Accelerate AI apps

Up to **57.0% better** on-device AI performance*

Speed resource-intensive work

Up to **47.8% higher** Cinebench 2024 score†

Collaborate on the go

Over **8 hours** of battery life††

* Geekbench AI CPU score (Quantized) vs. Lenovo ThinkPad T14s Gen 6

† Cinebench 2024 CPU multi-core score vs. Lenovo ThinkPad T14s Gen 6

†† Nine-participant Microsoft Teams meeting in Best power efficiency mode

This project was commissioned by HP and AMD.

The HP EliteBook 8 G1a 14 inch Notebook Next Gen AI PC: Innovation at your fingertips

Compared to Intel Core Ultra processor-based Dell and Lenovo PCs, the AMD Ryzen™ AI PRO processor-powered HP AI PC can speed productivity and AI tasks—and more

Every day, AI continues to accelerate the pace of business. For organizations that require on-device AI processing rather than cloud-based models—whether for increased speed, security, or personalization—HP recently released its line of Next Gen AI PCs, designed specifically to "tackle complex AI tasks running on your device on in the cloud while boosting performance for your daily work."[1]

To put this claim to the test, we assessed the performance of an HP EliteBook 8 G1a 14 inch Notebook Next Gen AI PC powered by an AMD Ryzen™ AI 7 PRO 350 processor, a Dell™ Pro 14 Plus laptop powered by an Intel® Core™ Ultra 7 268V processor with Intel vPro®, and a Lenovo ThinkPad T14s Gen 6 laptop powered by an Intel Core Ultra 7 268V processor with Intel vPro.

We found that the HP EliteBook 8 G1a 14 inch Notebook Next Gen AI PC achieved higher performance across a variety of productivity and AI workloads. Plus, with a workday's worth of battery life, serviceable parts, a built-in AI assistant, and intelligent privacy features, this AMD Ryzen™ AI PRO processor-powered AI PC can help propel your workforce forward in the age of AI.

What and how we tested

We equipped each PC with Windows 11 Pro, 32 GB of memory, and 1 TB of SSD storage:*

HP EliteBook 8 G1a 14 inch Notebook Next Gen AI PC

- AMD Ryzen™ AI 7 PRO 350 processor
- Integrated AMD Radeon™ 850M graphics
- Integrated AMD Ryzen™ AI neural processing unit (NPU) at up to 50 trillions of operations per second (TOPS)
- 62-Whr battery

Dell Pro 14 Plus

- Intel Core Ultra 7 268V with Intel vPro
- Integrated Intel Arc™ 140V graphics
- Integrated Intel AI Boost NPU at up to 48 TOPS
- 55-Whr battery

Lenovo ThinkPad T14s Gen 6

- Intel Core Ultra 7 268V with Intel vPro
- Integrated Intel Arc 140V graphics
- Integrated Intel AI Boost NPU at up to 48 TOPS
- 58-Whr battery

*The results we report reflect the specific configurations we tested. Any difference in the configurations—as well as screen brightness, network traffic, and software additions—can affect these results. For a deeper dive into our testing parameters and procedures, see the science behind the report.

To measure productivity and on-device AI performance, we ran these benchmark tests:

- Cinebench 2024
- Geekbench AI
- Geekbench 6
- LM Studio
- Procyon® AI Computer Vision Benchmark
- Procyon Office Productivity Benchmark

We also ran real-world tests to measure system performance while multitasking and to examine battery life under punishing workloads. Additionally, as the systems ran a sustained Cinebench 2024 workload, we measured their heat output. We also assessed each system's privacy features, serviceability, and built-in AI assistants. Read on to learn more about these results and what they might mean to you.

Note: The graphs in this report use different scales to keep a consistent size. Please be mindful of each graph's data range as you compare.

Productivity testing

Punch through your checklist

For multiple angles on potential productivity benefits, we ran several tests. To examine CPU performance, the Cinebench 2024 benchmark stresses the processor by rendering a 3D scene using CPU-intensive Redshift for Cinema 4D software.[2] To evaluate system performance, the Geekbench 6 benchmark executes multiple CPU-intensive tasks at the same time.[3] Finally, Procyon Office Productivity Benchmark measures CPU performance around common office productivity tasks, reflecting a typical day at the office. It even leaves Microsoft 365 apps "running in the background as the focus moves from one task to another."[4]

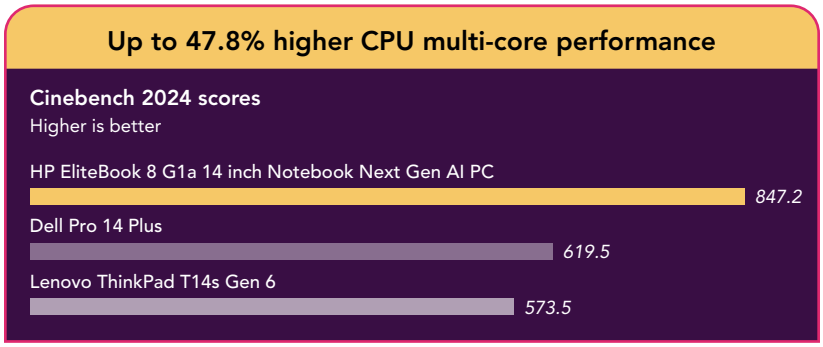


Figure 1: Cinebench 2024 multi-core scores. Source: PT.

