

# Application Note: Going Wireless

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## SUMMARY

This application note details the components and configuration needed to implement a wireless connection.

The application

## REQUIRED

Item	Description	Obtained From Amazon or Similar
1		freETarget V3.0 or higher
2		freETarget firmware 4.0.0 or higher
3	ESP-01	<a href="https://www.amazon.com/Wireless-Transceiver-Receiver-DC3-0-3-6V-Compatible/dp/B07R4MXPLF/ref=sr_1_12?crid=3V1D0J590CRTH&amp;dchild=1&amp;keywords=esp-01&amp;qid=1624114287&amp;sprefix=esp-01%2Caps%2C169&amp;sr=8-12">https://www.amazon.com/Wireless-Transceiver-Receiver-DC3-0-3-6V-Compatible/dp/B07R4MXPLF/ref=sr_1_12?crid=3V1D0J590CRTH&amp;dchild=1&amp;keywords=esp-01&amp;qid=1624114287&amp;sprefix=esp-01%2Caps%2C169&amp;sr=8-12</a>
4	ESP-01 5Volt Adapter	<a href="https://www.amazon.com/Aideepen-ESP8266-Wireless-Adapter-Compatible/dp/B01M09B43H/ref=sr_1_3?dchild=1&amp;keywords=esp-01+5V&amp;qid=1624114362&amp;sr=8-3">https://www.amazon.com/Aideepen-ESP8266-Wireless-Adapter-Compatible/dp/B01M09B43H/ref=sr_1_3?dchild=1&amp;keywords=esp-01+5V&amp;qid=1624114362&amp;sr=8-3</a>
5	2x6 Pin IDC Connector	<a href="https://www.digikey.com/en/products/detail/te-connectivity-amp-connectors/3-640441-6/698225">https://www.digikey.com/en/products/detail/te-connectivity-amp-connectors/3-640441-6/698225</a>
6	24 Gauge Wire	

## OPTIONAL

Item	Description	Obtained From
1	9 Volt Power Supply	<a href="https://www.amazon.com/iCreatin-Adapter-Arduino-Tbuymax-Positive/dp/B07CR1BY9M/ref=sr_1_5?keywords=arduino+power+supply&amp;qid=1645196707&amp;sr=8-5">https://www.amazon.com/iCreatin-Adapter-Arduino-Tbuymax-Positive/dp/B07CR1BY9M/ref=sr_1_5?keywords=arduino+power+supply&amp;qid=1645196707&amp;sr=8-5</a>

## INTRODUCTION

freETarget supports a WiFi connection using the accessory connector and an off-the-shelf ESP-01 Serial WiFi transceiver. freETarget supports two modes of operation:

- Preset SSID, FET-target\_name that allows for simple use of the WiFi
- Custom SSID that allows freETarget to be on your home network along with things like Scatt and TeamViewer.

Installing the ESP-01 consists of the following steps

- Build the ESP-01 interface
- Attach the ESP-01 to freETarget
- Select the target name
- Power Up
- Configure the freETarget SSID for your network

## ASSEMBLING THE WiFi INTERFACE

### Building the ESP-01 Adapter

The ESP-01 is a self-contained circuit that operates at 3.3 Volts. freETarget operates at 5.0 Volts, so connecting an ESP-01 directly to the board will damage the ESP-01 circuit. Fortunately, adapter circuits are available that convert the voltage levels. Install the ESP-01 into the adapter as shown in Figure 1.



Figure 1: ESP-01 and Adapter Assembly

The ESP-01 and freETarget connect to each other using a short six pin connector illustrated in Figure 2. While the ESP-01 adapter uses four pins and freETarget uses six, for the purposes of convenience two six pin connectors can be used.



Figure 2: Sample IDC Connector

The wiring for each of the connectors is found in Table 1 and Figure 3

Table 1: WiFi Cable Harness with Colours

freETarget Connector		Description	ESP-01 Connector	
1	Red	5VDC	2	Red
2	White	Auxiliary Transmit Data	4	White
3	Yellow	Auxiliary Receive Data	3	Yellow
4	TBD	Motor Drive (Not Used)		TBD
5		Spare (Not Used)		
6	Black	Ground	1	Black

