



Boost performance and provide strong end-user unified communications experiences with HP Elite t655 Thin Clients



An HP Elite t655 Thin Client powered by an AMD Ryzen™ Embedded R2314 processor outperformed an Intel Pentium Silver N6005 processor-powered Dell OptiPlex 3000 Thin Client and delivered quality Microsoft Teams and Zoom experiences for end users in Citrix, VMware, and Windows 365 VDI environments



Complete productivity tasks faster with a 18.4% higher overall PassMark rating



Handle CPU-intensive tasks better with a 65.6% higher Geekbench 6 multi-core score



Deliver good unified communications experiences to end users in Citrix, VMware, and Windows 365 VDI environments

Despite the prevalence of fast broadband networks, powerful servers, and inexpensive storage, a continuing roadblock to thin client adoption has been a perceived lack of processor power. In 2022, AMD introduced the Ryzen™ Embedded R2000 Series processors, optimized for, among other things, thin-client equipment.¹

In our tests, an HP Elite t655 Thin Client powered by an AMD Ryzen Embedded R2314 processor outperformed a Dell™ OptiPlex™ 3000 Thin Client powered by an Intel® Pentium® Silver N6005 processor. We also found that both thin clients delivered comparable Microsoft Teams and Zoom experiences for end users in Citrix® Virtual Apps and Desktops™ 7, VMware® Horizon® 8, and Windows 365 Cloud PC virtual desktop infrastructure (VDI) environments.

How we tested

Cost savings, remote data accessibility, potentially easier remote fleet management, and high security are key features in the growth of the thin client market. In fact, some analysts expect the thin client market to be worth USD 1.7 billion dollars by 2028.² But how much increased productivity you can expect depends on the thin client itself. To determine the performance advantages of investing in HP Thin Clients powered by AMD Ryzen™ processors instead of Dell Thin Clients powered by Intel Pentium processors, we conducted business application-based system responsiveness testing and unified communications end-user experience comparisons on both thin clients in Citrix Virtual Apps and Desktops 7, VMware Horizon 8, and Windows 365 Cloud PC VDI environments. Both thin clients included integrated graphics, 16 GB of memory (2 x 8GB), and 256 GB of SSD storage:



HP Elite t655 Thin Client powered by an AMD Ryzen™ Embedded R2314 processor (2.1-3.5GHz), AMD Radeon™ Graphics, Realtek Wi-Fi 6, and a Bluetooth® 5.3 wireless card

Dell OptiPlex 3000 Thin Client powered by an Intel Pentium Silver N6005 processor (2.0-3.3GHz), Intel Iris® Xe Graphics, Intel Wi-Fi 6E, and a Bluetooth 5.3 wireless card

To compare system responsiveness from multiple viewpoints, we ran the PassMark PerformanceTest and Geekbench 6 benchmarks. For the unified communications end-user experience comparison, we first set up Citrix Virtual Apps and Desktops 7, VMware Horizon 8, and Windows 365 Cloud PC VDI environments. Then, we compared webcam and audio capabilities on the test thin clients using Microsoft Teams and Zoom applications.

We also tried to install and run the Geekbench performance benchmark on Linux®-based versions of these systems. Unfortunately, we were able to accomplish this on only the Linux-based HP Elite t655 Thin Client. Our detailed results are in the [science behind the report](#).

The benchmark scores and unified communications end-user experience results we report reflect the specific configurations we tested. Any difference in the configurations, as well as browsers, screen brightness, network traffic, or software additions, can affect these results. For more information on the test systems, as well as our testing parameters and procedures, see the [science behind the report](#).

About HP Elite t655 Thin Client

HP designed this high-performance thin client to fit into any workspace. It includes a quad-core AMD Ryzen™ Embedded R2314 processor with AMD Radeon™ Graphics, up to 32 GB of DDR4-2667 SDRAM system memory, support for optional DASH out-of-band remote management, multi-layered security features, and optional Wi-Fi 6 and Bluetooth capabilities.³

To learn more about HP Elite t655 Thin Client, visit <https://www.hp.com/us-en/thin-clients.html>.