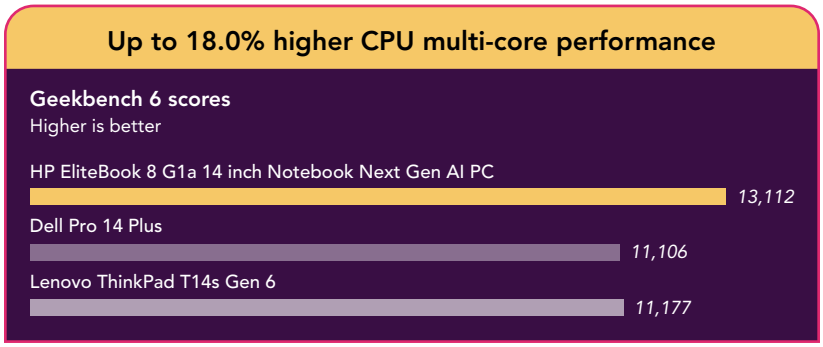


Figure 2: Geekbench multi-core scores. Source: PT.

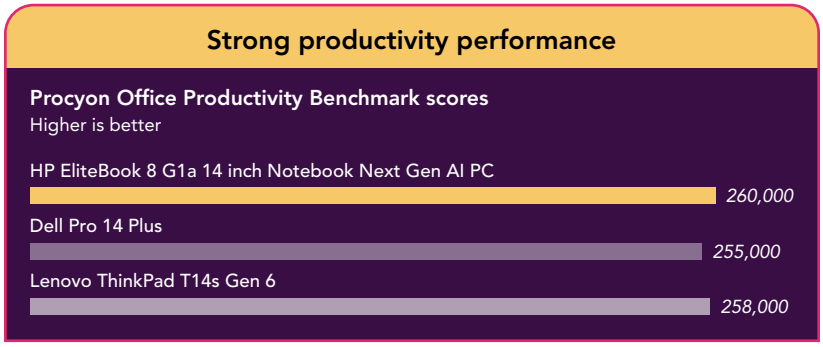


Figure 3: Procyon Office Productivity Benchmark overall scores. Source: PT.

About the HP EliteBook 8 G1a 14 inch Notebook Next Gen AI PC

Equipped with Windows 11 Pro and an AMD Ryzen™ AI 7 PRO 350 processor, this 14-inch AI PC features integrated AMD Radeon™ graphics, up to 64 GB of memory, and up to 2 TB of Gen4 NVMe® PCIe® storage.[5] According to HP, the EliteBook 8 G1a 14 Inch Next Gen AI PC is "designed to enhance productivity, collaboration, and security," and "delivers exceptional performance for demanding AI workloads that will make you more efficient and effective at work."[6]

Find out more from HP.

We also ran a real-world multitasking test with the Procyon Office Productivity Benchmark. In the first test, we ran Microsoft Teams and Windows Studio Effects in the background during benchmark testing, utilizing the systems' NPUs. Then, in the second test, we ran only Microsoft Teams in the background, which did not utilize NPUs.

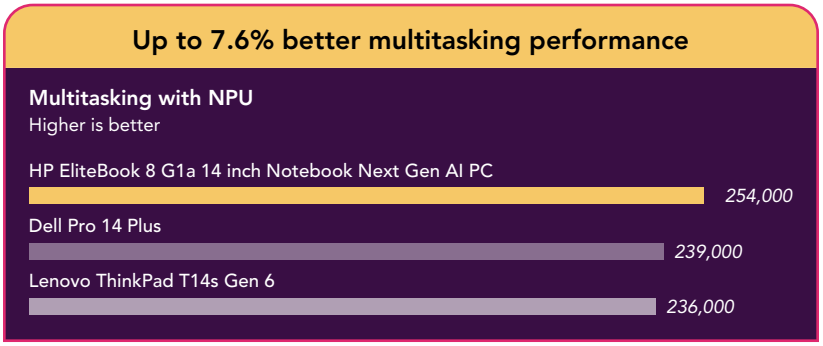


Figure 4: Procyon Office Productivity Benchmark overall rating with Microsoft Teams and Windows Studio Effects running in the background. Source: PT.

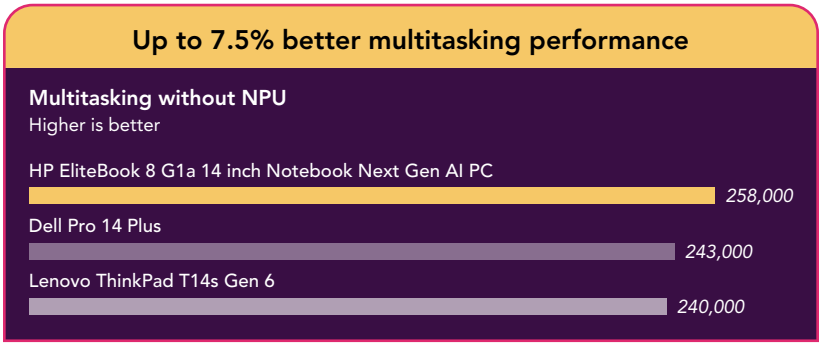


Figure 5: Procyon Office Productivity Benchmark overall rating with Microsoft Teams running in the background. Source: PT.

