



The science behind the report:

# Improve PC app performance, battery charging, and end-user experiences with Dell Optimizer

This document describes what we tested, how we tested, and what we found. To learn how these facts translate into real-world benefits, read the report [Improve PC app performance, battery charging, and end-user experiences with Dell Optimizer](#).

We concluded our hands-on testing on May 3, 2023. During testing, we determined the appropriate hardware and software configurations and applied updates as they became available. The results in this report reflect configurations that we finalized on October 19, 2022 or earlier. Unavoidably, these configurations may not represent the latest versions available when this report appears.

## Our results

To learn more about how we have calculated the wins in this report, go to <http://facts.pt/calculating-and-highlighting-wins>. Unless we state otherwise, we have followed the rules and principles we outline in that document.

Table 1: Results of our benchmark testing under load. We ran the Procyon Office Productivity Benchmark, Procyon Photo-Editing Benchmark, and iPerf3 speed test three times and recorded the median results.

	Dell™ Latitude™ 9430 laptop		Dell OptiPlex™ 7400 AIO desktop	
	Optimizer ON	Optimizer OFF	Optimizer ON	Optimizer OFF
<b>Procyon® Office Productivity Benchmark</b>				
<b>Overall score</b>	<b>4,115</b>	<b>3,212</b>	<b>4,037</b>	<b>3,787</b>
Microsoft Word	3,859	3,517	4,483	4,925
Microsoft Excel	4,417	3,947	4,469	4,270
Microsoft PowerPoint	4,055	2,959	4,011	3,112
Microsoft Outlook	4,187	2,093	2,703	2,253
<b>Procyon Photo Editing Benchmark</b>				
<b>Overall score</b>	<b>2,826</b>	<b>2,141</b>	<b>3,281</b>	<b>2,931</b>
Adobe® Photoshop® image retouching	2,626	1,780	2,285	2,154
Adobe Lightroom® batch processing	3,042	2,577	4,714	3,990

	Dell™ Latitude™ 9430 laptop		Dell OptiPlex™ 7400 AIO desktop	
	Optimizer ON	Optimizer OFF	Optimizer ON	Optimizer OFF
iPerf3 results (Mbps)				
Throttled, send	293	94.9	278	94.5
Throttled, receive	281	95.2	318	94.9
Not throttled, send	949	937	1,680	936
Not throttled, receive	942	942	1,720	949

Table 2: Results of our ExpressCharge battery testing. We ran the battery test three times and recorded the median results.

	Dell Latitude 9430	
	ExpressCharge ON	ExpressCharge OFF
Battery percentage after 1 hour of charging	90	58

Table 3: Results of our additional feature testing.

	Dell Latitude 9430	Dell Optiplex 7400
	Did it work?	Did it work?
Presence Detection		
Look Away Detect function	Yes	Yes
Walk Away Lock function	Yes	Yes
Wake on Approach function	Yes	Yes
Onlooker Detection function	Yes	Yes
Intelligent Audio		
Remove My Background Noise	Yes	Yes

# System configuration information

Table 4: Detailed information on the laptop we tested.

System configuration information	Dell Latitude 9430 laptop
<b>Processor</b>	
Vendor	Intel®
Model number	Core™ i5-1245U
Core frequency (GHz)	1.60
Number of cores	10
Cache (MB)	12
<b>Memory</b>	
Amount (GB)	16 (built-in onboard)
Type	DDR5
Speed (MT/s)	6,400
<b>Graphics</b>	
Vendor	Intel
Model number	Iris® Xe Graphics
<b>Storage</b>	
Vendor	Samsung®
Model	PM991a
Amount (GB)	256
Type	NVMe®
<b>Connectivity/expansion</b>	
Wired internet	N/A
Wireless internet	Intel Wi-Fi 6E AX211
Bluetooth®	Intel Wireless Bluetooth
USB	1 x USB 3.1 Gen 1
Thunderbolt	2 x Thunderbolt 4
Video	1 x HDMI
Camera	Intel ADL AVStream
Microphone	Intel MIPI Soundwire
Speakers	Intel MIPI Soundwire
<b>Battery</b>	
Type	Lithium-polymer
Size	Integrated
Rated capacity (Whr)	60

System configuration information		Dell Latitude 9430 laptop
Display		
Size (in.)	14	
Type	FHD+	
Resolution	1,920 x 1,200	
Touchscreen	No	
Operating system		
Vendor	Windows	
Name	11 Pro	
Build number or version	22621	
BIOS		
BIOS name and version	Dell Inc. 1.11.0	
Dimensions		
Height (in.)	0.54	
Width (in.)	12.22	
Depth (in.)	8.47	
Weight (lbs.)	2.8	

Table 5: Detailed information on the desktop we tested.

