

Application Note: Going Wireless

SUMMARY

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

The application

REQUIRED

Item	Description	Obtained From
1	freETarget V3.0.3 or higher	https://allanbrownatl.files.wordpress.com/2021/09/freetarget-3.0.3.zip
2	freETarget firmware 3.4.8 or higher	https://allanbrownatl.files.wordpress.com/2021/09/freetarget-3.4.8.hex.zip
3	ESP-01	Amazon https://www.amazon.com/Wireless-Transceiver-Receiver-DC3-0-3-6V-Compatible/dp/B07R4MXPLF/ref=sr_1_12?crid=3V1D0J59OCRT&dchild=1&keywords=esp-01&qid=1624114287&suffix=esp-01%2Caps%2C169&sr=8-12 Or Similar
4	ESP-01 5Volt Adapter	Amazon https://www.amazon.com/Aideepen-ESP8266-Wireless-Adapter-Compatible/dp/B01M09B43H/ref=sr_1_3?dchild=1&keywords=esp-01+5V&qid=1624114362&sr=8-3 Or Similar
5	6 Pin IDC Connector	Digikey https://www.digikey.com/en/products/detail/te-connectivity-amp-connectors/3-640441-6/698225 Or Similar
6	24 Guage Hookup Wire	

INTRODUCTION

freETarget supports a WiFi connection using the accessory connector and an off-the-shelf ESP-01 Serial WiFi transceiver. Using the ESP-01, freETarget appears as a WiFi hotspot that when a connection is made transmits the score JSON message to the PC program.

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
- On the PC choose the freETarget SSID for your target
- Use the bridge application freeTargetWiFi2Com to connect the target to the program

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.

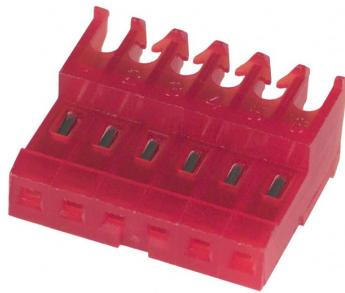


Figure 2: Sample IDC Connector

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

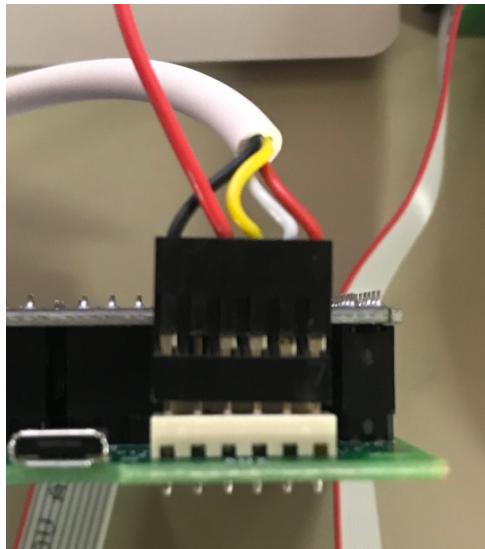


Figure 3: WiFi Cable on Arduino



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.

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”

Native WiFi Support

Starting with Version 3.0.3 of the PC program WiFi support is built into the program and can be used in the same manner as the USB Serial Port

Launch the program 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.

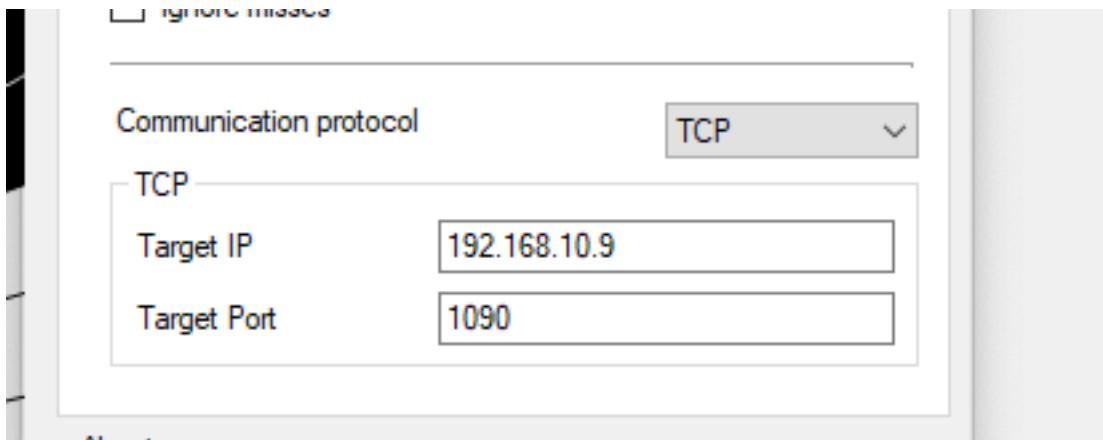


Figure 4: Communication Protocol Selection

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

freeTargetWiFi2Com

This is a simple go based app to bridge between the USB/COM port on the freETarget at and the wifi enabled freETarget. You can download it at the downloads page <https://free-e-target.com/downloads/>

This version forwards messages from the target to the pc software. It relies on a COM pairing driver such as <http://com0com.sourceforge.net/> It assumes that the target is using the default ip address of 192.168.10.9 port 1090, and that the pc software is listening on COM8.

To use the bridge first configure the pc software to listen on COM8, click the connect button in the top left on the pc software, then start wifi2com.exe either by double clicking on it in explorer or run it from a command line.

Once the bridge has started it will display a message from the target with the version number, the PC Software will then show that it is connected after a few seconds.

Each shot data will be displayed in the bridge output as it forwards it to the PC Software.

If COM8 and COM9 are not available then you need to create a different pair with the COM pairing driver, for example COM1 and COM2, configure the PC software to listen on COM1, then you can use the following syntax to run the bridge to connect to COM2.

```
wifi2com.exe -port=COM2
```

TROUBLESHOOTING

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

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

SPECIFICATIONS

When an ESP-01 is attached to freETarget, the firmware will detect the ESP-01 and automatically configure the connection.

SSID

The WiFi SSID connection will take on the name of the target, FET-<name>. For example FET-TARGET or FET-RUDOLF.

freETarget IP Address

The freETarget IP address is fixed and is 192.168.10.9

PC IP Address

The ESP-01 contains a DHCP server and will assign the PC an address of 192.168.10.0

Server Connection

The PC acts as a client to freETarget, and connects to freETarget on port 1090