

External Graphics Guide – Windows® 10

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ABBREVIATIONS

Abbreviation	Description
GPU	Graphics Processing Unit
eGPU	External Graphics Processing Unit (connected via Thunderbolt)
dGPU	Discrete Graphics Processing Unit (inside laptop)
iGPU	Integrated Graphics Processing unit (part of the processor)
USB	Universal Serial Bus
BIOS	Basic Input Output System
PC	Personal Computer
NVM	Non-Volatile Memory
PCIe	Peripheral Component Interconnect Express
App	Application (computer program)

GENERAL INFORMATION

External graphics using AMD® or NVIDIA® graphics chips is supported on Thunderbolt™ 4 and 3 enabled machines. Only machines running the latest version of 64-bit Windows 10 support external graphics. If you have an older machine and are not sure if your system can support external graphics then follow the guidelines in step: “Software/ Firmware Check”.

Thunderbolt 4 Windows PCs with an 11th generation Intel-Core processor and Thunderbolt 3 PCs with an 10th, 9th, 8th or 7th generation Intel-Core processor support external graphics, as long as they have current OS, BIOS, firmware and drivers. Systems based on a 6th generation Intel-Core processor may support external graphics with usage errata, depending on whether recent BIOS and firmware are available.

All laptops with an 11th generation Intel-Core Tiger-Lake processor have Thunderbolt 4 ports, even if there is no Intel® Thunderbolt trademark logo ⚡ next to the type C port (see Figure 1: Thunderbolt 4 laptops with an 11th Generation Intel-Core processor may be missing the Thunderbolt logo. Figure 1).



Figure 1: Thunderbolt 4 laptops with an 11th Generation Intel-Core processor may be missing the Thunderbolt logo.

For older models, please make sure that your machine has a Thunderbolt 3 port and not a regular USB-C port. Thunderbolt 3 (USB-C connector type) ports on a Windows PC and all Thunderbolt 3 and 4 cables must be marked with the Intel Thunderbolt trademark logo (see Figure 2). Only a Thunderbolt 3 or 4 port connected with a Thunderbolt 3 or 4 cable supports external graphics.



Figure 2: Thunderbolt 3 cable and port with Thunderbolt logo.

If the port has the lightning bolt logo below (see Figure 3), it means that this is a USB-C Charging Port and *not* a Thunderbolt port.



Figure 3: Icon for USB-C Charging Port. A port marked with this icon is not a Thunderbolt Port.

SOFTWARE/ FIRMWARE CHECK

Backup your PC using the backup software of your choice before running any recommended updates. Take notes about current BIOS, firmware and software versions as you follow this guide. To confirm that your Thunderbolt 4 or 3 enabled Windows 10 system is ready to fully support external graphics please check the following:

1. **Computer BIOS:** Make sure your machine has the latest BIOS installed. Go to your computer manufacturer's website and find your system model under support. Check for updates. Many PCs also have support assistance software installed that allows you to check for software updates (such as HP Support Assistant, Dell SupportAssist or Dell Command Update, Lenovo System Update, Asus Live Update).
 - 1.1 Find your computers BIOS version by entering "msinfo32" in the search bar of your Windows 10 desktop. BIOS versions which have been released in 2020 or later are ideal (see Figure 4).

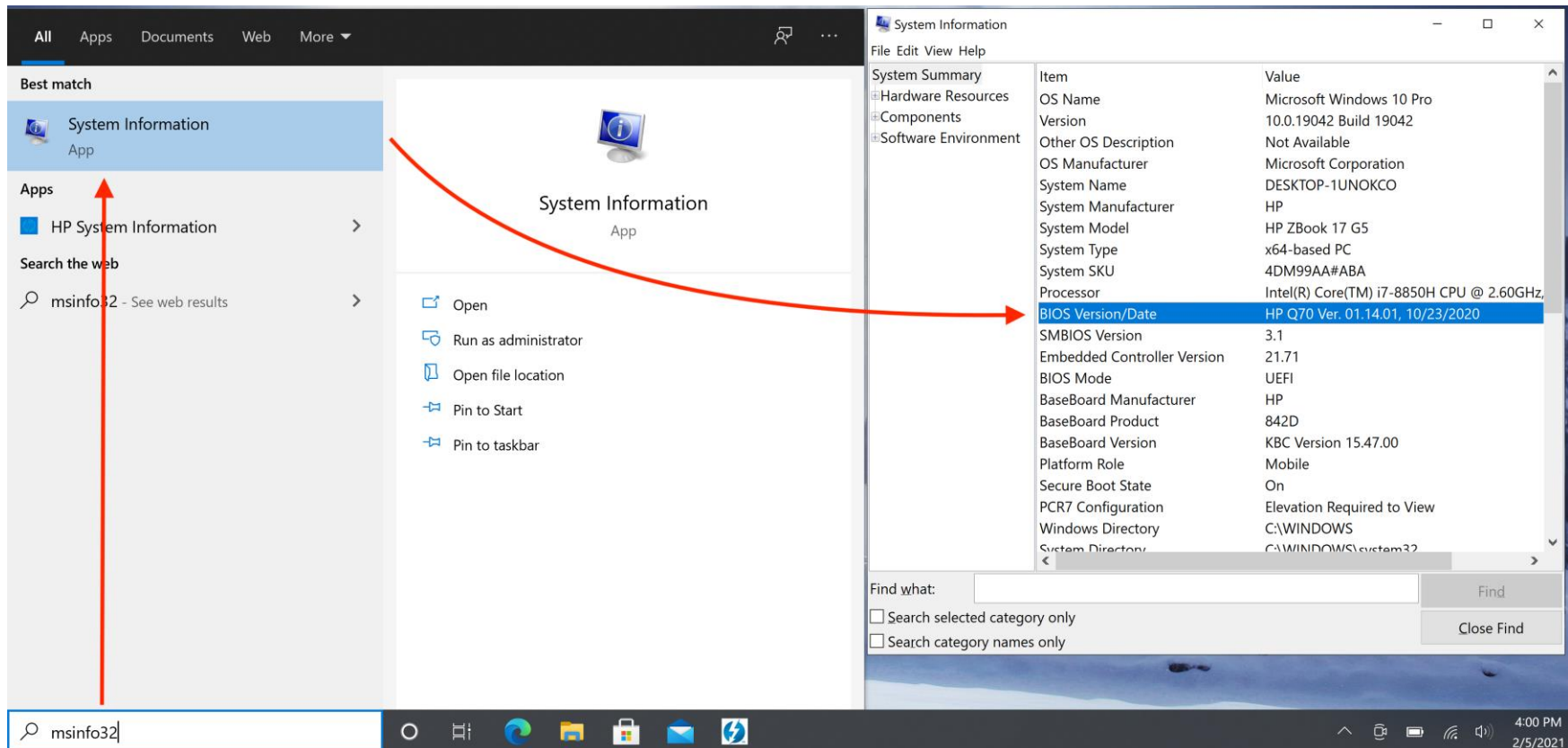


Figure 4: Windows 10 BIOS information.

2. **Windows Version:** Install all Windows 10 updates and check which version of Windows you have.