AI testing

Accelerate next-gen workloads

Geekbench AI measures on-device AI performance at different precision levels using real-world machine learning (ML) apps.[7] The precision levels reflect different requirements for AI models: Full Precision (FP32) is more accurate but requires more resources, Half Precision (FP16) is less accurate but more efficient, and the Quantized (INT8) precision level is the least accurate but most resource-efficient.[8] In our testing, we used the Open Neural Network Exchange (ONNX) AI framework and DirectML AI backend for machine learning on Windows.

In AI testing on CPU, the HP EliteBook 8 G1a 14 inch Notebook Next Gen AI PC outperformed the competition (see Figure 6). While its integrated NPU handles AI work with up to 50 TOPS, these results indicate its processor offers high performance for AI apps that don't yet utilize the NPU.

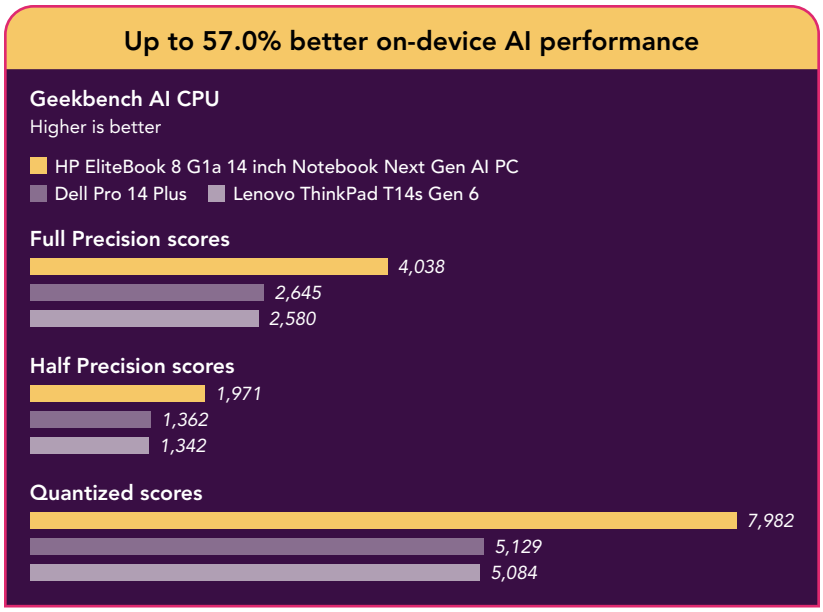


Figure 6: Geekbench AI CPU benchmark results. Source: PT.

LM Studio uses large language models (LLMs) to evaluate the AI chat capabilities that many of us use every day.[9] In our testing, we ran the test on CPU with the Meta-Llama-3.1-8B-Instruct-Q4_K_M model to measure the time to first token. Tokens are "the basic units of input and output in a language," typically words, subwords, or characters.[10] The LLM predicts the most likely token to follow a sequence of input tokens and generates valuable output. The less time users must wait for the first token—or the first part of their answer—the smoother their experience will feel.

For more on using LLMs locally on the devices, see Built-in AI assistant assessment: Accurate answers on device and from the cloud.

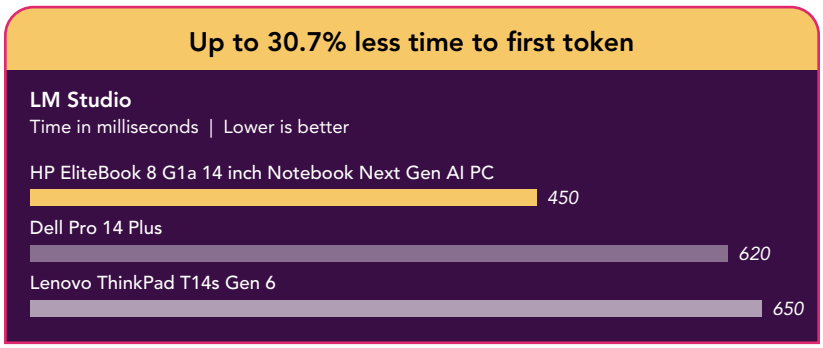


Figure 7: LM Studio results. Source: PT.

About the AMD Ryzen™ AI 7 PRO 350 processor

Part of the AMD Ryzen™ AI PRO 300 Series engineered for the age of AI, this processor boasts 8 cores, 16 threads, integrated Radeon™ 890M graphics, and the Ryzen™ AI engine with NPU performance at up to 50 TOPS.[11] These processors are built on AMD "Zen 5" architecture, which AMD calls a "cutting-edge 4nm technology" for "best-in-class CPU, GPU and NPU performance with exceptional responsiveness and swift multitasking across productivity, entertainment, and content creation."[12]

Learn more from AMD about Ryzen™ AI 300 Series processors.