System configuration information		Dell OptiPlex 7400 AIO desktop
Processor		
Vendor	Intel	
Model number	Core i7-12700	
Core frequency (GHz)	3.50 – 4.70	
Number of cores	14	
Cache (MB)	25	
Memory		
Amount (GB)	8	
Type	DDR4	
Speed (MHz)	3,200	
Integrated graphics		
Vendor	Intel	
Model number	UHD Graphics	
Discrete graphics		
Number of cards	1	

System configuration information	Dell OptiPlex 7400 AIO desktop
Vendor	AMD®
Model number	Radeon™ RX 6500M
VRAM	4GB GDDR6
Storage 1	
Vendor	KIOXIA
Model number	KBG40ZNS256G
Amount (GB)	256
Type	PCIe® NVMe
Storage 1	
Vendor	KIOXIA
Model	KBG40ZNS256G
Amount (GB)	256
Type	PCIe NVMe
Connectivity/expansion	
Wired internet	1 x Gigabit Ethernet
Wireless internet	Intel Wi-Fi 6E AX211
Bluetooth	5.2
USB	5 x 3.2 Gen 1, 1 x 3.2 Type-C
Video	1 x HDMI-In 1.4a 1 x HDMI 2.0 1 x Display Port 1.4
Display	
Size (in.)	23.8
Type	FHD WVA, Touch
Resolution	1,920 x 1,080
Touchscreen	Yes
Operating system	
Vendor	Windows
Name	11 Pro
Build number or version	22621
BIOS	
BIOS name and version	Dell Inc. 0.6.15

System configuration information	Dell OptiPlex 7400 AIO desktop
Dimensions	
Height (in.)	13.54
Width (in.)	21.26
Depth (in.)	2.07
Weight (lbs.)	13.89

## How we tested

We complete three sets of the Procyon Benchmark Suite, iPerf3, and ExpressCharge runs, which we describe below. For the first set, we ran the test scenarios using the default Windows power settings and selected "default settings" in the Dell Optimizer Power section. For the second set, we used the same power settings as the first set. Before we started testing, we put a load on the system by running a PowerShell script that creates files of sizes set by the user and zips those files via 7-zip, moves them, unzips them, deletes them, and repeats for the duration of the benchmark run. For the third set, we changed the Windows power settings to Best Power Efficiency and the Dell Optimizer Thermal Management setting to Quiet and ran the same script before we started testing.

To determine each device's baseline system, network, and battery recharging capabilities, we ran the Procyon Benchmark Suite, iPerf3 benchmark, and ExpressCharge test scenarios with and without Dell Optimizer application optimization. After running the baseline tests, we reset each device and added the applications under test and the associated scenario test applications to the optimize applications list in the Dell Optimizer Applications section. Then, once all of the applications' statuses switched to Optimized in the Dell Optimizer list, we ran the scenario tests again.

## Setting up the systems

We captured Windows 11 Pro system images for each device under test. Before capturing the images, we installed all available drivers, firmware, and BIOS updates, as well as all available Windows Updates. We used the captured images to restore Windows between UL Procyon Benchmark Suite, iPer3 benchmark, and ExpressCharge test scenarios.