Keep confidential data safe

Encrypt data as it flows between the system memory and processor, protect firmware, and lock down access. The HP Elite t655 Thin Client features multi-layered security, an embedded OS, and a NIST SP 800-193 component.⁴



About AMD Ryzen Embedded R2000 Series processors

AMD Ryzen™ Embedded R2000 Series processors with AMD Radeon™ Graphics deliver optimized performance for mid-range applications on compact systems. They are built on “Zen+” x86 core architecture cores.⁵

Invest in your future

It's not just call centers, healthcare, and financial services that can benefit from investing in HP Thin Clients. According to the TechTarget website, because thin clients enable secure access to company resources, “any organization that works with highly sensitive data or must meet strict compliance guidelines” might wish to consider them.⁶

HP Thin clients are also a great way to reduce the amount of time IT teams spend on setting up and issuing traditional PCs, dealing with traditional PC issues, responding to random hardware failures, constantly re-imaging traditional PCs, and tracking traditional PC's lifecycles. Most industries can incorporate HP Thin Clients into their employee workflow, especially at the administrative level. These streamlined PCs are small enough that you can mount them almost anywhere—which frees up valuable space in office settings, learning environments, and clinics. And they're perfect for completing operational tasks in retail distribution and manufacturing industries.⁷



Deliver a good unified communications experience to end users

Video conferencing is a critical business tool that has become even more important in remote and hybrid work environments. Achieving good performance in VDI environments can be challenging because unified communications solutions such as Microsoft Teams and Zoom put a lot of resource strain on virtualization platforms.⁸ For our unified communications end-user experience comparison, we first set up Citrix Virtual Apps and Desktops 7, VMware Horizon 8, and Windows 365 Cloud PC VDI environments. Then, we compared webcam and audio capabilities on the test devices using both the Microsoft Teams and Zoom applications:

- Microsoft Teams + Citrix Virtual Apps and Desktops 7
- Microsoft Teams + VMware Horizon 8
- Microsoft Teams + Windows 365 Cloud PC
- Zoom + Citrix Virtual Apps and Desktops 7
- Zoom + VMware Horizon 8
- Zoom + Windows 365 Cloud PC

An important metric in video and audio quality is bitrate, a term that describes the amount of data transferring in a given time, but many other factors also matter in VDI environments:

1. A higher video bitrate translates to a higher quality video—but a higher-quality video requires more bandwidth. See the callouts on the next page.
2. Unreasonably high bitrate can put additional strain on hardware and data bandwidth, which may lead to glitching.
3. Different screen resolutions need different bitrates.
4. One-on-one (1:1) meetings have different bandwidth requirements than group meetings.

We followed all VDI platform and Microsoft Teams and Zoom app optimization recommendations before we conducted our 1:1 unified communications end-user experience tests. We compared the relevant quality of service (QoS) printouts from each VDI environment. These printouts report the bitrate results in kilobits per second (kbps), the jitter and latency results in milliseconds (ms), and frames per second (FPS). We found that both devices performed comparably overall in the Microsoft Teams and Zoom apps on Citrix Virtual Apps and Desktops 7, VMware Horizon 8, and Windows 365 Cloud PC VDI environments.

See the [science behind the report](#) to dive into each specific VDI environment and our line-by-line results.

Microsoft Teams bandwidth requirements

- 1:1 audio calls = 30kbps
- 1:1 audio calls with screen sharing = 130kbps
- 1:1 quality video calls = 500kbps
- 1:1 720p HD video calls = 1.2Mbps
- 1:1 1080p HD video calls = 1.5Mbps
- Group video calls = 500kbps/1Mbps
- HD group video calls (540p videos on 1080p screen) = 1Mbps/2Mbps⁹



Zoom bandwidth requirements

- 1:1 audio voice over Internet Protocol (VoIP) = 60 – 80kbps (receiving)
- 1:1 Zoom Phone calls = 60 – 100kbps
- 1:1 audio calls with screen sharing = 50 – 75kbps
- 1:1 video calls with screen sharing = 50 – 150kbps
- 1:1 quality video calls = 600kbps*
- 1:1 720p HD video calls = 1.2Mbps*
- 1:1 1080p HD video calls = 3.8Mbps/3.0Mbps*
- Group video calls = 1.0Mbps/600kbps*
- 720p HD group video calls = 2.6Mbps/1.8Mbps*
- 1080p HD group video calls = 3.8Mbps/3.0Mbps*¹⁰



*(sending/receiving)

About the benchmarks

The **PassMark PerformanceTest** benchmark gathers CPU, disk, memory, and 2D/3D graphics performance metrics. It combines these individual component metrics to create a single, overall score: the PassMark rating.¹¹

The **Geekbench 6** CPU benchmark uses popular, real-world apps to measure single-core and multi-core performance. The GPU Compute benchmark tests how well systems handle demanding tasks such as gaming, image processing, or video editing.¹²



Meet or exceed productivity objectives

Slow computing hurts productivity. Because workflows stress systems in different ways, we conducted industry-standard benchmark tests that measure different aspects of system performance. Together, these results provide a picture of the kind of day-to-day responsiveness end users are likely to experience in a variety of situations. In this section, we show what our hands-on benchmark tests revealed.

