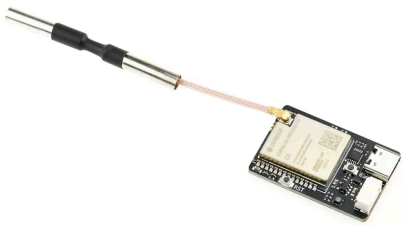
MicoAir-WiFi-Link

A dual-band WiFi 6 telemetry module for wireless FC tunning and drone light show networking



MicoAir-WiFi-Link Dual-Band WiFi 6 Telemetry Module

Powered by OFDMA and downlink MU-MIMO technologies, ensuring more reliable wireless connections for multi-drone networks.

Gallery

Specifications

Overview

MicoAir-WiFi-Link is a dual-band (2.4GHz / 5GHz) WiFi 6 telemetry module designed specifically for wireless flight controller tunning and multi-drone swarm light show networking. Powered by OFDMA and downlink MU-MIMO technologies, it provides highly efficient concurrent transmission, ensuring more reliable wireless connections for multi-device networks.

Typical Applications

MicoAir-WiFi-Link is ideal for the following scenarios:

- **Open-source Flight Controller (ArduPilot/PX4) Wireless Tunining**: Supports Ground Control Station (GCS) software such as **Mission Planner**, **QGroundControl** (QGC), and **MicoPilot**.
- **Drone Swarm Light Show Networking**: Enables multi-drone swarm communication, waypoint data, and command upload (supports Skybrush).
- **Robotics and Unmanned Systems Wireless Access**: Suitable for various control and debugging scenarios requiring short-range, high-bandwidth wireless communication.

Product Features

- Powered by ESP32-C5
- **Dual-band** WiFi: 2.4 GHz / 5 GHz
- Supports **WiFi 6** (802.11ax), backward compatible with 802.11 a/b/g/n/ac
- Defaults to AP mode for direct connection
- Supports STA mode for connecting to a router
- Supports bidirectional **Serial <-> UDP** transparent transmission
- BLE serial transparent transmission (Bluetooth connection currently only supported by MicoPilot)
- Built-in web-based configuration page
- Parameter configuration via USB serial **AT commands**
- Firmware upgrade via MicoAssistant

Parameters

- **Main Controller:** ESP32-C5
- **Wireless Standard**: WiFi 6 / 802.11ax, backward compatible with 802.11 a/b/g/n/ac
- **Frequency:** 2.4 GHz / 5 GHz
- **Communication Interface**: LVTTL (3.3V) Serial / USB-Type-C (CH340)
- **Core Functions**: WiFi UDP Serial Transparent Transmission / BLE Serial Transparent Transmission (BLE currently only supported by MicoPilot)
- **Default WiFi Mode**: AP (Can be switched to STA mode via AT commands)
- **Max Range (AP Mode)**: 100 meters (Direct connection to phone/PC, tested in open environments without interference)
- **Max Range (STA Mode)**: 500 meters (Relayed via high-power router, tested in open environments without interference)
- **Max Range (BLE)**: 10 meters
- **Operating Voltage:** 5V
- **Avg. Operating Current**: 150mA

Serial Port

- Debug Port Baud Rate: 115200
- Telemetry Port Baud Rate: 57600 / **115200 (Default)** / 230400 / 460800 / 921600

Note: The default telemetry port baud rate is 115200. The connected flight controller serial port must be configured to the same baud rate for proper communication.