UL Procyon AI Computer Vision Benchmark measures AI inference with various engines.[13] In our testing, we used the API optimized for each system's CPU, GPU, and NPU backends: the AMD Ryzen™ AI API on the AMD processor-based system and the Intel OpenVINO™ inference API on the Intel processor-based systems. The AI inference engines and their use cases include:

- **MobileNetV3 and Inception-v4:** Research institutions, tech companies, and individuals use these models for image recognition, object detection, and image classification tasks.[14,15]
- **YOLOv3:** Video surveillance companies, healthcare providers, and manufacturers use these Deep Neural Network (DNN) architectures to distinguish between different objects and features within images and videos.[16]

In integer-optimized testing, we found the wait times were lowest on the MobileNetV3 model, which is designed for real-time applications on mobile devices.[17]

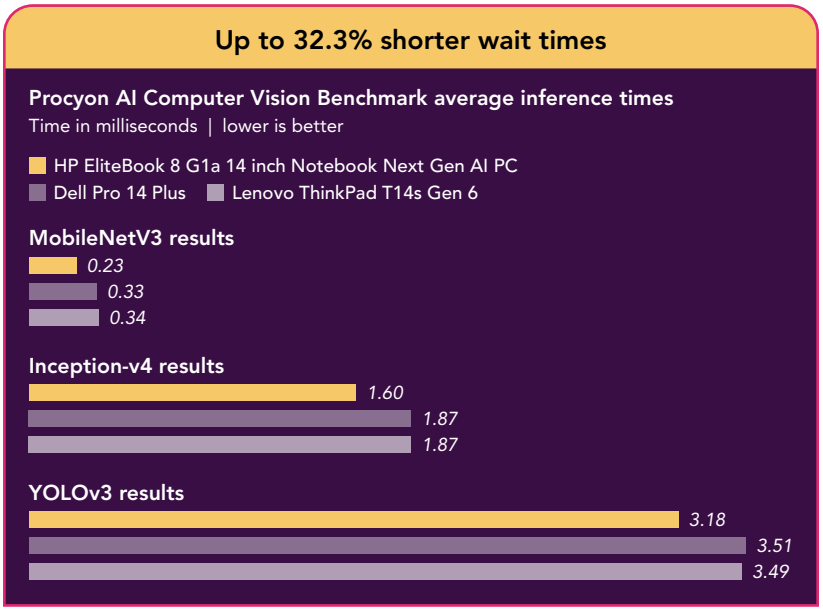


Figure 8: Procyon AI Computer Vision Benchmark average inference times. Source: PT.

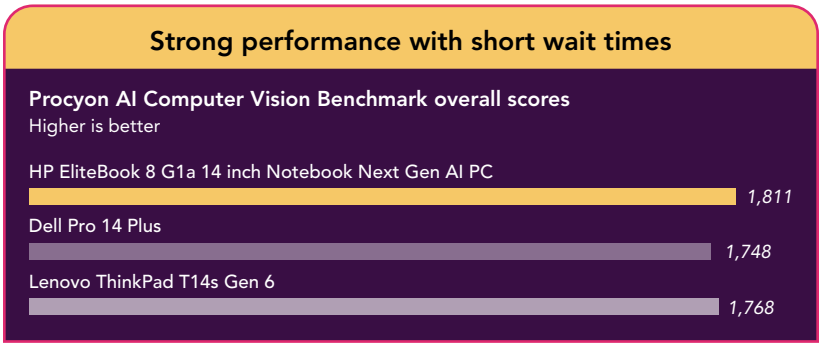


Figure 9: Procyon AI Computer Vision Benchmark overall scores. Source: PT.

Built-in AI assistant assessment

Accurate answers on device and from the cloud

Not only did the HP EliteBook 8 G1a 14 inch Notebook Next Gen AI PC deliver superior performance in our AI tests, but it also includes HP AI Companion, "a personal assistant generative AI tool to help users be more productive."[18] We compared HP AI Companion to Lenovo AI Now on the Lenovo ThinkPad T14s Gen 6, both of which utilize LLMs to provide AI capabilities. At the time of our testing, Dell did not offer a proprietary built-in AI assistant.

In our assessment, we tasked HP AI Companion and Lenovo AI Now with summarizing, analyzing, and fact-finding for both general knowledge questions and specific information that we provided in local documents.* We also prompted these AI assistants to adjust the systems' screen brightness. We tested in both cloud mode—where LLMs run in the cloud and return answers to the device—and on-device mode, meaning that LLMs run locally on the device.

Table 1 shows an overview of our findings. In all our tests, the HP AI Companion was able to answer general knowledge, document-specific, and system task prompts in both cloud and on-device modes. Lenovo AI Now was not: It answered general knowledge prompts only in cloud mode, it accurately answered four of the five document-specific prompts only in on-device mode, and it was unable to perform our system task prompt in either mode.

Table 1: A summary comparison of which task types each devices' OEM AI assistant was able to complete locally and online. For more information, see Table 2 and the science behind the report.

	HP AI Companion		**Lenovo** AI Now		**Dell** (no OEM AI assistant)
Task type	**Cloud mode**	**On-device mode**	**Cloud mode**	**On-device mode**	**N/A**
General knowledge prompts	**Yes**	**Yes**	**Yes**	**No**	N/A
Document-specific prompts)	**Yes**	**Yes**	**No**	**Yes**†	N/A
System task prompt	**Yes**	**Yes**	**No**	**No**	N/A

†4 out of 5 document-specific prompts (see Table 2)

*Our testing used a corpus of publicly available .docx, .pdf, and .ppt files, totaling 8.6 MB, which we downloaded to each system. For more details on our corpus, as well as our prompts and the responses the AI assistants gave, see the science behind the report.