Complete productivity tasks faster

The more responsive a system is, the less time knowledge workers must spend waiting for pages to load, and the more time they have to focus on the tasks at hand.

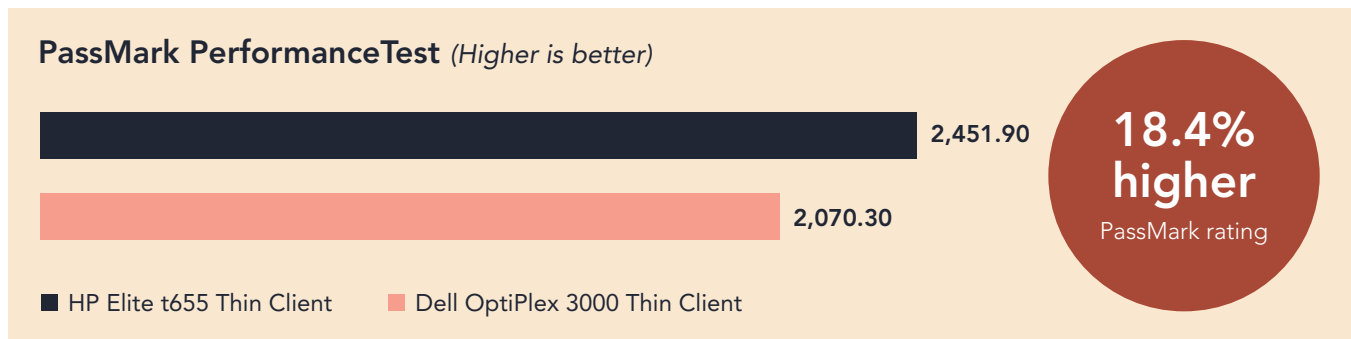


Figure 1: PassMark PerformanceTest PassMark ratings. Higher is better. Source: Principled Technologies.

Handle resource-intensive tasks better

Your teams may not play games on these streamlined PCs—but the Geekbench resource-intensive benchmark scores can still shed light on overall performance. For example, higher Geekbench single-core and multi-core scores can translate to speedier system response times on demanding productivity apps such as PowerPoint and Excel. And higher GPU scores can translate to speedier system response times when using computer-aided design (CAD) programs, MATLAB scientific simulation software, and product development and design applications.

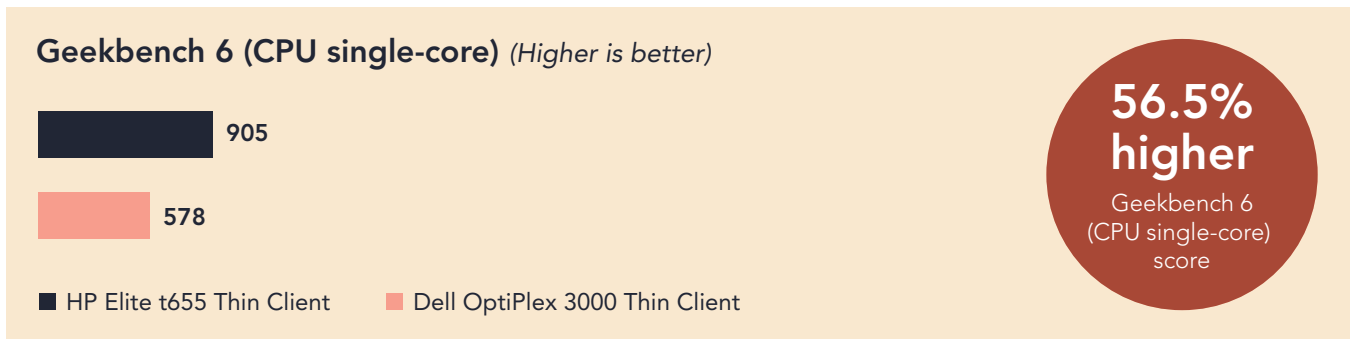


Figure 2: Geekbench 6 (CPU single-core) benchmark scores. Higher is better. Source: Principled Technologies.