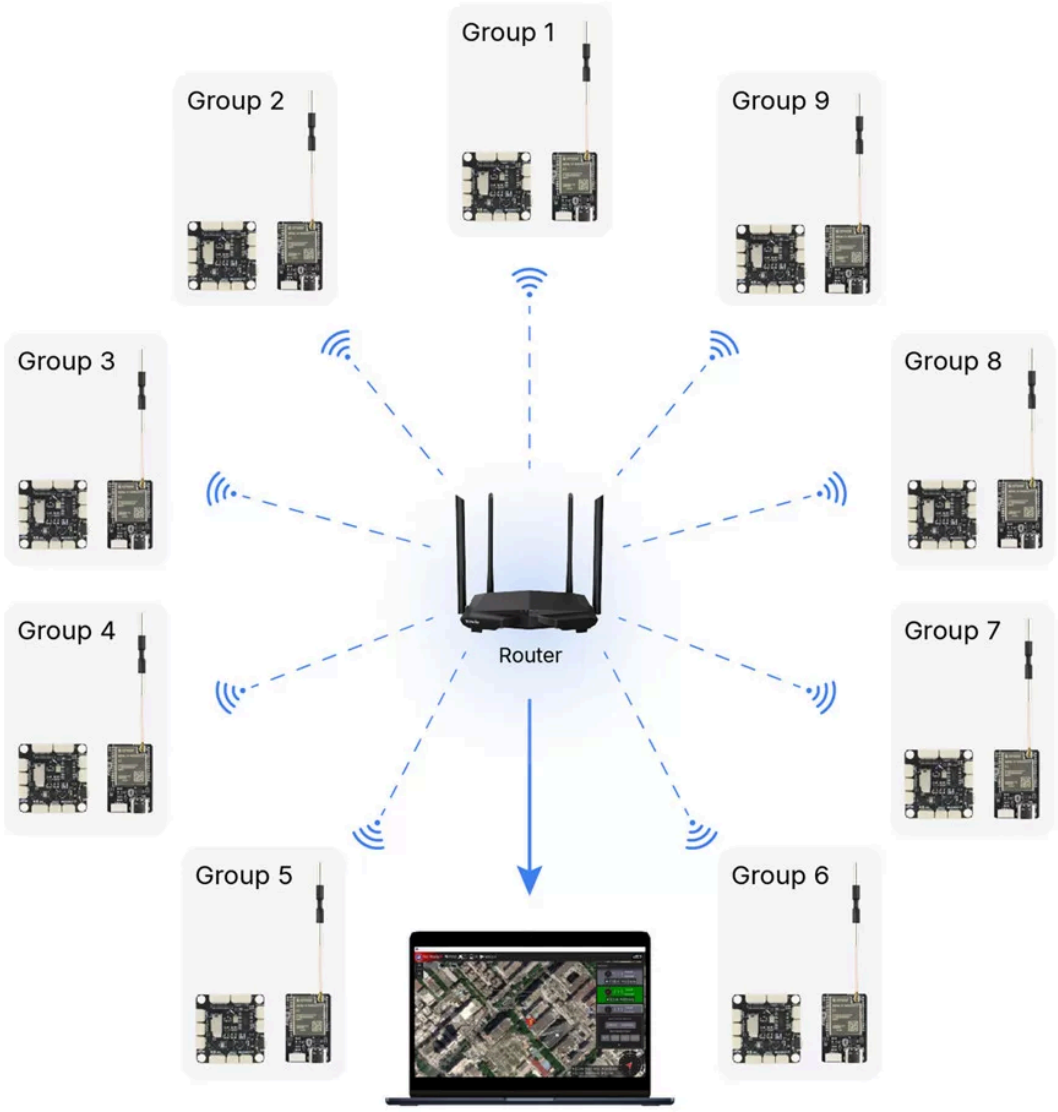
Default Network Parameters

- **AP SSID**: MicoAir_WiFi_Link_XXXX
- **AP Password**: 12345678
- **AP Gateway**: 192.168.4.1
- **STA Local IP**: 192.168.1.101
- **STA Target IP**: 192.168.1.2
- **STA Gateway**: 192.168.1.1
- **UDP Port**: 14550

WiFi Operating Modes

- **AP Mode (Default)**: The module creates its own WiFi hotspot. The Ground Control Station (PC/Phone) connects directly to it.

- **STA Mode**: The module connects to an existing local router. The GCS and the module communicate within the same Local Area Network (LAN).



