <u>All About</u> Arduino Libraries ()!

Restart the Arduino IDE.

Use the very latest version of the Arduino IDE!

## **Check Connections & Version**

Before we start, its important to verify you have the right setup & firmware version.

Load up the WiFi101->CheckWifi101Firmware sketch

Blink   Arduing File Edit Sketch		RTClib RTCZero	+ +	
New Open Open Recen Sketchbook Examples		SAMD_AnalogCorrection SPI Temboo TinyWireM USBHost	) ) ) )	
Close Save Save As Page Setup	Ctrl+W Ctrl+S Ctrl+Shift+S Ctrl+Shift+P	WiFi101 Wire RETIRED Examples from Custom Libraries		AP_SimpleWebServer CheckWifi101FirmwareVersion ConnectNoEncryption ConnectWithWEP
Print	Ctrl+P	AccelStepper Adafruit BME680 Library	1	ConnectWithWPA FirmwareUpdater MDNS WiEiWebSenver

Note that to use the official Arduino WiFi101 Library, we must configure it to use the pins specific to the ATWINC1500 Breakout. With each example sketch, you'll need to add WiFi.setPins(8,7,4); to the top of the setup function, before WiFi.status() is called.

//Configure pins for Adafruit ATWINC1500 Breakout
WiFi.setPins(8,7,4);

Like so:



Upload to your Arduino and open up the Serial Console at 9600 baud:

💿 COM220 (Arduino/Genuino Uno)	
	Send
WINC1500 firmware check.	
WINC1500: DETECTED	
Firmware version installed: 19.4.4	
Firmware version required : 19.4.4	
Check result: PASSED	E
✓ Autoscroll	▼ Both NL & CR ▼ 9600 baud ▼

You should see the firmware version. If your version has not PASSED follow this page to update your firmware! ()

If you have version 19.3 or less, the firmware is too old

If you get not response, the firmware is either waaay to old, or something is amiss with your wiring!

If you get a warning that says

WiFi101 shield: DETECTED Firmware version installed: 19.5.2 Latest firmware version available : 19.5.4

Specifically with 19.5.4 and 19.5.2, you can continue without updating



# Scanning WiFi

Now that you have the right firmware version, lets scan for network!

Run the WiFi101->ScanNetworks example to see a list of available visible networks

Don't forget to add WiFi.setPins(8,7,4) at the top of setup()

💿 COM220 (Arduir	o/Genuino Uno)	_	
			Send
MAC: C6:7F:F1:5	:F0:F8		
Scanning availa	ble networks		
** Scan Network	s **		
number of avail	able networks:2		
0) adafruit10	Signal: -66 dBm Encryption:	WPA	
1) DG1670AD2	Signal: -91 dBm Encryption:	WPA	=
V Autoscroll		Both NL & CR	▼ 9600 baud →

#### Connect & Read Webpage

OK finally you get to connect and read some data!

Open up the WiFi101->WiFi101WebClient example, then edit the ssid and pass variables to contain your network and password

34	
35	
36	<pre>char ssid[] = "adafruit"; // your network SSID (name)</pre>
37	<pre>char pass[] = "supersekret"; // your network password (use for WPA, or use as key for WEP)</pre>
38	<pre>int keyIndex = 0; // your network key Index number (needed only for WEP)</pre>
39	
40	<pre>int status = WL_IDLE_STATUS;</pre>
41	<pre>// if you don't want to use DNS (and reduce your sketch size)</pre>
42	<pre>// use the numeric IP instead of the name for the server:</pre>
10	

Add the following lines at the top of setup()



It will connect to the website in server and read the webpage manually:

💿 COM52 (Adafruit Feather M0 (Native USB Port))
Send
Attempting to connect to SSID: 10th Floor
Connected to wifi
SSID: 10th Floor
IP Address: 10.0.0.92
signal strength (RSSI):-46 dBm
Starting connection to server
connected to server
HTTP/1.1 200 OK
Date: Wed, 21 Sep 2016 22:33:32 GMT
Expires: -1
Cache-Control: private, max-age=0
Content-Type: text/html; charset=ISO-8859-1
P3P: CP="This is not a P3P policy! See https://www.google.com/support/accour
Server: gws
X-XSS-Protection: 1; mode=block
X-Frame-Options: SAMEORIGIN
Set-Cookie: NID=87=kmIfFqMh8M 7gv9BDt982kjfllc-imsU4d-X3fZthsS ye4Sfa541V33C
Accept-Ranges: none
Vary: Accept-Encoding
Connection: close
html

