

# Autonomous Vehicles Research Studio

## Setup Guide – Router to PC Setup

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**FCC Notice** This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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#### Waste Electrical and Electronic Equipment (WEEE)



This symbol indicates that waste products must be disposed of separately from municipal household waste, according to Directive 2002/96/EC of the European Parliament and the Council on waste electrical and electronic equipment (WEEE). All products at the end of their life cycle must be sent to a WEEE collection and recycling center. Proper WEEE disposal reduces the environmental impact and the risk to human health due to potentially hazardous substances used in such equipment. Your cooperation in proper WEEE disposal will contribute to the effective usage of natural resources.

This product meets the essential requirements of applicable European Directives as follows:

**CE Compliance** 

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EC; Electromagnetic Compatibility Directive (EMC)

**Warning:** This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.



**This equipment is designed to be used for educational and research purposes and is not intended for use by the public.** The user is responsible to ensure that the equipment will be used by technically qualified personnel only. While the end-effector board provides connections for external user devices, users are responsible for certifying any modifications or additions they make to the default configuration.

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## A. IP Setup / Change

**Note:** The ground control station PC has already been configured with IP 192.168.2.5 to connect to the provided router that has the IP 192.168.2.1. The steps below are in case the IP needs to be changed. If you just need to confirm/test the connection, please see section C.

1. Make sure both the ground control station PC and the router are powered on.
2. With the router connected directly to the ground control station PC via an ethernet cable, open the **Network and Sharing Center** (search for Control Panel, and then navigate to Control Panel > Network and Internet > Network and Sharing Center).
3. Click on the **Ethernet** link, as shown in Figure 1, to open the **Ethernet Status** dialog box.

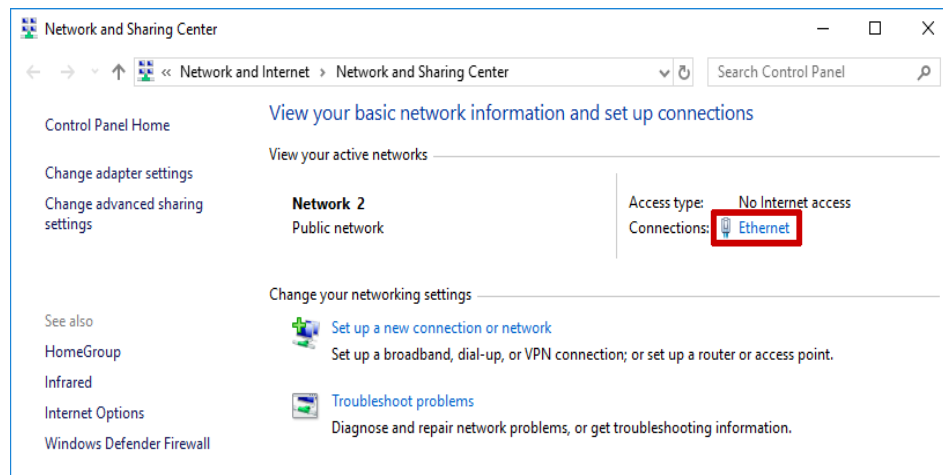
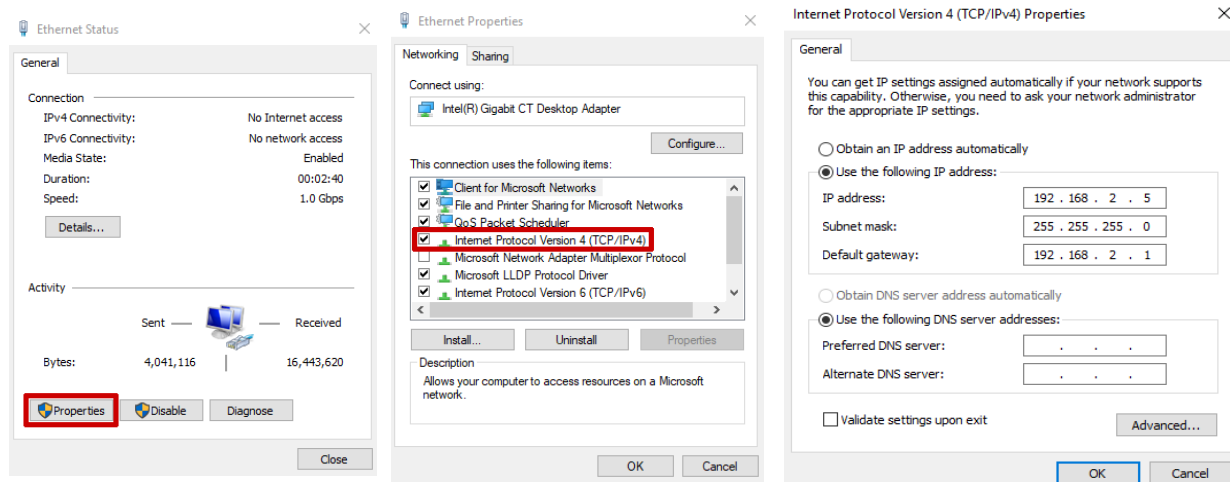