BLE

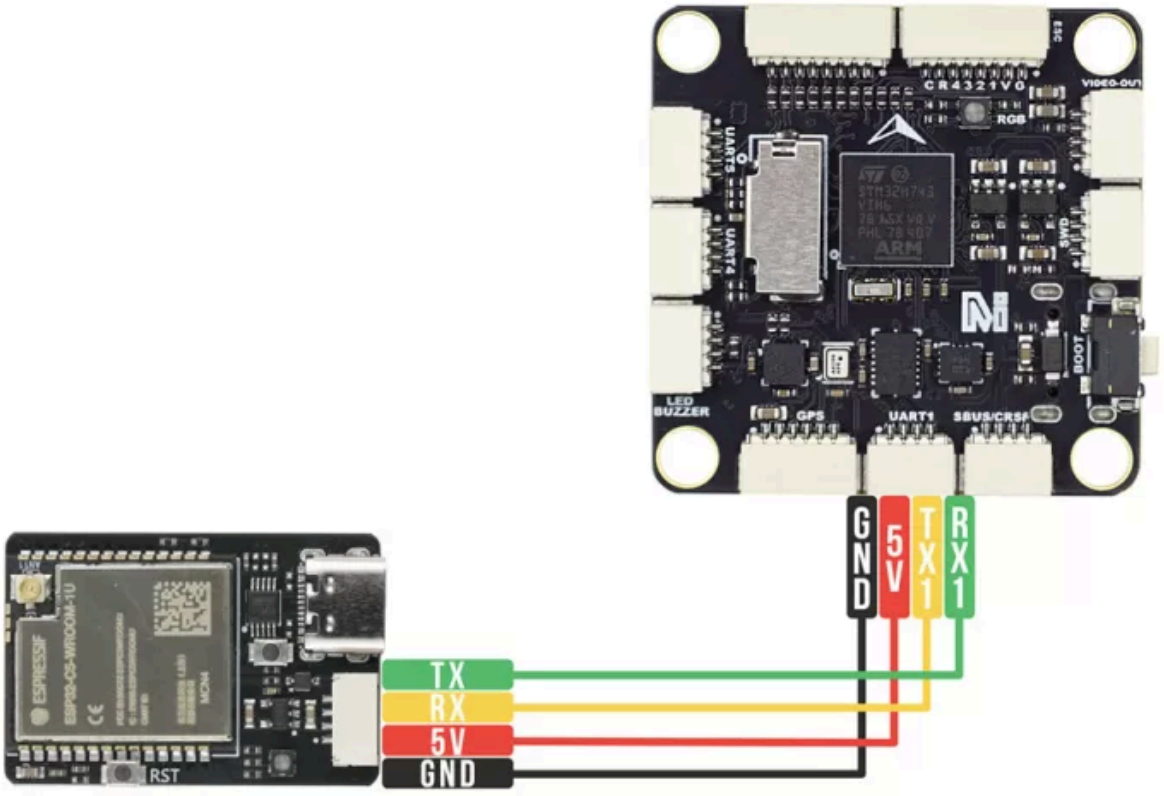
- **Bluetooth Name**: MicoAir_BLE_XXXX
- **Bluetooth Password**: None
- **Connection Range**: 10 meters
- **Conflict with 2.4G WiFi**: Since BLE and 2.4G WiFi share the same physical antenna and channel, they cannot be used simultaneously. The factory default is 5G WiFi (AP Mode) + BLE. If the module is switched to 2.4G WiFi (AP Mode), BLE will be automatically disabled. In STA mode, connecting to a 2.4G router will also automatically disable BLE.

Note: Currently, only the MicoPilot GCS app supports connecting the flight controller via this Bluetooth link.

Interface Description

Telemetry Interface

- TX and RX must be cross-connected.
- The flight controller and the module must share a common ground (GND).
- The flight controller serial baud rate must match the module's configured baud rate.



Debug Interface

The module's USB Type-C serial port is used for:

- Configuring parameters via AT commands.
- Firmware upgrades.

Default Debug Port Settings:

Baud Rate: 115200 / Data Bits: 8 / Stop Bits: 1 / Parity: None

[CH340 Windows Driver Download]