2.1 Install Windows 10 updates by going to Settings → Update & Security → Check for updates (see Figure 5).

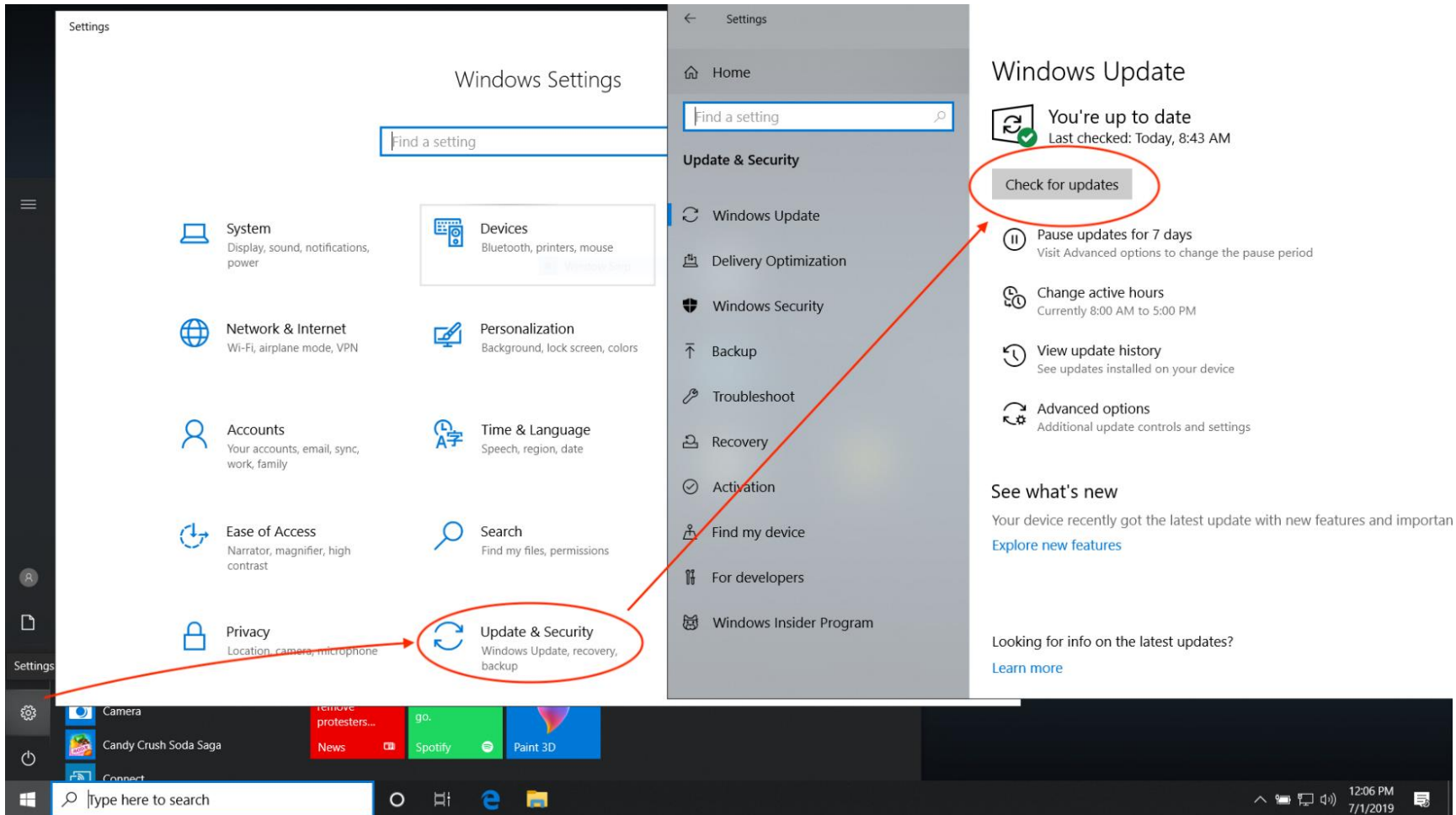


Figure 5: Windows 10 update.

2.2 Make sure your Windows 10 installation is at least at version 20H2 by entering “winver.exe” in the search bar in the lower left-hand corner of your Windows 10 desktop (see Figure 6).

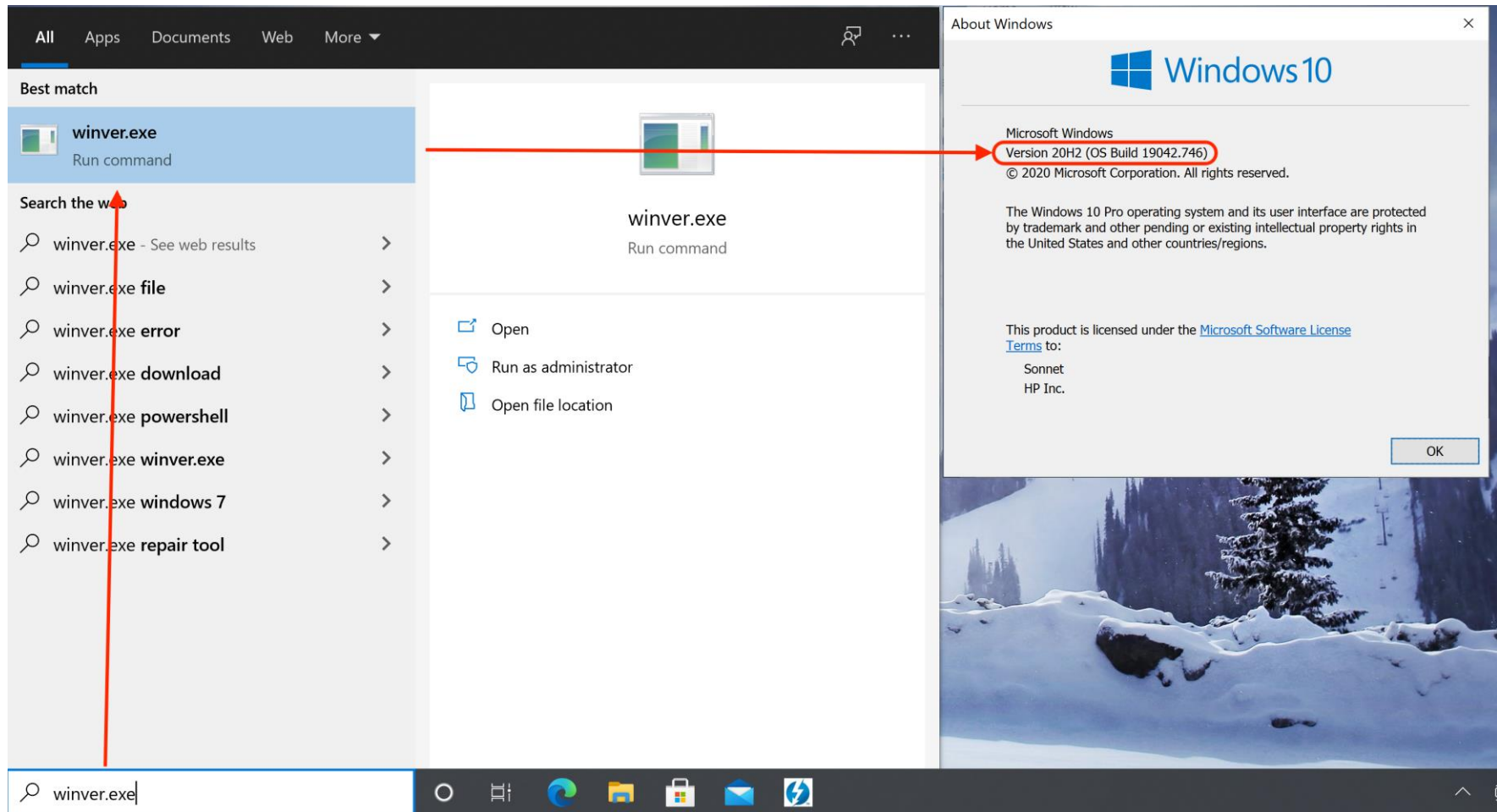


Figure 6: Windows 10 version check.