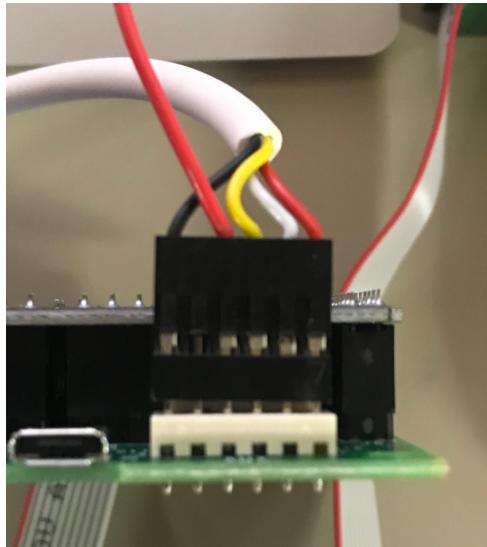


Figure 3: WiFi Cable on Arduino



WiFi Cable on ESP-01

**Connect the ESP-01 to freETarget using the cable harness.**

**IMPORTANT**

When connecting the cable harness to the ESP-01, ensure that Pin 1 of the connector mates to Pin 1 of the adapter. Pins 5 and 6 will overhang the board and not be connected.

## **CHOICES**

At this point you can choose:

- Easy installation that fixes the SSID to FET-target\_name and you simply link up to the target.
- Network installation that lets you put one or more freETargets on the same network along with your other devices

## EASY INSTALLATION (DEFAULT)

Using the WiFi interface on the target involves the following steps

- Name the target
- Set the PC onto the target SSID
- Connect the PC Client to the Target

### Naming the Target

freETarget allows you to assign a name to each target for identification. This name appears in the SSID of the WiFi sources on your computer. If you are using a single lane freETarget, the default name “FET-TARGET” can be used for the SSID.

In larger installations a name can be chosen from Table. Use NAME setting found in the PC program setup tab.

Table 2: freETarget Lane Names

Name ID	
0	TARGET
1-10	Numeric 1-10
11-18	Seven Dwarfs “DOC”, “DOPEY”, “HAPPY”, “GRUMPY”, “BASHFUL”, “SNEEZEY”, “SLEEPY”
19-27	Eight Reindeer “RUDOLF”, “DONNER”, “BLITZEN”, “DASHER”, “PRANCER”, “VIXEN”, “COMET”, “CUPID”, “DUNDER”
28-32	Norse Gods “ODIN”, “WODEN”, “THOR”, “BALDAR”

### Setting the PC SSID

The PC must be on the same SSID as the target. For simplicity, the target generates its own SSID and address that your PC must connect to.

To change your PC SSID from your PC setup follow these steps

- 1 – Setup
- 2 – Network & Internet
- 3 – WiFi Show Available Networks
- 4 – Choose FET-

## Network & internet > Wi-Fi

Laptop WiFi

googlefiber properties  
Connected, secured

Show available networks

googlefiber  
Connected, secured

FET-TARGET

googlefiber5G

### Connect the PC Client ot the target

Launch the PC Client and under the settings icon (Gear Wheel), General Tab, look for the Communication Protocol selection (Figure 4). Make sure that TCP is selected and that the IP address is as shown.

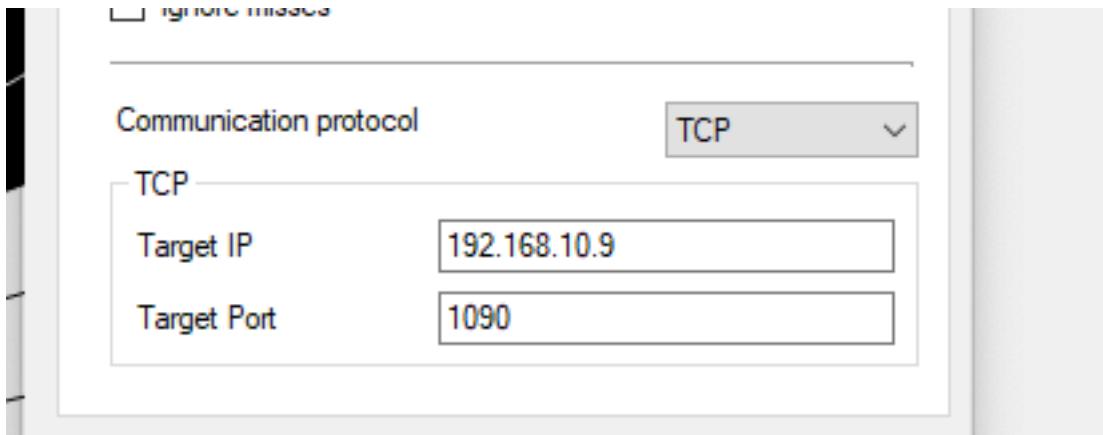


Figure 4: Communication Protocol Selection

Press CONNECT to connect to the freETarget. The program will show the freETarget firmware version. Only 3.4.8 and higher will work correctly.