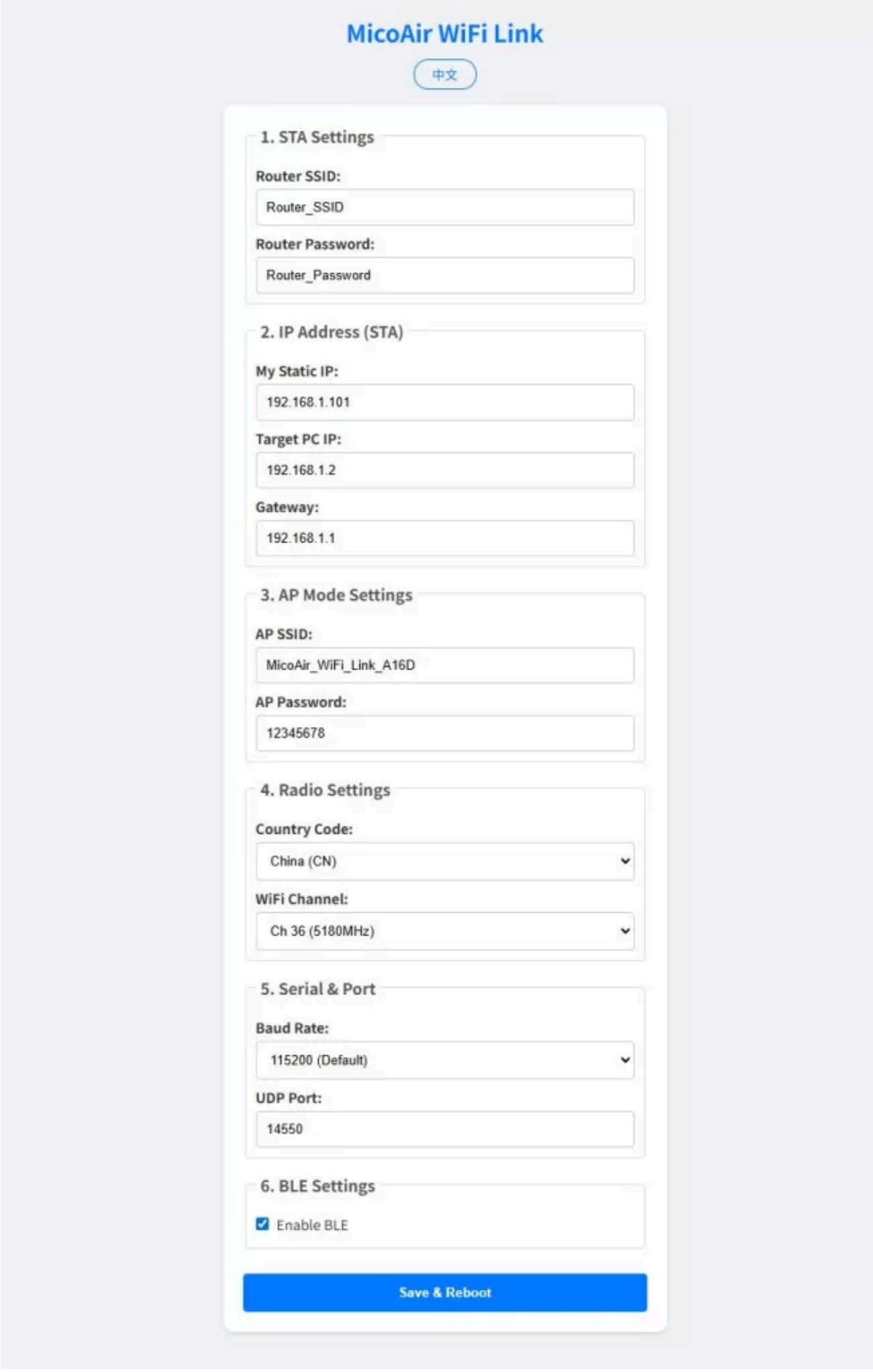
Web Configuration Guide

In AP Mode, open a web browser and visit:

http://192.168.4.1

Here, you can configure basic WiFi parameters.

Note:Switching to STA mode currently only supports configuration via AT commands.


MicoAir WiFi Link
中文
1. STA Settings
Router SSID:
Router_SSID
Router Password:
Router_Password
2. IP Address (STA)
My Static IP:
192.168.1.101
Target PC IP:
192.168.1.2
Gateway:
192.168.1.1
3. AP Mode Settings
AP SSID:
MicoAir_WiFi_Link_A16D
AP Password:
12345678
4. Radio Settings
Country Code:
China (CN)
WiFi Channel:
Ch 36 (5180MHz)
5. Serial & Port
Baud Rate:
115200 (Default)
UDP Port:
14550
6. BLE Settings
Enable BLE
Save & Reboot

Physical

- **Dimensions**: 34.5×23.5x6mm
- **Weight**: 5.5g (without antenna)

AT Command

The module supports querying and modifying parameters by sending AT commands via the USB serial port.