3. Thunderbolt Firmware Version: Check the Thunderbolt firmware version of your computer. Check for updates.

3.1 On Thunderbolt 3 machines prior to 2019, check your Thunderbolt firmware version by entering “Thunderbolt” in the search bar on your Windows 10 desktop. In the lower right-hand corner of your desktop, a Thunderbolt icon should pop up. Right click on it and select “About” (or “Settings” and then “Details”). Check your NVM Firmware version as well as external GPU support. For computers manufactured in 2016 or 2017, NVM version 23 or higher is best (see Figure 7).

Note for 2016 and 2017 Windows computers: If your system has a Thunderbolt NVM Firmware version lower than 23, it may still support external graphics even if it says “External GPUs supported: No”. However, you may experience some limitations (e.g. when disconnecting eGPU while system is running, computer may hang or blue screen).

4. Thunderbolt Driver Version: Check the Thunderbolt driver version of your computer. Go to your computer manufacturer’s website and find your system model under support. Check for updates.

4.1 For Thunderbolt 3 machines prior to 2019, follow step number 3 and look for “Software package version: xx.x.xx.xxx” (see Figure 7). Version 17.4.78.500 and above is best. Previous versions may work.

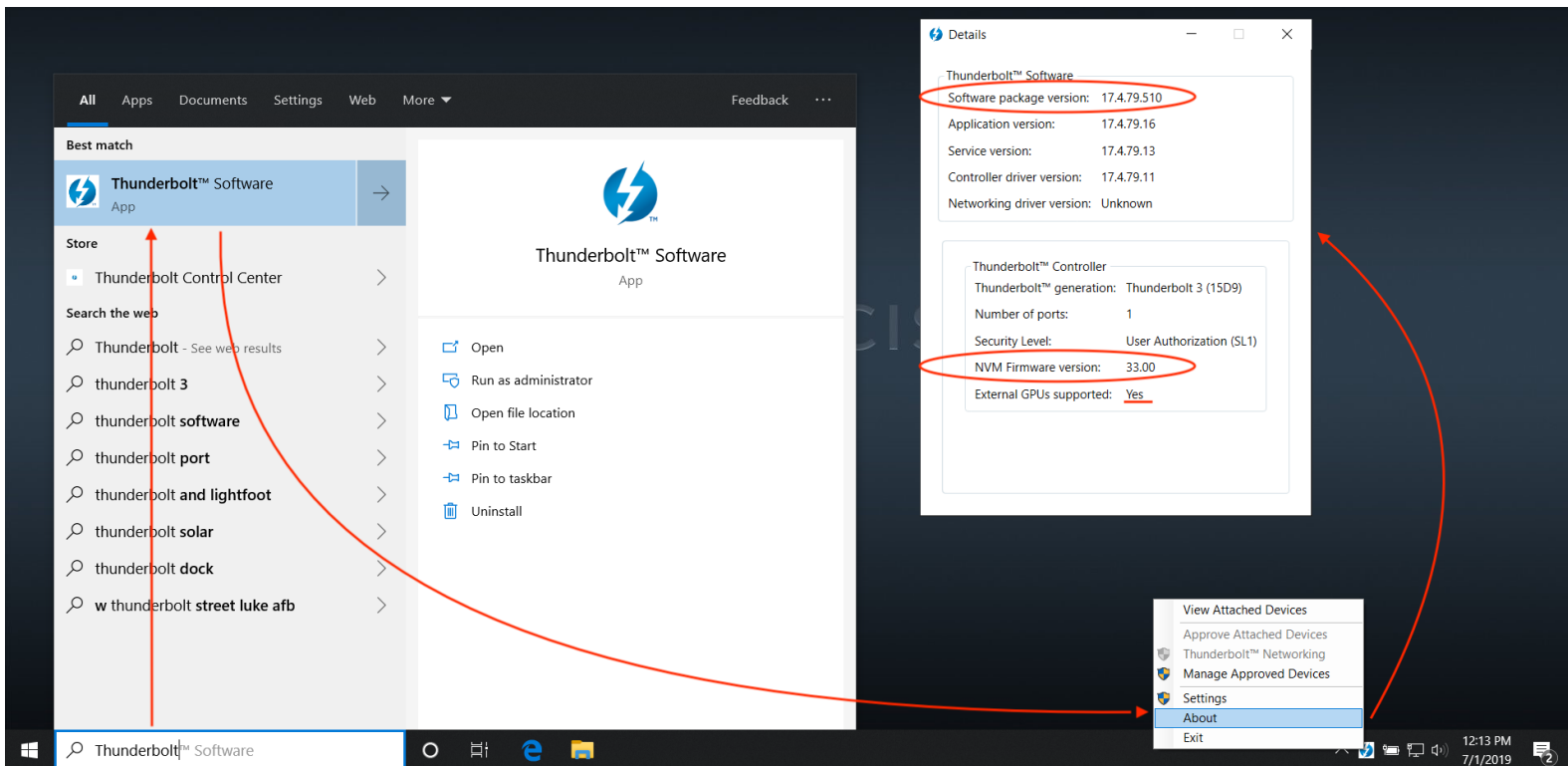


Figure 7: Thunderbolt firmware and driver version check on Thunderbolt 3 machines (before 2019).

4.1 If you have a Thunderbolt 4 or Thunderbolt 3 machine from 2019 or newer, please enter “Thunderbolt Control Center” in the search bar. In the Control Center, go to “About” and look for the “Controller driver version”, see Figure 8. Version 1.41.941.0 and above is best.