Table 2 provides a more comprehensive look at the prompts we used in each scenario and whether the AI assistants could accurately respond to our prompts. Our testing focused on more than whether these AI assistants were answering questions or not—we also checked and graded their answers for accuracy. You'll find analysis of our findings after this table.

Table 2: A comparison of which tasks each devices' OEM AI assistant was able to complete and in which mode. For more information, see the science behind the report.

Task type	HP AI Companion		Lenovo AI Now	
	Cloud mode	On-device mode	Cloud mode	On-device mode
General knowledge prompts				
Factual response: Answer a general knowledge question in one short sentence	Yes	Yes	Yes	No
Follow-up retention and accuracy: Accurately answer a follow-up question to the factual response without the prompt restating the context	Yes	Yes	Yes	No
Long-form response: Answer a general knowledge prompt asking for a 140–160-word summary with five key points	Yes	Yes	Yes	No
Document-specific prompts				
Document summarization (.docx): Summarize a document in 140–160 words, covering three key points and using complete sentences, without the prompt mentioning the filename	Yes	Yes	No	Yes
Document summarization (.pdf): Summarize a PDF in 140–160 words, covering four key points and using complete sentences, without the prompt mentioning the filename	Yes	Yes	No	Yes
File Q&A retrieval: Relate a fact out of a document without the prompt mentioning the filename	Yes	Yes	No	Yes
File Q&A hallucination check: Recognize and respond that no documents in the corpus contain certain facts	Yes	Yes	No	No
Multi-document analysis: Gather and present data from multiple documents	Yes	Yes	No	Yes
System task prompt				
Adjust screen brightness: Set the system's screen brightness	Yes	Yes	No	No

General knowledge results

While users can easily get answers to questions from a quick online search, what happens when they're not online? Or what if they need to ask follow-up questions to fully understand the subject? Built-in AI assistants with on-device processing can help address these problems, but only if they actually work. In our tests, HP AI Companion was able to accurately answer general knowledge prompts in both cloud and on-device mode, while Lenovo AI couldn't answer general knowledge prompts unless it was in cloud mode.

HP AI Companion can deliver the answers users need—even when they're not connected to the internet.

Document-specific results

Users should also be able to rely on AI assistants to answer questions about files on their devices. HP AI Companion reliably responded to prompts about local files in both modes. Lenovo AI Now accurately completed four out of five document-specific tasks in on-device mode only.

In the hallucination check, we asked the AI assistants to look only at our local files and tell us which document contained a fact about Mars. HP AI Companion correctly told us that none of our documents discussed this fact, summarized other documents' content, and advised us to check other sources. In contrast, Lenovo AI Now incorrectly pointed us to three files that did not contain the fact we asked about. These issues could create errors and misunderstandings for your workforce, and could even add time to workflows where AI should be saving time.

Delivering consistently accurate answers—both on device and from the cloud—the HP EliteBook 8 G1a 14 inch Notebook Next Gen AI PC can accelerate AI-assisted workflows.

System task results

Finally, we wanted to see whether the AI assistants could change PC settings without human touch interaction. So, we asked them to make our screens brighter. HP AI Companion responded to our prompt by automatically adjusting the screen brightness for us; Lenovo AI Now pointed us to the system settings page where we could adjust it ourselves.

With convenient system command integrations, HP AI Companion available in the HP EliteBook 8 G1a 14 inch Notebook Next Gen AI PC can save your workforce time and mental energy.

Battery life

Collaborate from anywhere

For our real-world battery life assessment, we set up a Microsoft Teams meeting for nine participants and measured how long the laptops' batteries lasted. We used the Windows 11 Best power efficiency mode. In our tests, the HP EliteBook 8 G1a 14 inch Notebook Next Gen AI PC delivered more than a full workday's worth of battery life and a strong power efficiency ratio.

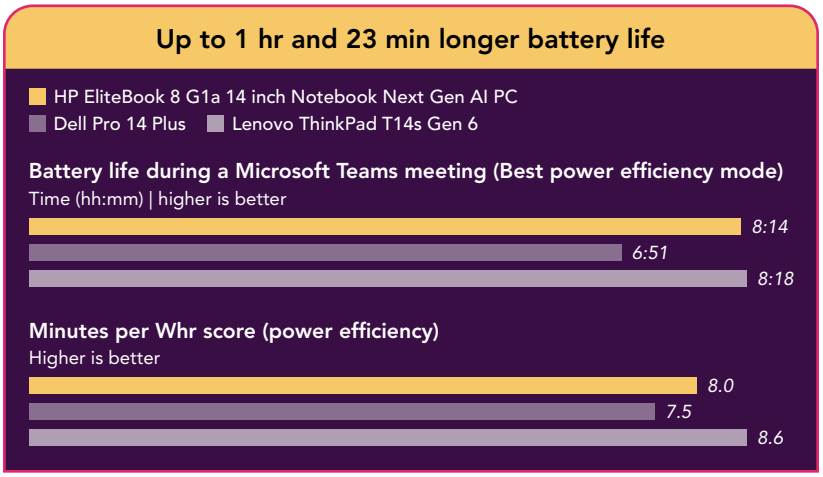


Figure 10: Battery life and power efficiency during a Microsoft Teams meeting. Source: PT.