Note:A c arriage return and line feed (**\r\n**) must be appended to the end of each command. If using a Serial Monitor on a PC, be sure to check “Append CR-LF” or “Send Newline” in the settings.

AT Command List

Command	Description
AT	Test communication, returns OK
AT+ALL?	Query all current configuration information
AT+STATUS?	Query the current network state and core parameter configuration
AT+MODE? / AT+MODE=<0/1>	Query / Set operating mode (0: AP Mode, 1: STA Mode)
AT+BLE? / AT+BLE=<0/1>	Query / Set BLE telemetry switch (0: Disabled, 1: Enabled)
AT+CHAN? / AT+CHAN=<1~13/36/40/44/48/149/153/157/161/165>	Query / Set WiFi channel (Only effective in AP mode)
AT+APSSID? / AT+APSSID=<ssid>	Query / Set the module's AP hotspot name (Max 32 characters)
AT+APPWD? / AT+APPWD=<pwd>	Query / Set the AP hotspot password (8~63 characters)
AT+SSID? / AT+SSID=<ssid>	Query / Set the target router SSID (Used in STA mode)
AT+PWD? / AT+PWD=<pwd>	Query / Set the target router password (Used in STA mode)
AT+BAUD? / AT+BAUD=<baud>	Query / Set the telemetry serial port baud rate communicating with the flight controller
AT+PORT? / AT+PORT=<port>	Query / Set the UDP communication port (Default 14550)
AT+MIP? / AT+MIP=<ip>	Query / Set the module's Local IP (Static IP)

Command	Description
`AT+GW?` / `AT+GW=<ip>`	Query / Set the Gateway IP (Used when setting a static IP in STA mode)
`AT+TIP?` / `AT+TIP=<ip>`	Query / Set the target communication IP
`AT+VER?`	Query firmware version information
`AT+RST`	Reboot the module (**Requires execution after modifying parameters to take effect**)
`AT+RESET`	Restore factory default settings

AT Command Usage Examples

Below are typical operation steps for common scenarios. The module generally replies with `OK` after successfully executing a command.

Example 1: Query current module state and parameters

Confirm the current network status and parameter configuration.

```
Send: AT+STATUS?
Similar response:
Mode: AP
AP_SSID: MicoAir_WiFi_Link_ABCD
AP_PWD: 12345678
IP: 192.168.4.1
Baud: 115200
UDP_Port: 14550
Target_IP: 255.255.255.255
OK
```

Example 2: Modify the telemetry serial baud rate

When a higher baud rate is required for the connection between the flight controller and the module (e.g., changing to `460800`):

```
Send: AT+BAUD=460800
Response: OK

Send: AT+RST
Response: OK
(The new baud rate takes effect after reboot. Future AT command communicatio
```

Example 3: Switch to STA mode and connect to a router

To increase communication range or to allow multiple devices to join the same LAN, set the module as a client (STA Mode) to connect to an existing wireless router (e.g., target router SSID `MyRouter`, Password `password123`).

```
1. Set the target router SSID
Send: AT+SSID=MyRouter
Response: OK

2. Set the target router password
Send: AT+PWD=password123
Response: OK

3.Set a static IP. :
Send: AT+MIP=192.168.1.101
Response: OK

4.Set the Target(PC) IP. :
Send: AT+TIP=192.168.1.200 (Your PC IP)
Response: OK

5.Set the operating mode to STA Mode (Mode ID: 1)
Send: AT+MODE=1
Response: OK
```

Example 4: Modify the default AP password

In the factory default AP mode, modify the AP password to enhance privacy and prevent unauthorized access (minimum 8 characters required):

```
Send: AT+APPWD=my_new_pwd
Response: OK

Send: AT+RST
Response: OK
(After reboot, clients connecting to the module's hotspot will need to input
```

GCS Tutorial

Ensure that the telemetry module is correctly connected to the flight controller's serial port, and the corresponding FC serial port baud rate is set to 115200 (MicoAir-WiFi-Link default baud rate).