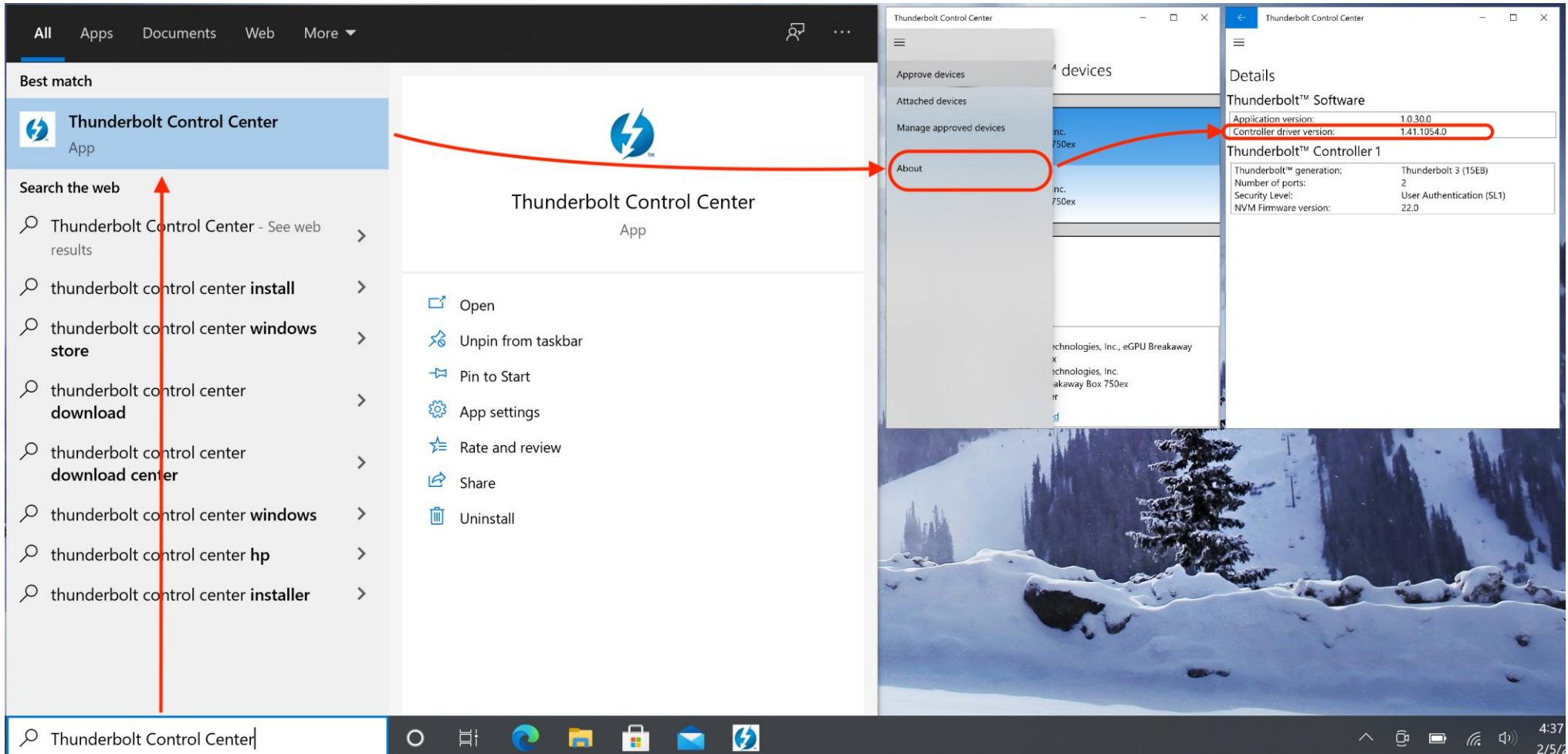


Figure 8: Thunderbolt driver version check on Thunderbolt 4 and Thunderbolt 3 machines (2019 and newer)

SETTING UP EXTERNAL GRAPHICS (EGPU)

1. Choose either a Sonnet eGPU Breakaway Puck or an eGPU Breakaway Box. If you go with a Sonnet eGPU Breakaway Box choose a compatible graphics card. Use our [Graphics Card Compatibility Chart](#) to find the right card and Box.
2. If you have an eGPU Breakaway Box install your **AMD or NVIDIA card** in the Box. Plug the auxiliary power connector(s) into the card. Close the Box. Plug the Box or Puck into the power outlet. Turn on the power switch if the Box has one.
3. Connect the eGPU device to your computer with the included Thunderbolt cable (The blue light on the device will not come on until you connect it to a live computer).
 1. If you have a Thunderbolt 3 computer, click on the message indicating that a new Thunderbolt device has been attached. Allow the app to make changes. You should get a message asking whether you want to connect this Thunderbolt device. Select **“always connect”** and click **“OK”** (see Figure 9).
 2. Thunderbolt 4 PCs should automatically approve a connected Thunderbolt device.

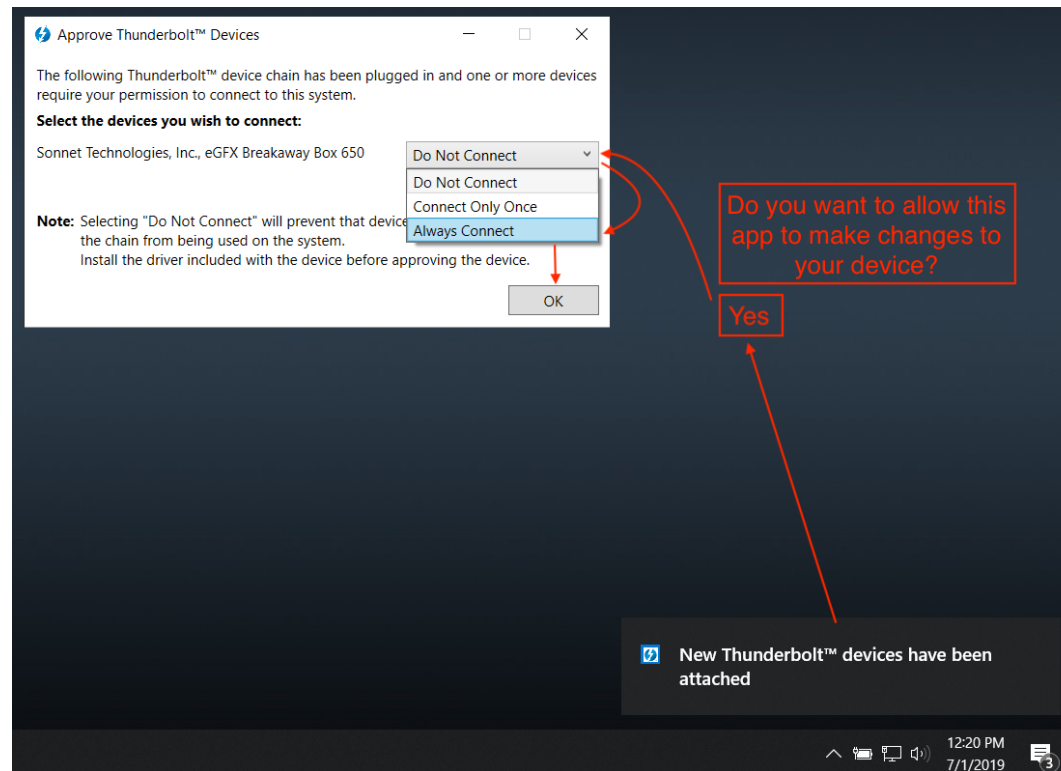


Figure 9: Approving connected Thunderbolt device on Thunderbolt 3 PC.

4. Check if your Thunderbolt device is being detected by the Thunderbolt software.
 1. If you have a Thunderbolt 3 PC prior to 2019, double click on the Thunderbolt icon in the lower right-hand corner of your desktop, you should now see the eGPU device in the window “Attached Thunderbolt Devices” (see Figure 10).