## TROUBLESHOOTING

If your freETarget is not working with the PC program, carry out the following checks

- Connect to the freETarget using the conventional USB cable and COM port.
  - Connect to the board
  - Using the Arduino Button examine the settings
    - Does the string “WiFi”:0 appear?
      - The ESP=01 WiFi adapter is not connected
      - Verify the cable harness and connections
    - Does the string “WiFi”:1 appear?
      - Is the WIFI\_ADDRESS show 192.169.10.9:1090?
      - The ESP-01 WiFi adapter is connected and recognized by the Arduino
- Verify that the PC program has the correct connection (TCP) and IP addresses

# NETWORK INSTALLATION

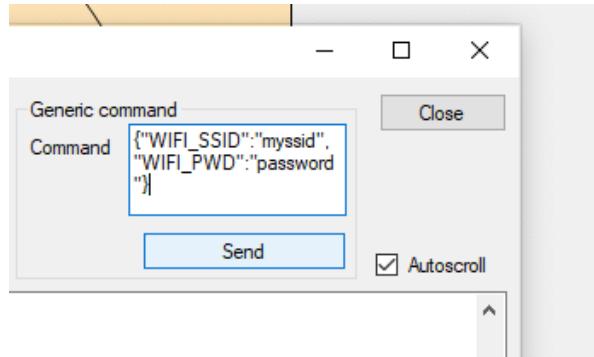
Starting with Version 4.0, FreeTarget allows you to put the target on the same network as the rest of your system. To do so, you need to connect freeETarget to your PC using the USB cable and configure it manually.

There are two steps to follow

- Set your network SSID and password into the target
- Enter the network information into the PC

## Set the SSID into the Target

- Connect to the target with the USB as you would normally
- Using the Arduino tab, set the SSID and Password
  - Leaving the SSID blank {"WIFI\_SSID":""} puts the target into the default mode
  - Leaving the PWD blank {"WIFI\_PWD":""} connects to an open network



- Hit Send
- Unplug / Plug the target to reset the settings
- Connect to the target again
- Using the Arduino tab, verify that the SSID and Password have connected you to the network. Look for

```
"WiFi_PRESENT": 1,  
"WiFi_IP_ADDRESS": "IP address:1090",
```

## Connect the PC Client to the target

Make sure that your PC is on the same SSID as the target form the steps above Launch the PC Client and under the settings icon (Gear Wheel), General Tab, look for the Communication Protocol selection (Figure 4). Make sure that

TCP is selected and that the IP address is as shown. The IP address has to match the IP address shown in the steps above.

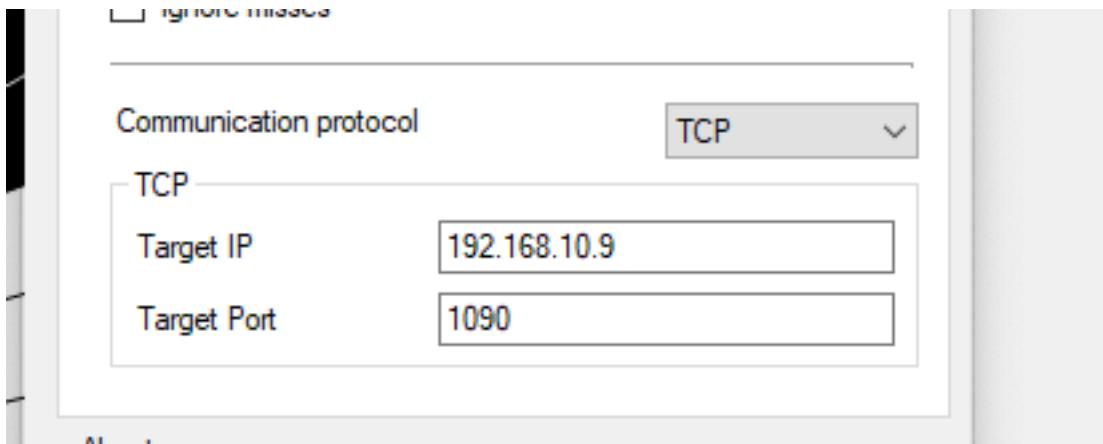


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    - Does the setting "WiFi":1 appear?
      - Is the WIFI\_ADDRESS show [your house IP]1090?
      - The ESP-01 WiFi adapter is connected and recognized by the Arduino
- Verify that the PC program has the correct connection (TCP) and IP addresses
- When powering up does the startup diagnostics report a WiFiError?
  - The ESP-01 sometimes has difficulties connecting to some home networks. If this is the case, you will need to go back to the default mode by setting {"WIFI\_SSID":""}
  - Connect your PC to the SSID FET-target name
  - Configure the PC Client to use IP address 192.168.10.9:1090