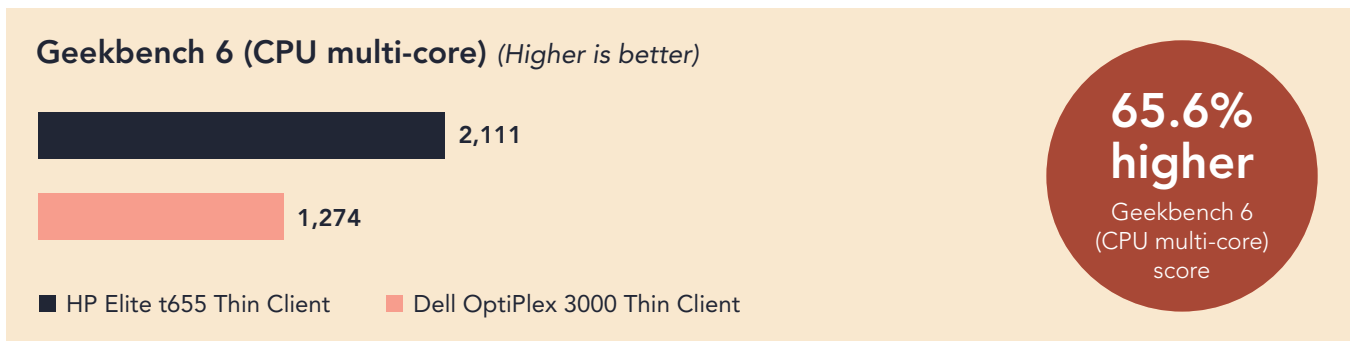


Figure 3: Geekbench 6 (CPU multi-core) benchmark scores. Higher is better. Source: Principled Technologies.

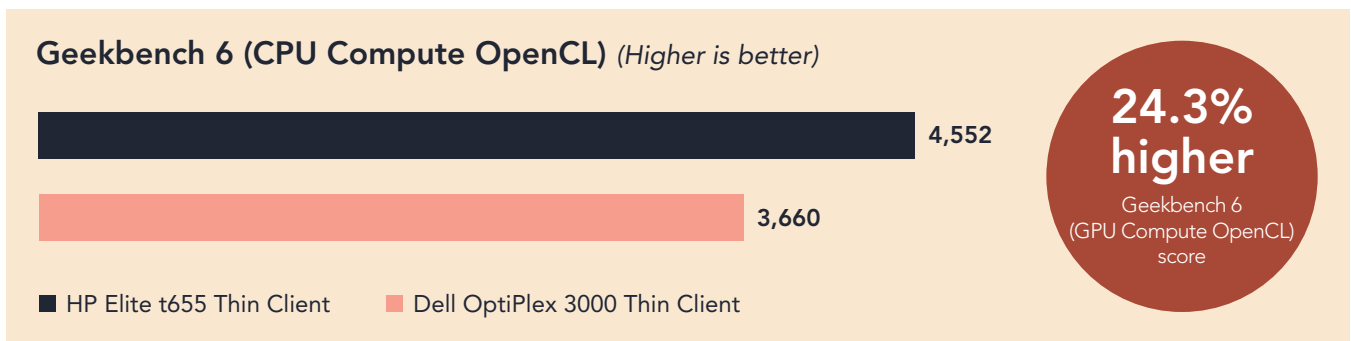


Figure 4: Geekbench 6 (GPU Compute OpenCL) benchmark scores. Higher is better. Source: Principled Technologies.

Conclusion

HP Thin Clients have the potential to help business save money, reduce energy usage, and make remote data both accessible and secure. We found that an HP Elite t655 Thin Client powered by an AMD Ryzen™ Embedded R2314 processor could help employees complete productivity tasks faster and handle resource-intensive tasks better than a Dell OptiPlex 3000 Thin Client powered by an Intel Pentium Silver N6005 processor. We also found that this HP Thin Client also provided quality unified communication experiences in multiple VDI environments.

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Read the science behind this report at <https://facts.pt/3tpSdWf> ►



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