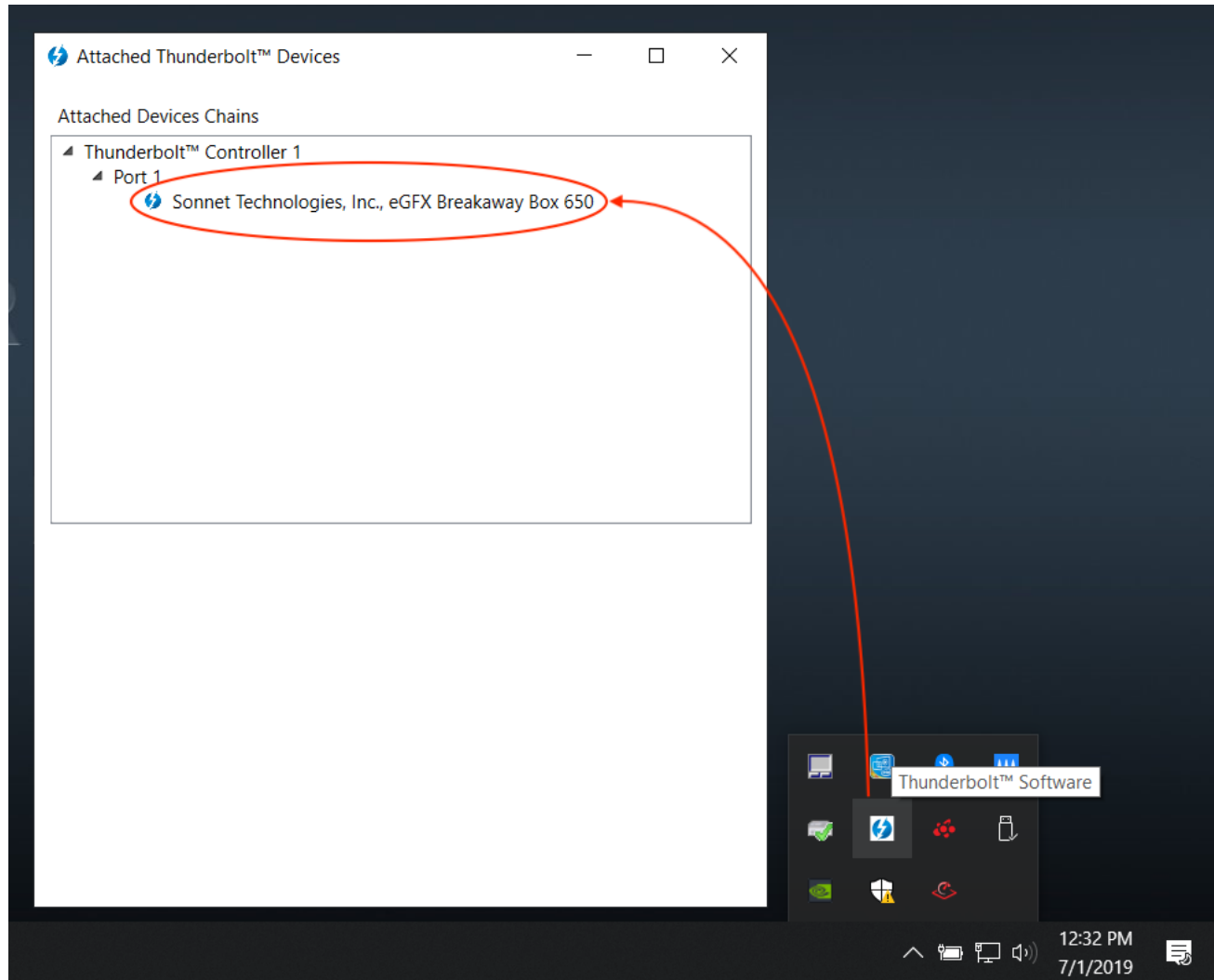


Figure 10: Attached Thunderbolt devices on Thunderbolt 3 PC (before 2019).

2. If you have a Thunderbolt 4 PC or a Thunderbolt 3 PC from 2019 and newer, open the Thunderbolt Control Center app, you should see your Thunderbolt device under “Attached Thunderbolt Devices”, see Figure 11.

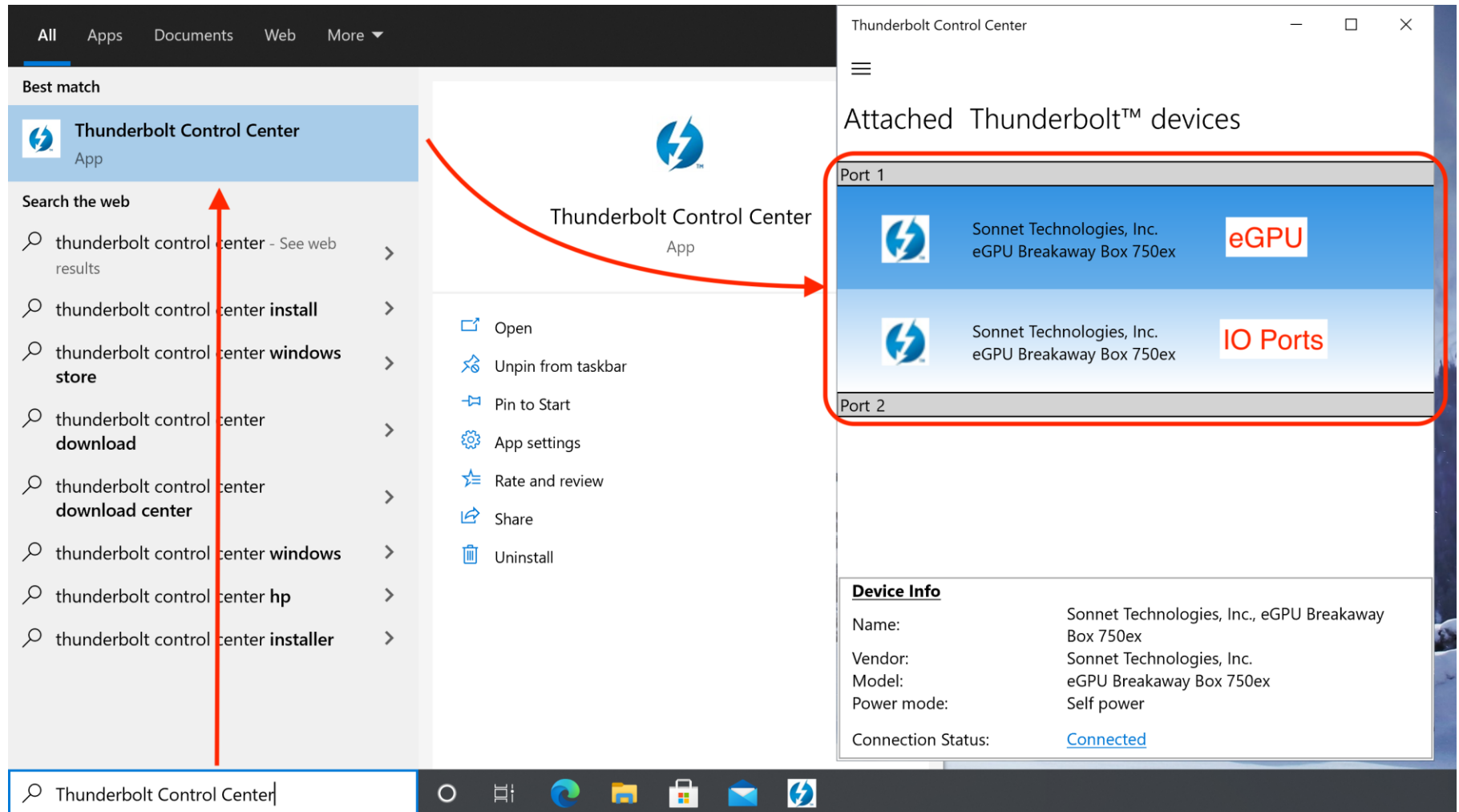


Figure 11: Attached Thunderbolt devices on Thunderbolt 4 or Thunderbolt 3 PC (2019 and newer).

5. Go to the [AMD](#) or [NVIDIA](#) website to find the right driver for your eGPU. Download and install the desktop driver. Follow the instructions of the installation assistant.

Note: The NVIDIA GeForce desktop driver will work with discrete Quadro- and external GeForce GPUs at the same time. However, you have to uninstall the Quadro driver before installing the GeForce driver.

6. Check that your eGPU is being detected by your computer. Enter “Device Manager” in the search bar of your Windows desktop. Open the tab “Display adapters”. Your eGPU should appear without any caution signs (see Figure 12).