Thermal tests

Stay cool without compromise

High-performing device and processor combinations can produce excessive heat during intensive workloads. If this sensation creates a distraction for users completing business-critical work, productivity and creativity could slow down.

The HP EliteBook 8 G1a 14 inch Notebook Next Gen AI PC includes HP Smart Sense to "optimize PC performance. Work without distraction with HP Smart Sense which makes automatic adjustments keeping your system cool and quiet and lets you enable performance mode when you need it most," according to HP.[19] The other PCs we tested also include built-in intelligent features: Dell Optimizer for the Dell Pro 14 Plus, and Lenovo Intelligent Cooling for the Lenovo ThinkPad T14s Gen 6. For our physical user experience testing, we turned on each device's intelligent feature.

When we ran a Cinebench 2024 workload for 30 minutes, the HP EliteBook 8 G1a 14 inch Notebook Next Gen AI PC scored significantly higher under this intensive workload (see Figure 11). And, it achieved this score while staying 13.3°F cooler than the Dell Pro 14 Plus (see Figure 12). While the Lenovo ThinkPad T14s Gen 6 also ran cool, its performance score lagged behind. The results speak for themselves: The HP EliteBook 8 G1a 14 inch Notebook Next Gen AI remained cool under load without compromising on performance.

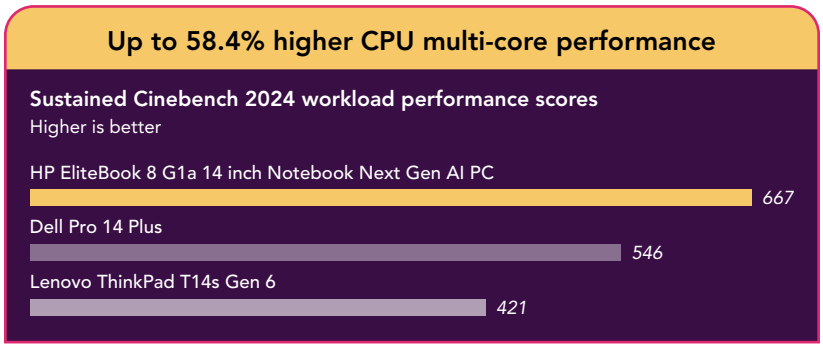


Figure 11: Median performance scores while the PCs were plugged in and running the Cinebench 2024 benchmark for 30 minutes. Source: PT.

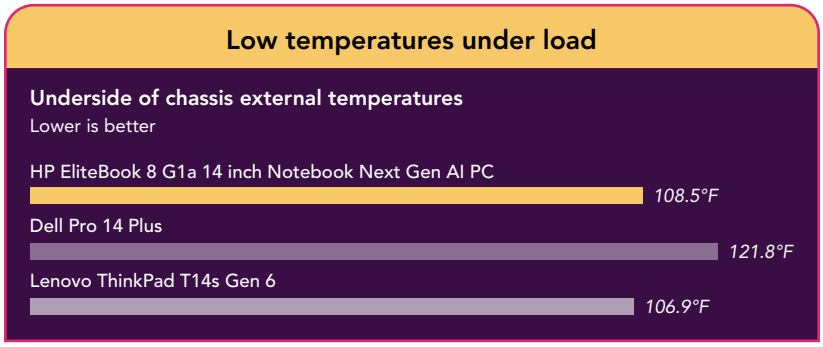


Figure 12: Median thermal results while the PCs were plugged in and running the Cinebench 2024 benchmark for 30 minutes. Source: PT.

Serviceability tests

Sustainably save time, fleet wide

If your team can easily replace device components when the unexpected happens, your organization could cut down on repair costs and downtime. Serviceable devices are also a more sustainable option, enabling your team to avoid replacing entire systems if just one component needs servicing.

When we tested the three devices' serviceability, we found that the HP EliteBook 8 G1a 14 inch Notebook Next Gen AI PC enabled us to service three components in less time than the competitors. It was the only device with two fans—and despite our replacing them both, we still did so in less time than the other PCs. It was also the only device that allowed us to replace the memory modules. While the minutes saved may seem minor in isolation, they can make a significant difference to budget and uptime across a fleet of devices.

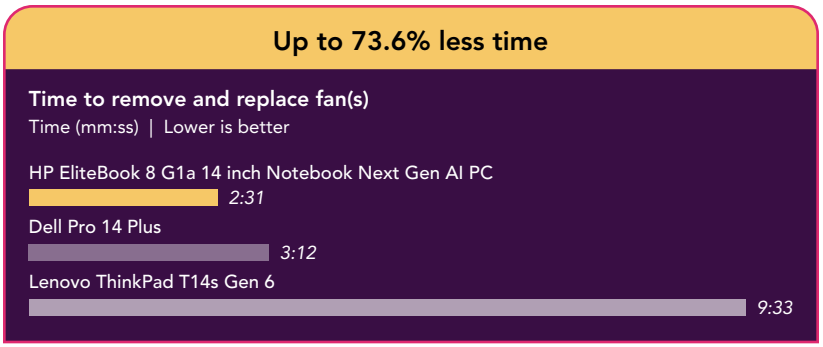


Figure 13: Time to remove and replace the systems' fans: two in the HP device and one each in the Lenovo and Dell devices. Source: PT.