### Creating and updating the OEM Windows image

1. Boot the system.
2. To complete installation, follow the on-screen instructions, using the default selections when appropriate.
3. In the bottom right corner, click the battery icon, and adjust the Windows Power mode (plugged in) to Best Performance.
4. Unplug the system.
5. In the bottom right corner, click the battery icon, and adjust the Windows Power mode (on battery) to Balanced. Plug the system back in.
6. Set DPI scaling to 100%, and set Screen and Sleep options to Never.
  - Right-click the desktop, and select Display settings.
  - Under the Scale and layout section, for the Change the size of text, apps, and other items option, select 100%.
  - From the left column, select Power & Sleep.
  - For all power options listed under Screen and Sleep, select Never.
7. Disable User Account Control notifications.
  - Select Windows Start, type `UAC`, and press Enter.
  - Move the slider control to Never notify, and click OK.
8. Disable Virtualization Based Security
  - Select Windows Start, type `Group Policy`, and press Enter.
  - Select Computer Configuration → Administrative Templates → System → Device Guard
  - Double-click Turn on Virtualization Based Security.
  - Select Disabled, click Apply, and click OK.
9. Run Windows Update, and install all updates available.
10. Launch the Windows Store app, and install all Store app updates.
11. Launch the Dell SupportAssist application, and install all available updates.
12. Verify the date and time are correct, and synchronize the system clock with the time server.
13. Disable Automatic Windows Update.
  - Right-click Windows Start.
  - Select Computer Management.
  - Select Services and Applications.
  - Select Services.
  - Scroll down, and double-click Windows Update.
  - Click Stop.
  - From the Startup type drop-down menu, select Disabled.

## Capturing an image

1. Connect an external HDD to the system.
2. To select All Control Panel Items, open Control Panel, and click the arrow next to it.
3. Click Backup and Restore.
4. Click Create a system image.
5. Verify that the external HDD is selected as the save drive, and click Next.
6. Verify that all drives are selected to back up, and click Next.
7. Click Start backup.
8. At Do you want to create a system repair disc, select No, and close the dialogs.

## Restoring an image

1. Connect an external HDD to the system.
2. While restarting the system, press and hold Shift.
3. Select Troubleshoot.
4. Select Advanced options.
5. Select See more recovery options.
6. Select System image recovery.
7. At the Restore system files and settings screen, select Next.
8. Select the external HDD, and click Next.
9. Once the recovery has completed, click Finish.

## Running the system responsiveness tests with the UL Procyon Benchmark Suite

### Setting up the Procyon Benchmark Suite

1. Purchase and download the Procyon benchmark from <https://benchmarks.ul.com/procyon>.
2. Install Procyon.
3. Launch Procyon.
4. Select Settings, and input the Office Productivity and Photo Editing license keys.
5. Close Procyon.
6. Install Adobe Photoshop, Lightroom Classic, and Adobe Premiere®.
7. Open each Adobe app, and close any welcome or tutorial messages that appear.
8. Close the apps.
9. Install Microsoft Outlook, PowerPoint, Excel, and Word.
10. Open each Microsoft 365 app, and close any welcome or tutorial messages that appear.
11. Close the apps.

### Running the Procyon Office Productivity Benchmark

1. Boot the system.
2. Select Windows Start.
3. Type cmd, and press Ctrl+Shift+Enter.
4. Type `Cmd.exe /c start /wait Rundll32.exe advapi32.dll,ProcessIdleTasks`
  - Do not interact with the system until the command completes.
  - After the command completes, wait five minutes before running the test.
5. Open Dell Optimizer.
6. Navigate to the Applications section, and turn on the Enabled switch.
7. Launch Procyon.
8. Select Test Suite.
9. Select the Office Productivity test.
10. To begin the test, click Run.
11. When the test completes, record the results.
12. Navigate to the Applications section in Dell Optimizer, and turn off the Enabled switch.
13. Repeat steps 7 through 11.
14. Repeat steps 5 through 12 twice more, and record the median results.

## Running the Procyon Photo-Editing Benchmark

1. Boot the system.
2. Select Windows Start.
3. Type `cmd`, and press `Ctrl+Shift+Enter`.
4. Type `Cmd.exe /c start /wait Rundll32.exe advapi32.dll,ProcessIdleTasks`
  - Do not interact with the system until the command completes.
  - After the command completes, wait five minutes before running the test.
5. Open Dell Optimizer.
6. Navigate to the Applications section, and turn on the Enabled switch.
7. Launch Procyon.
8. Select Test Suite
9. Select the Photo Editing test.
10. To begin the test, click Run.
11. When the test completes, record the results.
12. Navigate to the Applications section in Dell Optimizer, and turn off the Enabled switch.
13. Repeat steps 7 through 11.
14. Repeat steps 5 through 12 twice more, and record the median results.

## Running the network throughput tests with iPerf3

For this iPerf3 benchmark speed test, which reports the amount of data successfully transferred over 10 streams in 30 minutes, we throttled the Ethernet connection to 100Mbps and the Windows Wi-Fi 6 network connection to 802.11 because the cumulative speed of the two connections needed to be less than 1Gbps.