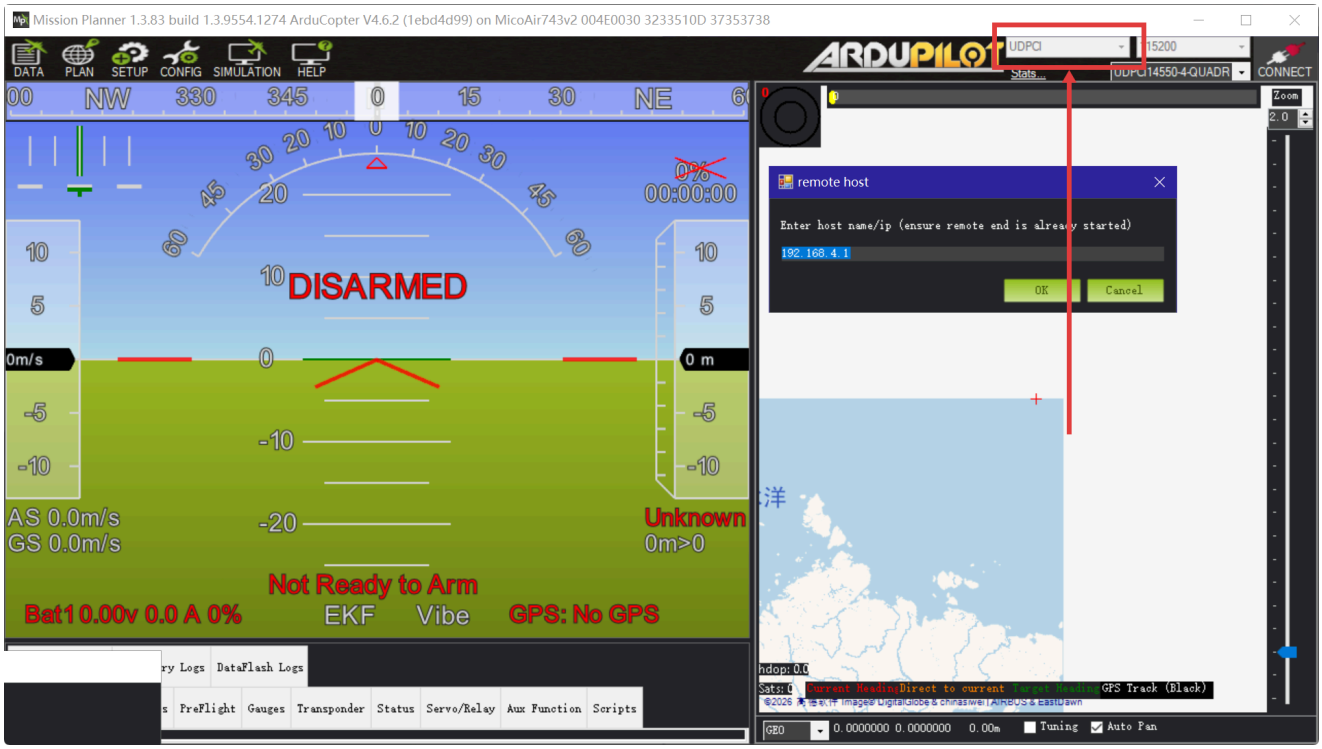
MicoPilot Connection Tutorial

- **BLE Connection Instructions**: First, ensure your smartphone's Bluetooth is enabled. Open the MicoPilot Ground Control Station APP, tap the `Connect` button in the top right corner, and select Bluetooth mode. A Bluetooth connection window will pop up and automatically display discovered Bluetooth devices. Wait a few seconds, and you should see the MicoAir-WiFi-Link device name (e.g., MicoAir_BLE_XXXX) in the first row, as shown below. Tap to connect.

- **WiFi UDP Connection Instructions**:
  First, connect your smartphone to the module's WiFi hotspot, typically named: MicoAir_WiFi_Link_XXXX. Open the MicoPilot APP, tap the `Connect` button in the top right corner, and select WiFi/UDP. A UDP connection window will pop up—select UDPCI mode, leave the gateway IP and port at their default values (192.168.4.1 and 14550), and tap Connect.