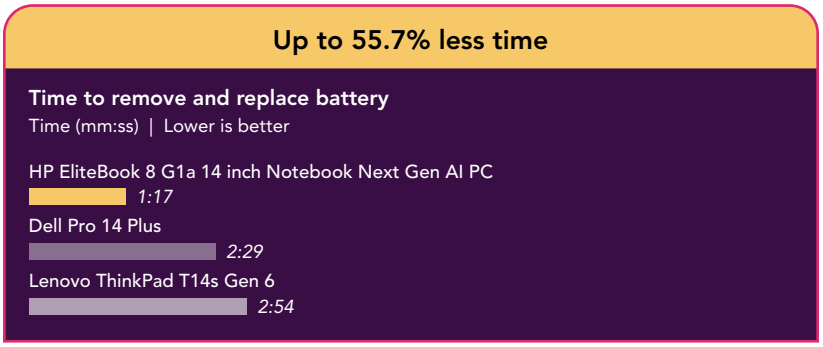


Figure 14: Time to remove and replace a battery. Source: PT.

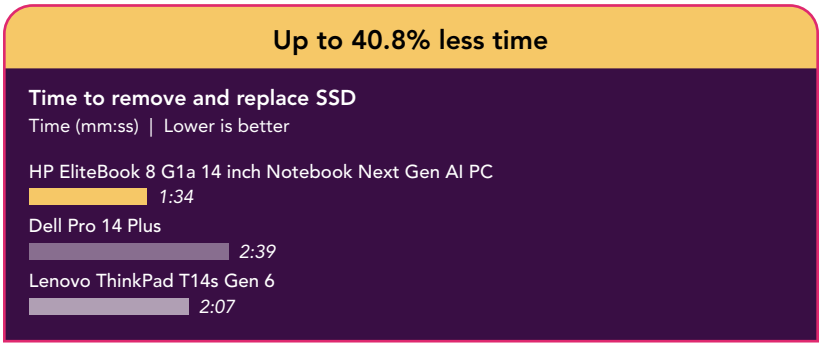


Figure 15: Time to remove and replace an SSD. Source: PT.

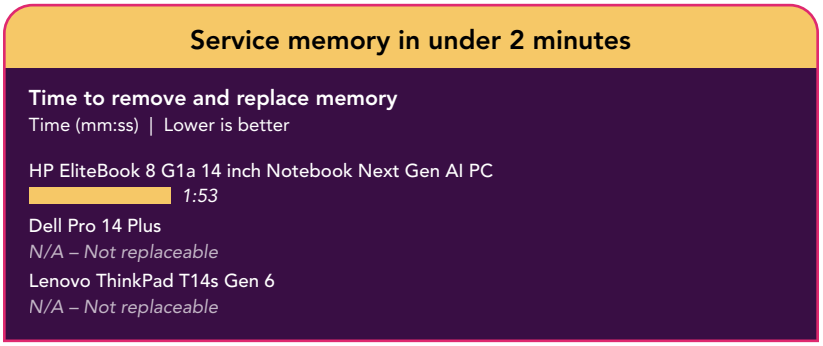


Figure 16: Time to remove and replace two memory modules. Source: PT.

Built-in privacy protection

We evaluated two presence-detection features in the HP EliteBook 8 G1a 14 inch Notebook Next Gen AI PC and compared them to those of the other two devices:

- **Wake on approach,** part of Presence Sensing in Windows 11, uses system proximity sensors to determine "when you are near the device and automatically turns on the screen. This way, you can sign in and start using your device right away."[20]
- **Onlooker detection,** enabled in the myHP app, "utilizes an AI-powered webcam sensor to alert users when prying eyes are detected and automatically blur the screen if needed."[21]
  - On the Lenovo ThinkPad T14s Gen 6, the equivalent feature is Privacy Guard, which we enabled in Lenovo View.[22]

Table 3: A comparison of built-in privacy features each device supported. Less time is better.

	HP EliteBook 8 G1a 14 inch Notebook Next Gen AI PC	Lenovo ThinkPad T14s Gen 6	Dell Pro 14 Plus*
Wake on approach	**Yes**	**Yes**	**No**
Time to wake on approach (sec.)	**1.3**	**1.5**	N/A
Onlooker detection	**Yes**	**Yes**	**No**
Time to detect onlooker and blur screen (sec.)	**1.0**	**2.6**	N/A

*Other screen configurations of the Dell Pro 14 Plus may support these features, but the device we tested did not. See the science behind the report for additional configuration information.