Figure 1: Ethernet Status settings via the Network and Sharing Center

**Note:** In case an ethernet cable is plugged into the second ethernet port on the PC (for Prime cameras or Internet), a second link labelled **Ethernet 2** will also be displayed. These steps are NOT meant for that link.

- In the **Ethernet Status** dialog box (Figure 2a), click on **Properties**, which opens an **Ethernet Properties** dialog box (Figure 2b). Double-click on **Internet Protocol Version 4 (TCP/IPv4)**, which opens the properties dialog box (Figure 2c).



a. Ethernet Status

b. Ethernet Properties

c. IPv4 Properties

Figure 32: Setting a static IP for the ground control station PC

- Set the **IP address** to 192.168.2.x, where x can be any single digit from 2 to 9. This is the static IP that will be assigned to the ground control station PC and will be used in the communication infrastructure of all the models. Set the **Subnet mask** to 255.255.255.0 and the **Default gateway** to 192.168.2.1 (IP of the router).

**Note:** Each PC/laptop used with the **Autonomous Vehicles Research Studio** should have a unique static IP. The ground control station PC is pre-configured to **192.168.2.5**

- Press **OK** in the **IPv4 Properties** dialog box, **OK** in the **Ethernet Properties** dialog box and **Close** in the **Ethernet Status** dialog box.

## B. Connecting a Device Wirelessly

To connect additional vehicles to the UVS network the 5 GHz and 2.4 GHz 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

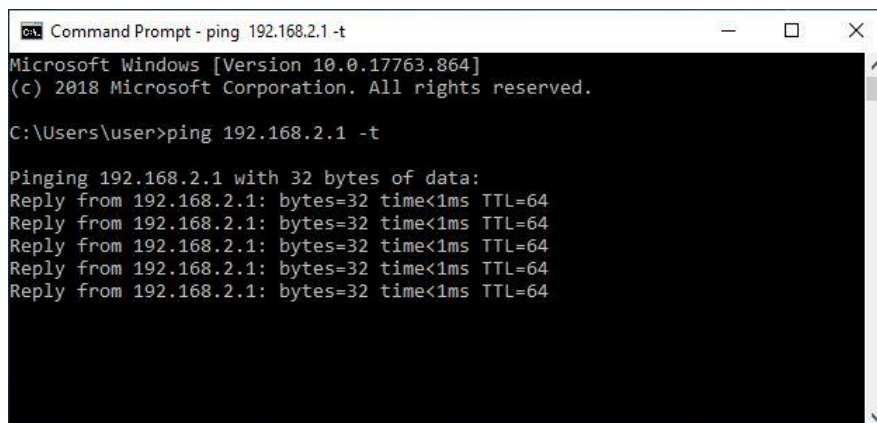
Router login credentials are as follows:

Username: admin

Password: Quanser\_123

## C. Testing Router-PC Connectivity

1. Make sure both the ground control station PC and the router are powered on and that the router is connected directly to the ground control station PC via an ethernet cable. If using a laptop (not recommended), make sure to confirm you are connected to the router, either wirelessly or using an ethernet cable.
2. Open a Command Prompt (type `cmd` in the **Start Menu**).
3. Enter the following command: `ipconfig` and press enter. This should show something like the output in Figure 4. Showing your current computer's IP and the default gateway (router's IP).
4. Confirm that your computer is set up in the default IP (192.168.2.5) or to the one you set up in section A.
5. Enter the following command in the prompt: `ping 192.168.2.1` and press enter. If you see consistent replies from the router (Figure 4), the communication link between the ground control station PC and the router has been set up correctly.



```
Command Prompt - ping 192.168.2.1 -t
Microsoft Windows [Version 10.0.17763.864]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Users\user>ping 192.168.2.1 -t

Pinging 192.168.2.1 with 32 bytes of data:
Reply from 192.168.2.1: bytes=32 time<1ms TTL=64
Reply from 192.168.2.1: bytes=32 time<1ms TTL=64
Reply from 192.168.2.1: bytes=32 time<1ms TTL=64
Reply from 192.168.2.1: bytes=32 time<1ms TTL=64
Reply from 192.168.2.1: bytes=32 time<1ms TTL=64
```

Figure 4: Ping command from the ground control station PC to the router

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