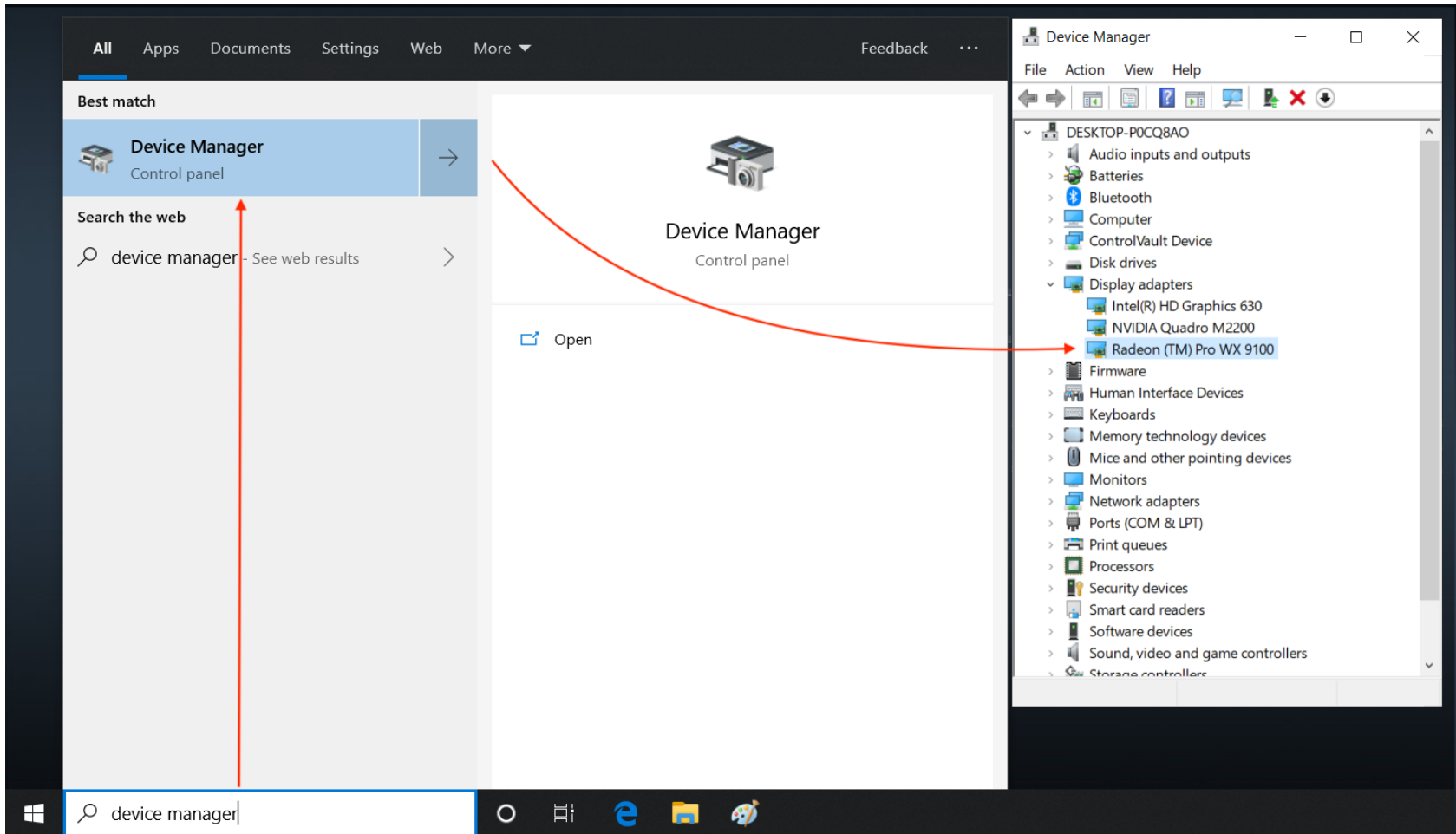




Figure 12: Device Manager with external AMD Radeon (TM) Pro WX 9100.

One more thing and you're ready to go!

Please note: When you disconnect your external graphics processor, use the safe eject feature (Icons: AMD , NVIDIA ) , see Figure 13 and Figure 14. With NVIDIA, when you reconnect the eGPU, you have to click “Connect GPU” to reactivate your external graphics card (see Figure 15).

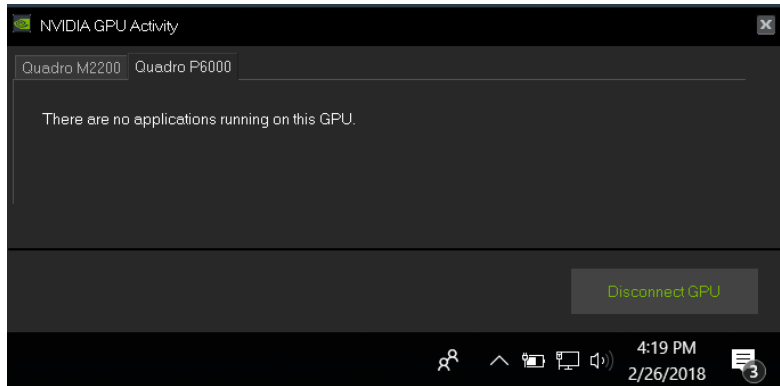


Figure 14: Nvidia disconnect GPU.

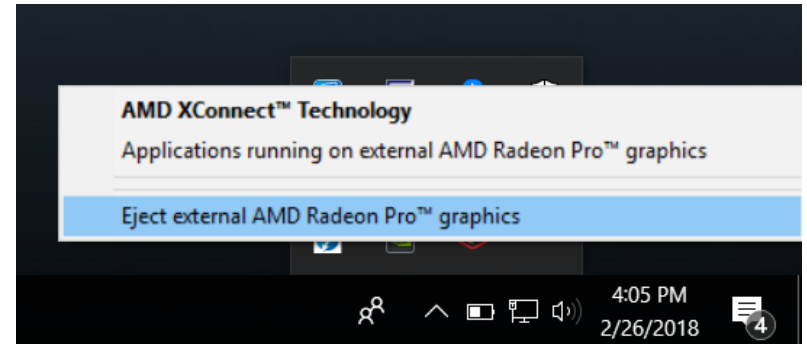


Figure 13: AMD eject external graphics.

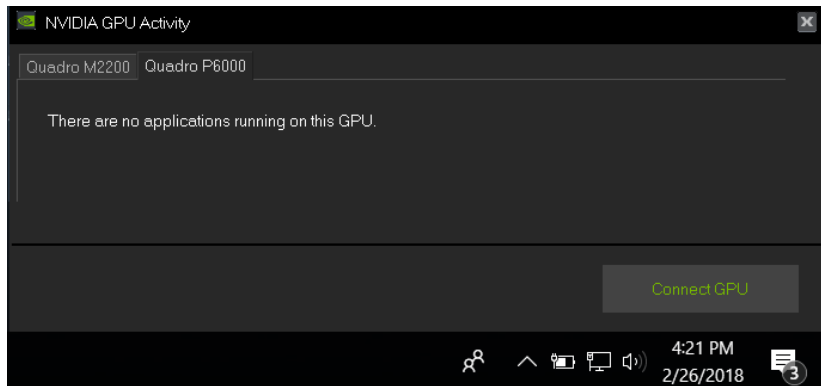


Figure 15: Nvidia connect GPU.

MANUALLY SELECTING THE EXTERNAL GRAPHICS PROCESSOR (EGPU)

1. In order to manually assign the external Graphics Processor to an application, navigate to your computer desktop screen. Right click and select "Display settings". Then select "Graphics settings" (see Figure 16).