That's it! pretty easy, huh? There's other examples you can try such as server mode, UDP data transmission & SSL

# Updating Firmware

If you're running 19.5.2 there is no need to update to 19.5.4, despite what the WiFi101 library says it should work just fine and you could brick your device by updating, it is not perfectly foolproof! Thanks :)

As new versions of the WiFi101 library come out, you may end up getting a complaint that the library and WINC1500 firmware are out of sync:



No problem - you can update the firmware through your Arduino/compatible! Start by loading up the FirmwareUpdater sketch

💿 Check	Wifi101FirmwareVersio	on   Ar	duino 1.8.1	0	
File Edit	Edit Sketch Tools Help				
New Ope Ope		+			
Sket	chbook	•		٦	
Exar	nples	-	<b>A</b>		
Clos Save Save		Examples for Adafruit Feather M0 12S	AP_SimpleWebServer CheckWifi101FirmwareVersion ConnectNoEncryption ConnectWithWEP		
Page Setu Print		P	SAMD_AnalogCorrection SPI USBHost	ConnectWithWPA FirmwareUpdater	
Pref	erences Ctrl+Comm	na	Wire	MDNS_WiFiWebServer Provisioning_WiFiWebServer	

If you are using a Feather M0 or WINC1500 breakout, don't forget to update the pins as necessary with setPins()!

If you are using a WiFi101 or WINC1500 shield, you do not have to add setPins() code



Upload it to your board. Make sure the Serial console is not open before or after uploading.

💿 FirmwareUpdater   Arduino 1.8.1				
File Edit Sketch	Tools Help			
FirmwareUpda	Auto Format Archive Sketch Fix Encoding & Reload	Ctrl+T		
<pre>// payloadL } UartPacket;</pre>	Serial Monitor Serial Plotter	Ctrl+Shift+M Ctrl+Shift+L		
static const	WiFi101 Firmware Updater Board: "Adafruit Feather M0	)"		
<pre>#define CMD_R #define CMD_W #define CMD_E</pre>	Port: "COM21 (Adafruit Feat Get Board Info	ther M0)"		
#define CMD_M #define CMD_H	Programmer: "USBtinyISP" Burn Bootloader	Þ		

Then select the Updater tool built into the IDE

Select the right COM port, and click Test Connection



If all is good you'll get a confirmation



Next, select the firmware - we of course recommend the latest version!

If you don't see the right/matching version you may need to update the IDE

WiFi101 Firmware/Certificates Updater	
1. Select port of the WiFi module	
If the port is not listed click "Refresh list" button to regenerate the list	
COM1 COM21	Refresh list
	Test connection
2. Update firmware	
Select the firmware from the dropdown box below	
WINC1501 Model B (19.5.2)	<b>-</b>
WINC 150 1 Model B (19.5.2) WINC 150 1 Model B (19.4.4)	
WINC 1501 Model & (19.4.4)	
3. Update SSL root certificates	
Add domains in the list below using "Add domain" button	
arduino.cc:443	Add domain
	Remove domain
Upload Certificates to WiFi module	

Once you feel ready - make sure the USB cable is connected solidly! Click Update Firmware

💿 WiFi101 Firmware/Certificates Updater	
1. Select port of the WiFi module	
If the port is not listed click "Refresh list" button to regenerate the list	
COM1 COM21	Refresh list
	Test connection
2. Update firmware	
Select the firmware from the dropdown box below	
WINC1501 Model B (19.5.2)	▼]
Update Firmware	
3. Update SSL root certificates	
Add domains in the list below using "Add domain" button	
arduino.cc:443	Add domain
	Remove domain
Upload Certificates to WiFi module	
Programming 413604 bytes	

And a minute or two later...



Now you're ready to rock! Reload the Firmware Check sketch from before, this time you will see:

💿 COM21 (Adafruit Feather M0)	
	Send
WiFi101 firmware check.	
WiFi101 shield: DETECTED	
Firmware version installed: 19.5.2	
Latest firmware version available : 19.5.2	
Check result: PASSED	≡
	-
Autoscroll Both NL & CR 🗸	115200 baud

# **Updating SSL Certificates**

If you're trying to connect to a computer or service via SSL and the connection is failing, you may need to update the certificates built into the WINC1500. By default it comes with many of the most popular SSL certificates but you may bump into a site that requires one that isnt included.