### Setting up the server

1. Download iPerf3 compiled binaries from <https://iperf.fr/iperf-download.php>.
2. Extract the zip file to a folder on the server.
3. Open a terminal session in the folder, and run `.\iperf3.exe -s -w 2m`

### Setting up the PCs

1. Download iPerf3 compiled binaries from <https://iperf.fr/iperf-download.php>.
2. Extract the zip file to a folder on the server.
3. Open Dell Optimizer, and click Network.
4. Ensure Network is enabled, and Simultaneous Data Transfer is On.
5. Navigate to the unzipped iPerf3 folder.
6. Open a terminal session in the folder, and run:
  - a. `.\iperf3.exe -c <ServerIP> -t 70 -O 10`
  - b. `.\iperf3.exe -c <ServerIP> -t 70 -O 10 -R`
  - c. `.\iperf3.exe -c <ServerIP> -t 70 -O 10 -P 4`
  - d. `.\iperf3.exe -c <ServerIP> -t 70 -O 10 -P 4 R`
7. From each test, capture the throughput and size.
8. Wait 5 minutes, and run step 6 two more times.
9. When testing is complete, repeat steps 5 through 9 two more times, and record the results.
10. Switch off Simultaneous Data Transfer.
11. Complete steps 5 through 9 three times, and record the results.

## Running the ExpressCharge function tests

1. Open Dell Power Manager.
2. Click Battery Information.
3. Click Settings.
4. Select ExpressCharge, and click OK.
5. Close Dell Power Manager.
6. Open Dell Optimizer, and click Power.
7. Set Dynamic Charge Policy to On.
8. Unplug the device, and allow the battery to drain completely until it powers off.
9. Once the device powers off, simultaneously start a 60-minute timer and plug in the device.
10. After 60 minutes, power up the device, and immediately record the battery percentage.
11. Repeat steps 8 through 10 two more times.
12. Open Dell Power Manager.
13. Click Battery Information.
14. Click Settings.
15. Select Standard, and click OK.
16. Close Dell Power Manager.
17. Repeat steps 8 through 11.
18. Open Dell Power Manager.
19. Click Battery Information.
20. Click Settings.
21. Select ExpressCharge, and click OK.
22. Close Dell Power Manager.
23. Open Dell Optimizer, and click Power.
24. Set Dynamic Charge Policy to Off.
25. Repeat steps 8 through 11.

## Running the Presence Detection function tests

1. Boot the system.
2. Open Dell Optimizer.
3. Navigate to the Presence Detection section.
4. To sign in instantly, click Setup facial recognition.
5. To set up facial recognition, complete the wizard.
6. Turn on Onlooker Detection.
7. Select Allow camera to identify your and others' presences.
8. Have a testing partner:
  - Stand directly behind the primary tester
  - Stand 3 feet behind the primary tester
  - Stand at a 45-degree angle beside the primary tester
  - Note Onlooker Detection feature activation results
9. Repeat step 8 twice more.
10. Navigate to the Look Away Detect setting, and turn it On.
11. Look away from the screen for several seconds, and note screen brightness dimming results.
12. Repeat step 11 twice more.
13. Navigate to the Walk Away Lock setting, and turn it On.
14. Stand up, walk 6 feet away from the device, and note Windows locking results.
15. Repeat step 14 twice more.
16. Navigate to the Wake on Approach setting, and turn it On.
17. Sign out of Windows, and walk 6 feet away from the device.
18. Wait for the screen to go to sleep.
19. Approach the device, sit down directly in front of it, and note Windows instant sign-in results.
20. Repeat steps 17 through 19 twice more.
21. Sign out of Windows, and walk 6 feet away from the device.
22. Wait for the screen to go to sleep.
23. Approach the device, sit at a 45-degree angle in front of the device, and note Windows instant sign-in results.
24. Repeat steps 21 through 23 twice more.

## Running the Intelligent Audio function tests

1. Boot the system.
2. Begin a Zoom call with a remote testing partner.
3. Turn on a television, turn up the volume, and stop when the remote testing partner can clearly hear it.
4. Open Dell Optimizer, and click Audio.
5. Enable Remove My Background Noise.
6. Have the remote testing partner note television noise removal capabilities.
7. Disable Remove My Background Noise.
8. Repeat steps 2 through 7 twice more.

Read the report at <https://facts.pt/9033Csu>



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