Mission Planner Connection Tutorial (AP Mode)

In the top right corner of Mission Planner, select UDPCI mode, and click Connect. In the popup dialog, enter the telemetry module's gateway IP address: `192.168.4.1`, and port number `14550`. MP will automatically begin connecting to the flight controller. If it takes too long or fails to retrieve flight controller parameters, please verify whether your PC is connected to the WiFi hotspot, the FC serial baud rate is properly set to 115200, and the wiring is correct (Rx and Tx must be cross-connected).



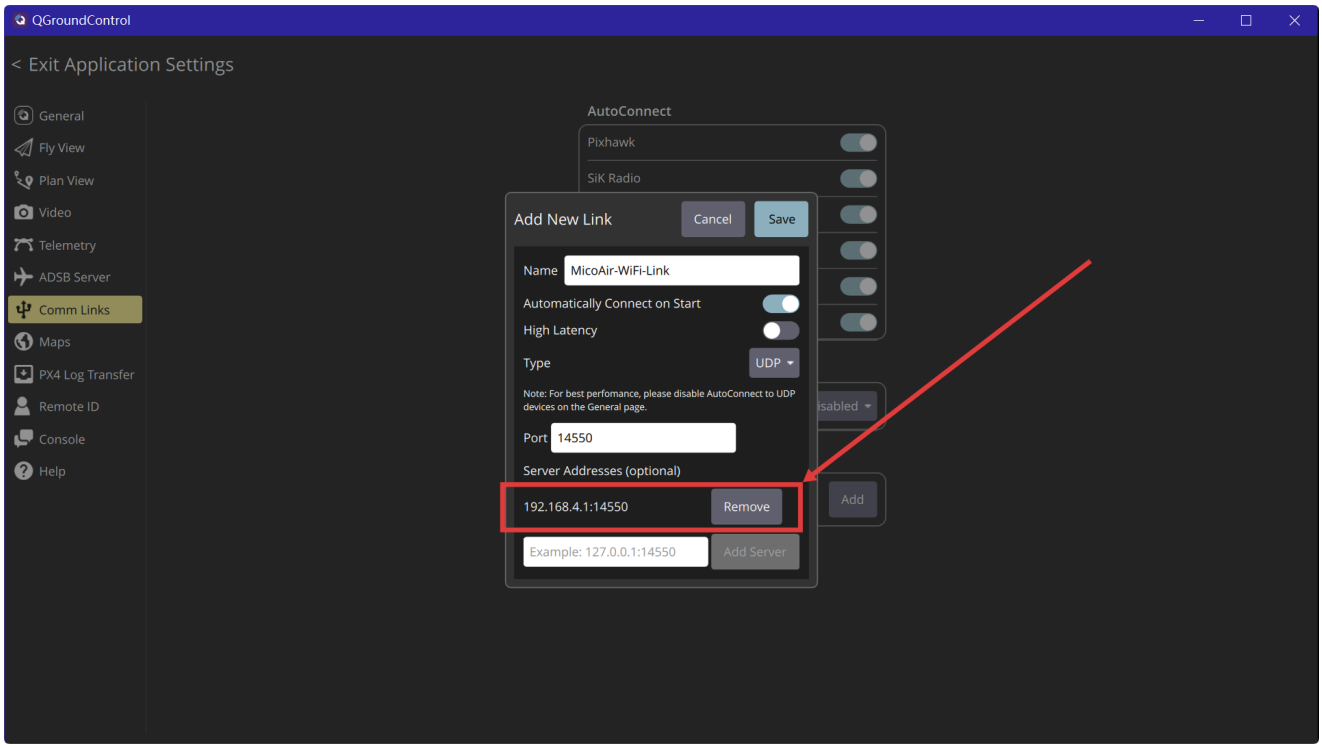
QGroundControl Connection Tutorial (AP Mode)

Open QGC, navigate to Application Settings → Comm Links, and click Add at the bottom to create a new link. Set Type to UDP, Port to 14550, and add the telemetry module's gateway IP address (`192.168.4.1`) under Server Addresses. Check `Automatically Connect on Start` to enable automatic connections for future launches, and click Save.

At the top of the AutoConnect section, check UDP to enable the UDP autoconnect feature; select the newly created link, click Connect, and wait for QGC to establish a connection with the flight controller. The next time you launch QGC, it will automatically connect based on this configured link.

If the connection still fails despite following these steps, consider turning off the Windows

Firewall or adding QGC to the firewall's whitelist.



Building Your Own Drones