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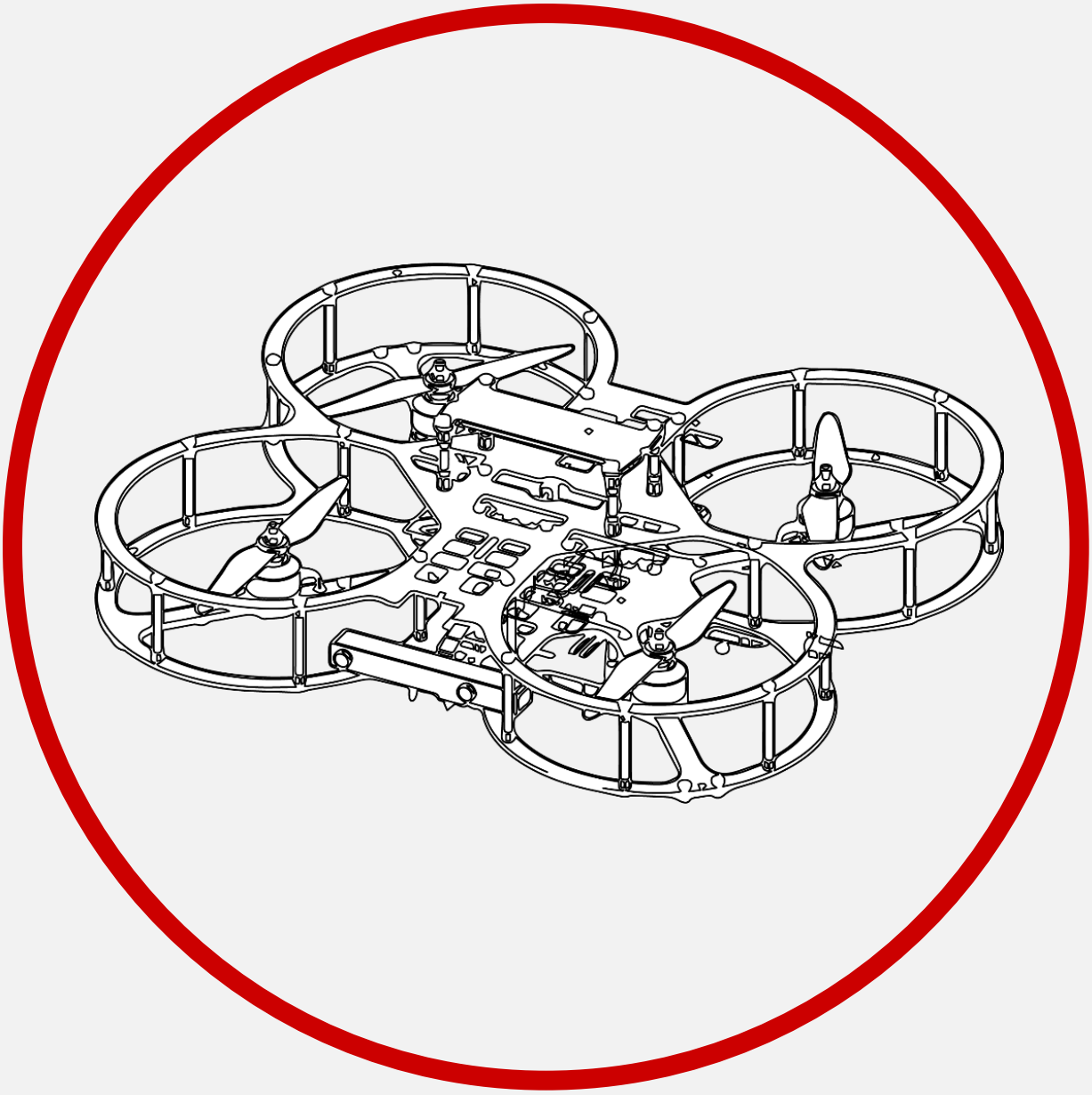

Autonomous Vehicles Research Studio

Setup Guide – QDrone 1 Communication

v 2.0 – 18*th April* 2023

Table of Contents

A. Communicating with QDrone 1

The QDrone 1 is shipped pre-configured to connect to the wireless network created by the provided router: Quanser_UVS-5G. This happens automatically following a boot sequence when they are powered on. To ensure that the drone is connected, observe if there is an IP in the LCD screen on top of the drone and try to ping it from the command prompt in the ground control station, similar to ensuring that the ground control station PC - router connection has been established in the router to PC documentation.

To connect additional vehicles to the UVS network, the 5GHz and 2.4GHz bands on the router have been configured as follows:

5GHz:

SSID: Quanser_UVS-5G Password: UVS_wifi

2.4GHz:

SSID: Quanser_UVS Password: UVS_wifi

Router login credentials are as follows:

Username: admin Password: Quanser_123

The QDrone does not have a preset IPV4. **If you would rather set a fixed IP, refer to the Setting Fixed IP Addresses document (supplementary_material > setting_fixed_ip).** For a successful connection, the DHCP server option on the router must be enabled. For the Netgear Nighthawk router provided with the AVRS system, the DHCP server can be found by going to Advanced/Setup/LAN Setup.

To ensure compatibility with the Self-Driving Car Research studio, the **5GHz band** for the Netgear Nighthawk router has been configured to **channel 44.** If you do notice intermittent issues with communication to any of the vehicles, it is recommended that you use a WiFi spectrum analyzer and check if there are networks which are broadcasting on the same channel but at a higher signal strength. Microsoft has a free WiFi analyzer: (https://www.microsoft.com/en-us/p/wifi-analyzer/9nblggh33n0n?activetab=pivot:overviewtab#)

You can change the Netgear Nighthawk's channel number by logging into the router and checking the channel number under the 5GHz wireless band.