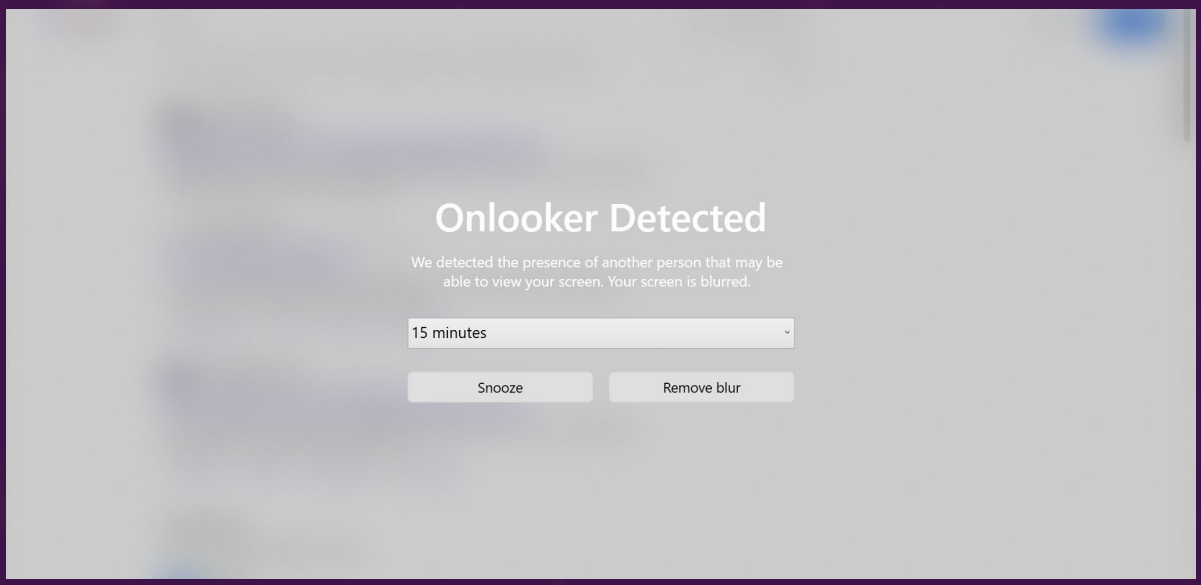
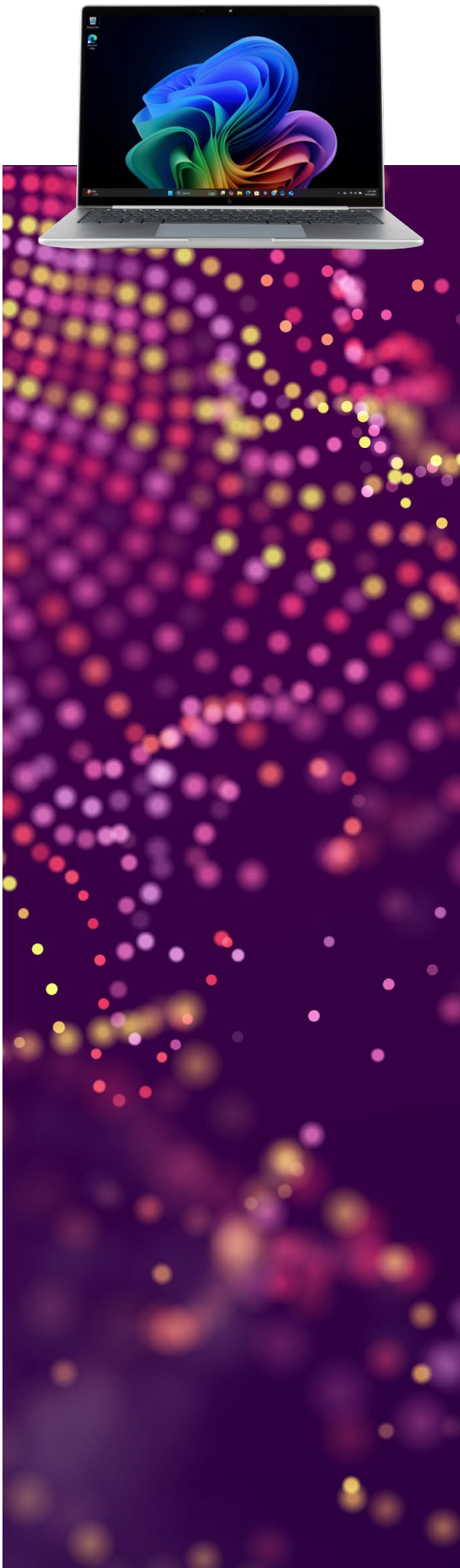


Figure 17: Screenshot of the HP EliteBook 8 G1a 14 inch Notebook Next Gen AI PC's onlooker detection privacy feature from our testing. Source: PT.

Conclusion

For the demands of next-gen workloads, your teams need a system and processor designed to handle AI and other rising applications. Delivering high performance scores, a workday's worth of battery life, and comfortable physical user experiences, the HP EliteBook 8 G1a 14 inch Notebook Next Gen AI PC we tested also featured quickly serviceable components, a helpful built-in AI assistant, and intelligent privacy features.

Compared to a Dell Pro 14 Plus and a Lenovo ThinkPad T14s Gen 6, each powered by an Intel Core Ultra 7 268V processor with Intel vPro, the AMD Ryzen™ AI 7 PRO 350 processor-powered HP EliteBook 8 G1a 14 inch Notebook Next Gen AI PC is a powerful and performant choice for the AI era.



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