Its quite easy to update the certificates, you'll need to upload some code and run the uploaders but it only has to happen once

Start out by uploading the FirmwareUpdater sketch from WiFi101

💿 CheckWifi101Fi	irmwareVersion   )	Arduino 1.8.1		a mine as a series of a
File Edit Sketch	ile) Edit Sketch Tools Help			
New Open Open Recent Sketchbook	Ctrl+N Ctrl+O			
Examples Close	I Ctrl+W	WiFi101	•	AP_SimpleWebServer
Save Save As	Ctrl+S Ctrl+Shift+S	Examples for Adafruit Feather M0 I2S SAMD_AnalogCorrection SPI USBHost Wire	,	CheckWifi101FirmwareVersion ConnectNoEncryption ConnectWithWEP
Page Setup Print	Ctrl+Shift+P Ctrl+P			ConnectWithWPA FirmwareUpdater
Preferences	Ctrl+Comma		1	MDNS_WiFiWebServer Provisioning_WiFiWebServer

If you are using a Feather M0 or WINC1500 breakout, don't forget to update the pins as necessary with setPins()!

If you are using a WiFi101 or WINC1500 shield, skip this step



#### and upload it!

After uploading be sure to note what is the name of the COM or Serial port for the Arduino Zero or Feather...You'll need this for the next step

le Edit Sketch To	ools Help		
	Auto Format	Ctrl+T	
	Archive Sketch		
FirmwareUpda	Fix Encoding & Reload		
22 #include	Serial Monitor	Ctrl+Shift+M	
23	Serial Plotter	Ctrl+Shift+L	
24			
25 // Define	Board: "Adafruit Feather M0 (Native USB Port)"	•	
26 // If you 27 // guide Port		1	Serial ports
28 #define W			COM1
29 #define W	Programmer: "USBtinyISP"	1	COM3 (Adafruit Feather M0 (Native USB Port)
30 #define W	Burn Bootloader		COM15

Upload it to your Feather. Make sure the Serial console is not open before or after uploading.

Then select the Updater tool built into the IDE



Select the right COM port, and click Test Connection

💿 WiFi101 Firmware/Certific	ates Updater	
1. Select port of the WiFi mo	dule	
If the port is not listed click "	Refresh list" button to regenerate th	e list
I COM1		Refresh list
COM21		
		Test connection

If all is good you'll get a confirmation

Test succ	essful	X
<b>()</b>	The programmer is working!	
	ОК	

Now at the bottom of the page, click Add Domain and type in the URL of the site you want to access:



#### Then click Upload Certificates

💿 WiFi101 Firmware/Certificates Updater	
1. Select port of the WiFi module	
If the port is not listed dick "Refresh list" button to regenerate the list	
COM1 COM21	Refresh list
	Test connection
2. Update firmware	
Select the firmware from the dropdown box below	
WINC1501 Model B (19.5.2)	•
Update Firmware	
3. Update SSL root certificates	
Add domains in the list below using "Add domain" button	
arduino.cc:443 io.adafruit.com:443	Add domain Remove domain
Upload Certificates to WiFi module	

A few moments later...success!

WiFi101 Firmware/Certificates Updater	
1. Select port of the WiFi module	
If the port is not listed click "Refresh list" button to regenerate the list	
COM1	Refresh list
COM21	
	Test connection
2. Update firmware	x
Select the firmware from Success	
WINC1501 Model B (19 The certificates have been uplo	vaded!
ОК	
3. Update SSL root certificates	
Add domains in the list below using "Add domain" button	
arduino.cc:443 io.adafruit.com:443	Add domain
	Remove domain
Upload Certificates to WiFi module	
Done!	

#### What SSL/TLS support is available with the WINC1500?

Officially Atmel lists TLS 1.0 & 1.1, however we have noticed that the firmwares shipping on boards today seem to also support TLS 1.2 (verified by checking the results of www.howsmyssl.com ()).

The supported ciphers are:

- TLS\_DHE\_RSA\_WITH\_AES\_128\_GCM\_SHA256
  - TLS\_RSA\_WITH\_AES\_128\_GCM\_SHA256
- TLS\_DHE\_RSA\_WITH\_AES\_128\_CBC\_SHA256
- TLS\_DHE\_RSA\_WITH\_AES\_128\_CBC\_SHA
- TLS\_RSA\_WITH\_AES\_128\_CBC\_SHA256
- TLS\_RSA\_WITH\_AES\_128\_CBC\_SHA

•

## Downloads

# Datasheets & Files

- All the details you could ever want are over at the Atmel website ()
- EagleCAD PCB files on GitHub ()
- Fritzing objects in the Adafrut Fritzing library ()

## Schematic

Click to embiggen. Please note we ship with the 'PB rev module, not 'PA!



# **Fabrication Print**

Dimensions in inches