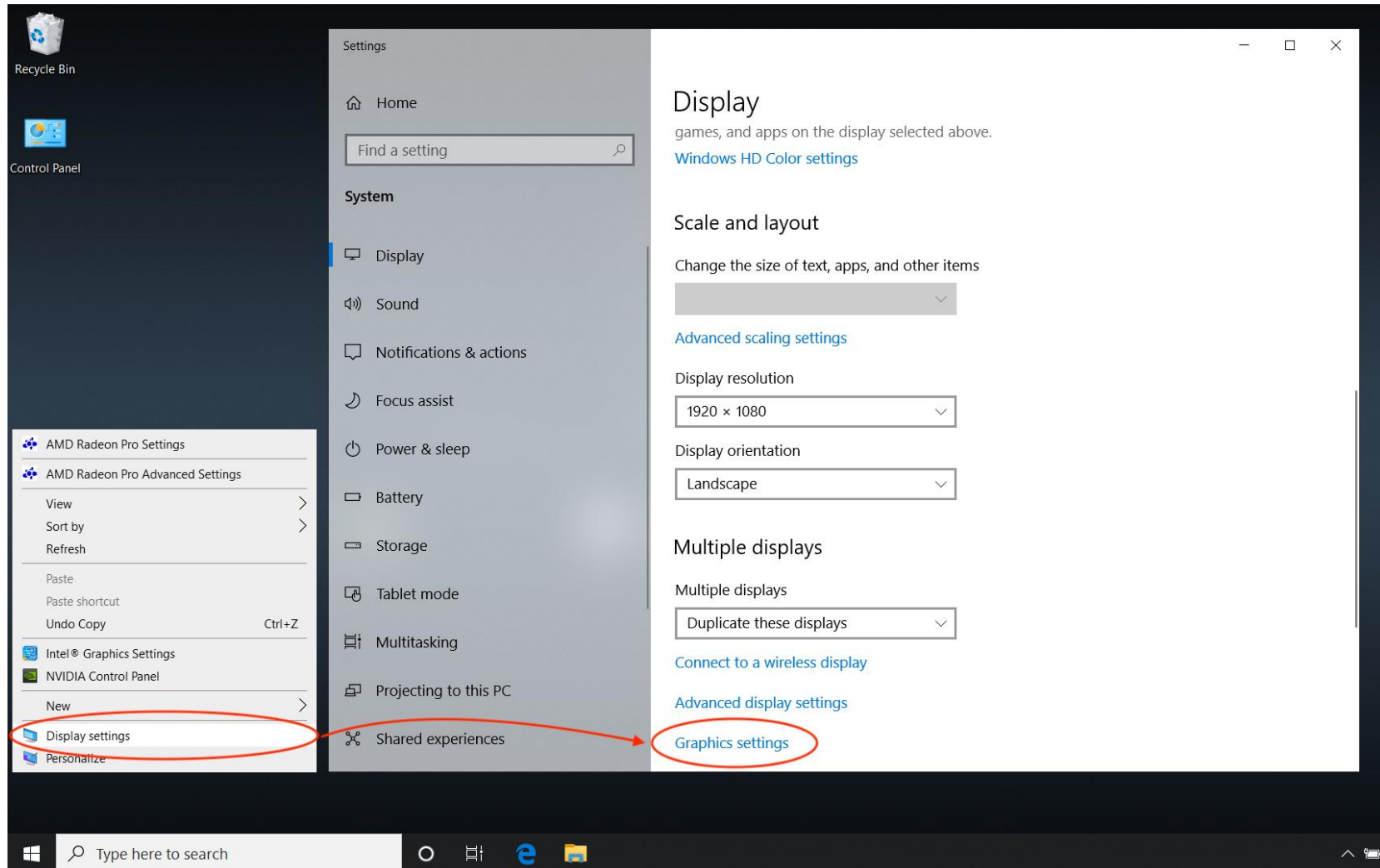


Figure 16: Right click to open "Display settings" and "Graphics settings".

2. Click the “Browse” button to search for an application. Applications are generally located in the “Program Files” or “Program Files (x86)” folder. Once the application has been added, click the “Options” button to select the graphics preferences (see Figure 17).

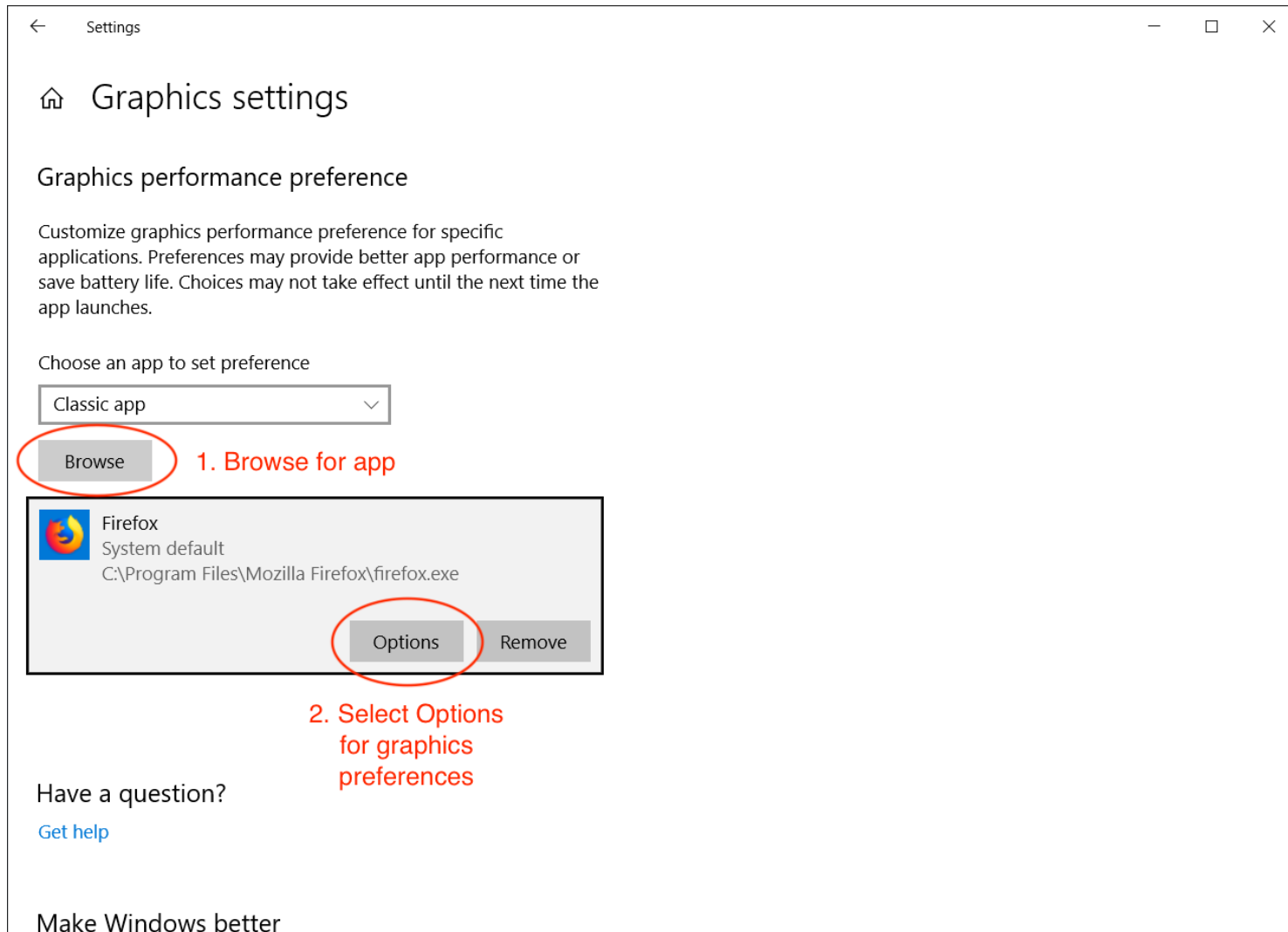


Figure 17: Browse for an application and select “Options” for the graphics preferences.