B. Boot-Up for QDrone 1

i. Connecting the Battery

Insert a fully charged battery into the battery compartment on the QDrone 1 (Figure 1) all the way to the hard stop. **Tighten the battery with the velcro**.

> **Note:** Ensure that the velcro strap is tight and that the battery is secured in place.

Connect the XT-60 connector on the battery to the XT-60 connector on the drone. This is immediately acknowledged by 3 beeps from the drone, as the drone's computer boots.

> **Note:** Turn off the QDrone 1 by disconnecting the XT-60 battery cable from the one on the drone whenever the drone is not in use.

> ⚠ **Caution:** Leaving the QDrone 1 with the battery connected will continue to drain power below the minimum voltage threshold of 10V, **and may permanently damage the battery**.

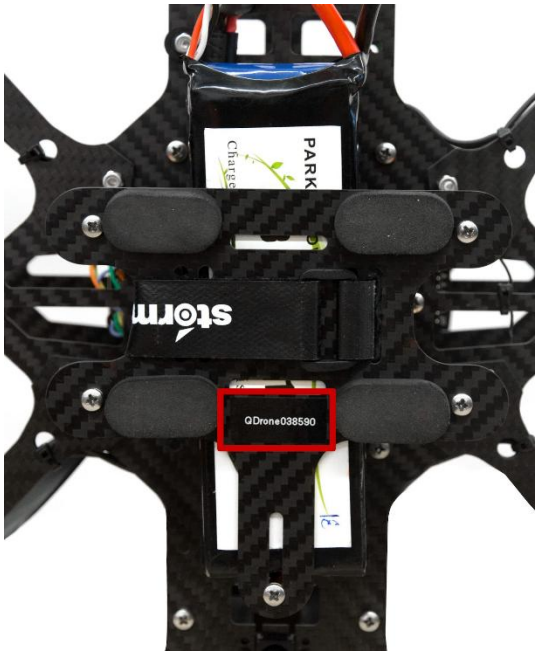

Figure 1. Battery setup and hostname

ii. Testing the Connection

Open a command prompt on the ground control station PC (type `cmd` in the start menu). Type the following command: `ping QDrone0XXXXX.local -t` where QDrone0xxxxx represents the hostname of the QDrone 1 found on the bottom plate (Figure 1). A reply should be registered as in Figure 2, which indicates that a connection has been established. You can press CTRL+C to terminate the ping.

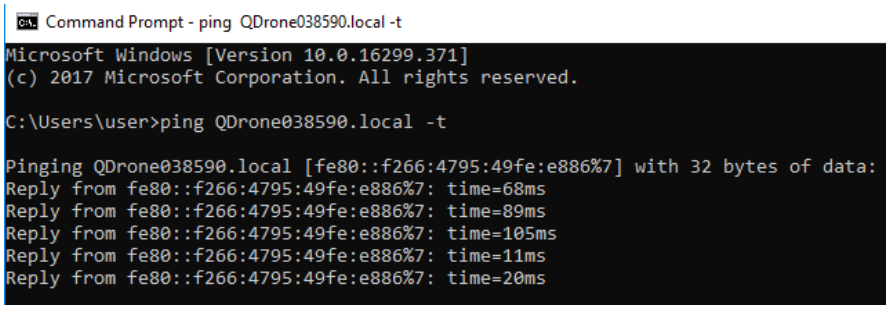

Figure 2. QDrone 1 and the ground control PC connection using the hostname lookup.

An alternative way of checking connectivity between the QDrone 1 and the router is to use the IPV4 Address which can be found by connecting to the router. Router login credentials are found in section A. The QDrone 1 network information can be found by checking under the Connected/Attached Devices option.

Type the following command: `ping 192.168.2.X -t` where 192.168.2.x represents the IPV4 address found through the router. A reply should be registered as in Figure 3, which indicates the drone is properly connected.

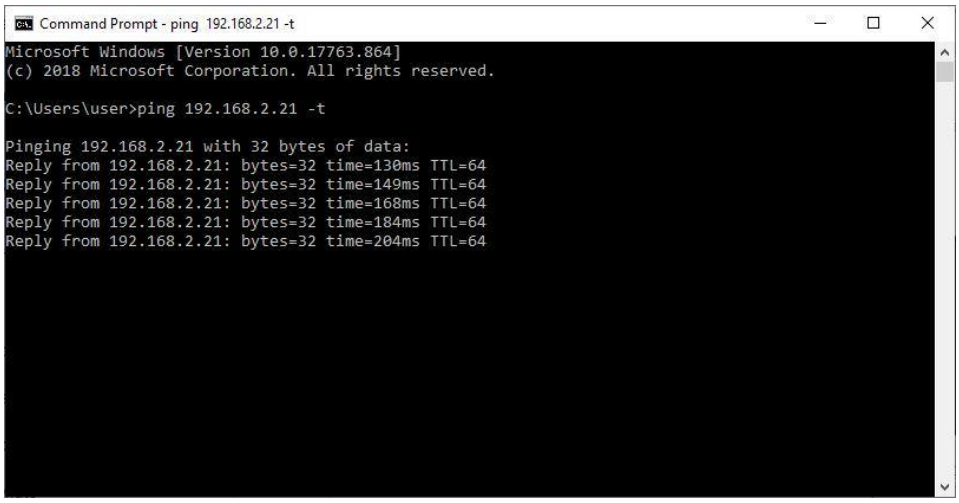

Figure 3: Checking the connection between the QDrone 2 and the ground control station PC

Note: If the ping test fails, double-check the network connection from the router and try again. Refer to the Setting Fixed IP Addresses document on more information. Also try power cycling the drone. If issues persist, contact Quanser technical support (tech@quanser.com).

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