3. In the “Graphics specifications” window there are two GPUs listed. The power savings GPU is generally the integrated GPU and the high-performance GPU is generally the external GPU. The application can be forced to use either the integrated or the external GPU by setting the graphics preferences to either “Power saving” or “High performance” (see Figure 18). Select the desired GPU, save the selection and exit.

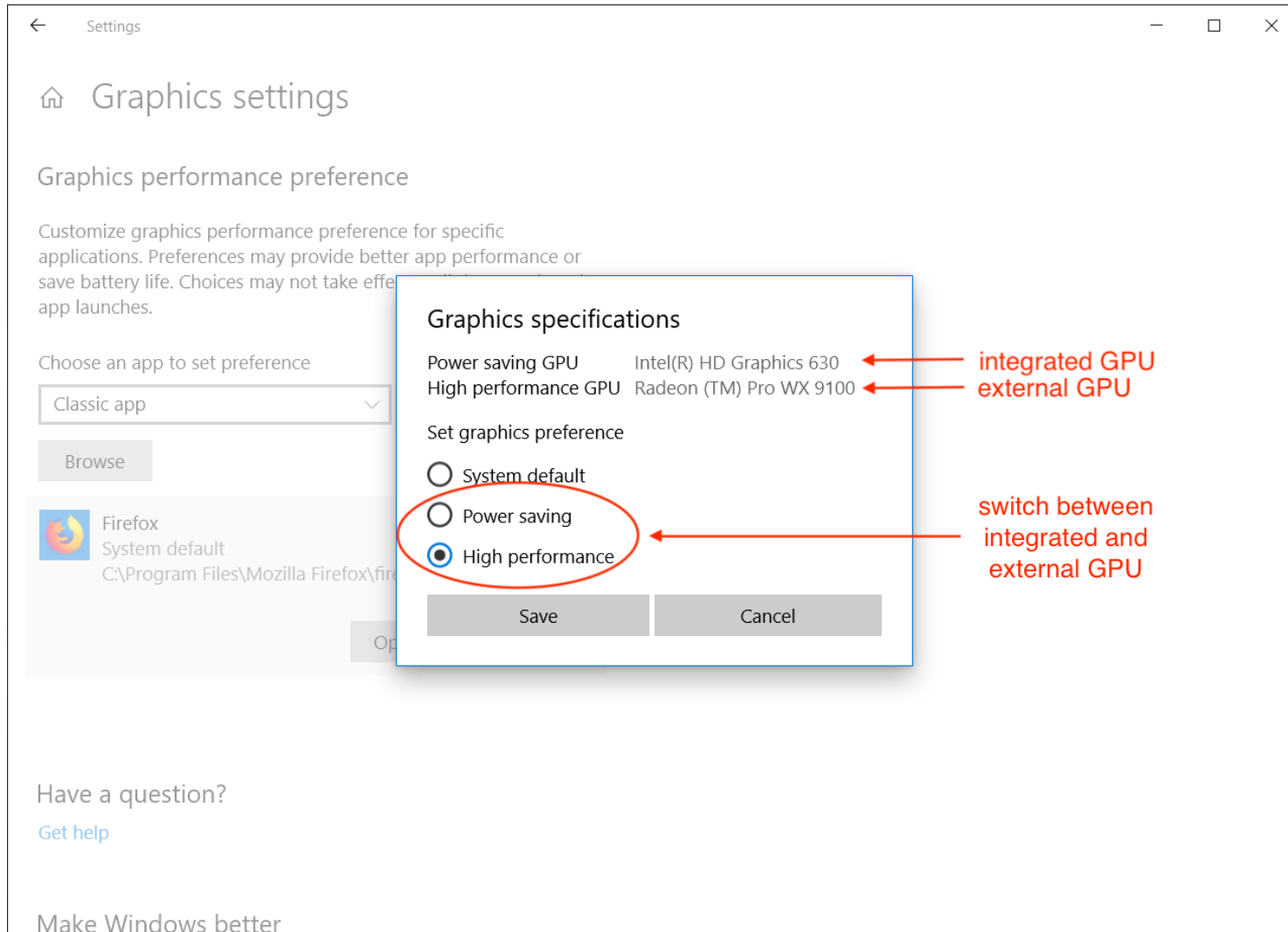


Figure 18: Switch between the integrated and the external GPU.

KNOWN ISSUES

This section lists known issues related to external graphics on Windows.

- **Device Manager Code 12 – PCIe Resource Allocation Problem:** Microsoft continues to optimize the software mechanism which dynamically allocates PCIe resources. Previously, this process was been handled by the computer BIOS. With Windows version 1909 and 2004 this dynamic mechanism may fail to assign enough resources to externally attached graphics processors (especially AMD based GPUs). Please update Windows 10 to version 20H2 or newer to resolve this issue.
- **Windows 10 Boot Camp Support for Intel based Mac Computers:** External GPUs are not supported on Intel based Mac systems running Boot Camp Windows 10. Attempting to run an eGPU with Boot Camp Windows 10 will usually result in a Device Manager error. Neither Apple nor Sonnet, nor NVIDIA, nor AMD support external graphics with Boot Camp.
- **eGPU Breakaway Puck Radeon RX 5500 XT & 5700:** The Radeon RX 5500 XT and 5700 Puck is not officially Thunderbolt certified for use with Windows 10 systems. The following problems can occur when using an eGPU Puck on Windows:
 - With host computers based on Intel Ice Lake (10th generation) or Tiger Lake (11th generation) processors, the system may hang when it enters a sleep power state.
 - The LG UltraFine 4K Thunderbolt 3 display may not work with either Puck on Windows.
 - When connecting an LG UltraFine 5K Thunderbolt 3 display to either Puck, a Windows message may appear indicating that a USB device is not recognized. The display typically continues to work, but an unknown USB device remains in the Device Manager.

TROUBLESHOOTING

If your external graphics card isn't working correctly, please check the following:

- Make sure the Thunderbolt interface of your eGPU product is being detected. See “Setting up External Graphics (eGPU)” (Step 4, Figure 10 or Figure 11).

If you don't see your Sonnet product under “Attached Thunderbolt devices”, check the following:

- Does your computer have a Thunderbolt port? (see Figure 3)
 - Is the power cable connected, the power switch on (not all eGFX Breakaway Boxes have a switch), the Thunderbolt 3 cable connected and the computer on? If not all of the above, the eGPU device will not turn on.
 - Are you using a Thunderbolt cable? Check for the Thunderbolt logo on the connectors (see Figure 2).
 - Could the cable be defective? Try a different Thunderbolt 3 or 4 cable.
 - Do other Thunderbolt devices (not USB devices) work with your PC? If not, your Thunderbolt port may be defective or your Thunderbolt driver may be corrupted. Contact your computer manufacturer to get assistance.
 - If only the Sonnet eGPU product doesn't work, please reach out to the [Sonnet tech support](#).
- If your Sonnet eGPU product appears under “Attached Thunderbolt devices” (see step above), try to find your external GPU in the Device Manager under “Display adapters”. See “Setting up External Graphics (eGPU)” (Step 6, Figure 12).
 - If you don't find your eGPU under “Display adapters” but you see a “Microsoft Basic Display Adapter”, install the correct graphics driver.
 - If you have a Breakaway Box and neither your eGPU nor a “Microsoft Basic Display Adapter” appear under “Display adapters”, make sure your eGPU is correctly seated in the PCIe slot. Also, make sure that the auxiliary power cable is fully seated and connected to your eGPU. It is also possible that your card is defective.
 - If you have a Breakaway Puck and your eGPU does not appear under “Display Adapters” reach out to the [Sonnet tech support](#).
 - If you are a professional user, make sure that your application has detected the external GPU. You may have to select the external graphics card in the system preferences of your application.

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