

INSIDE: HOW TO SECURE WINDOWS 11, CHROME, GMAIL, & AMAZON

PCWorld

SEPTEMBER 2023



DELL
XPS 15

WINDOWS LAPTOPS VS. MACBOOKS

5 REASONS TO GO PC

MACBOOK
PRO



Smokey Says...

MAKE IT YOUR
GOAL
TO EXTINGUISH
HOT
COALS



IF IT'S TOO HOT TO TOUCH,



IT'S TOO HOT TO LEAVE

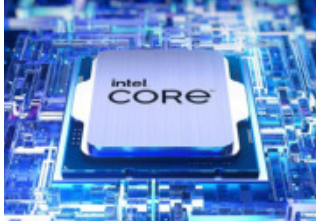
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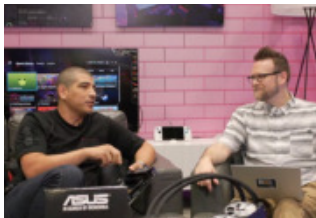
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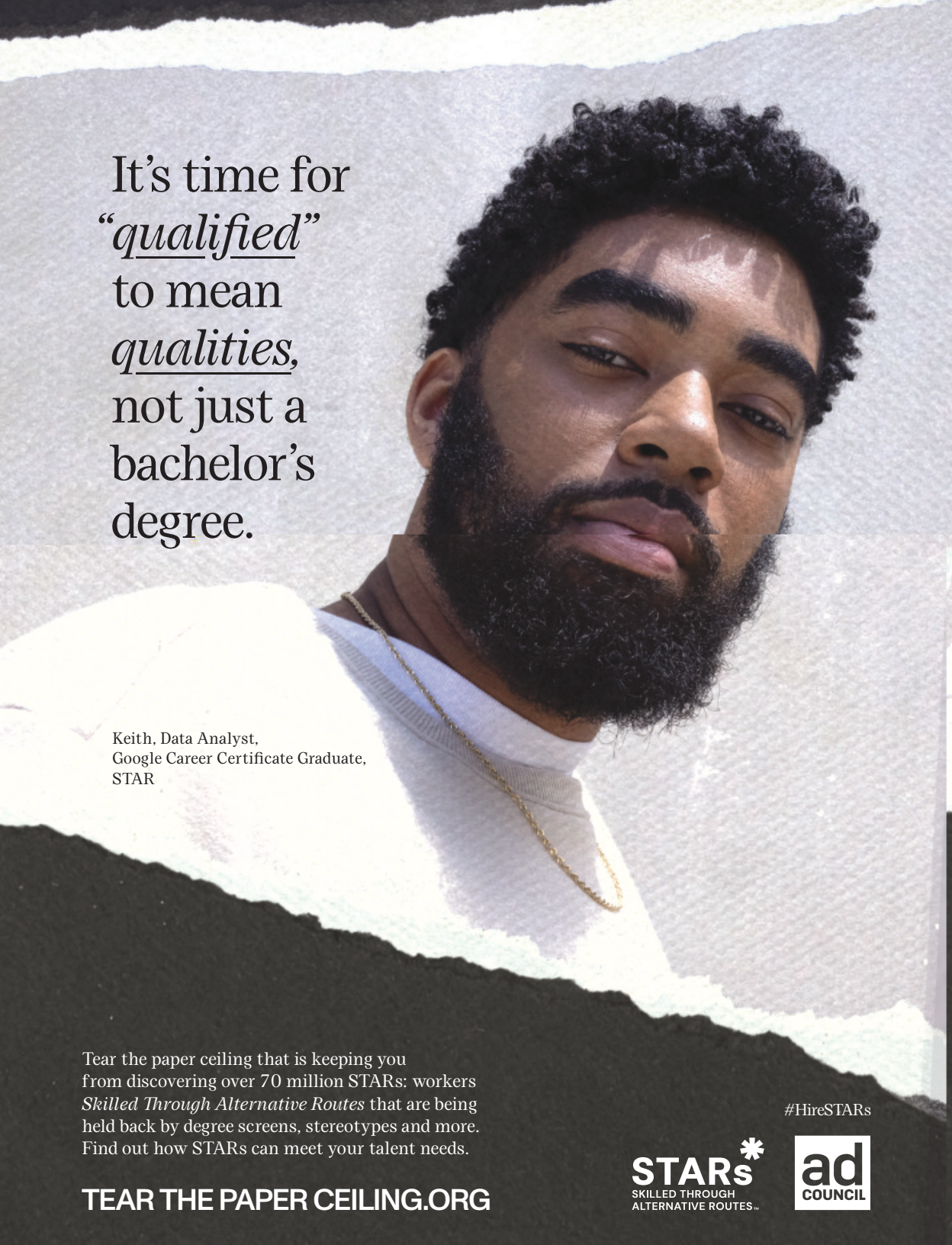
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It's time for
“qualified”
to mean
qualities,
not just a
bachelor's
degree.

Keith, Data Analyst,
Google Career Certificate Graduate,
STAR

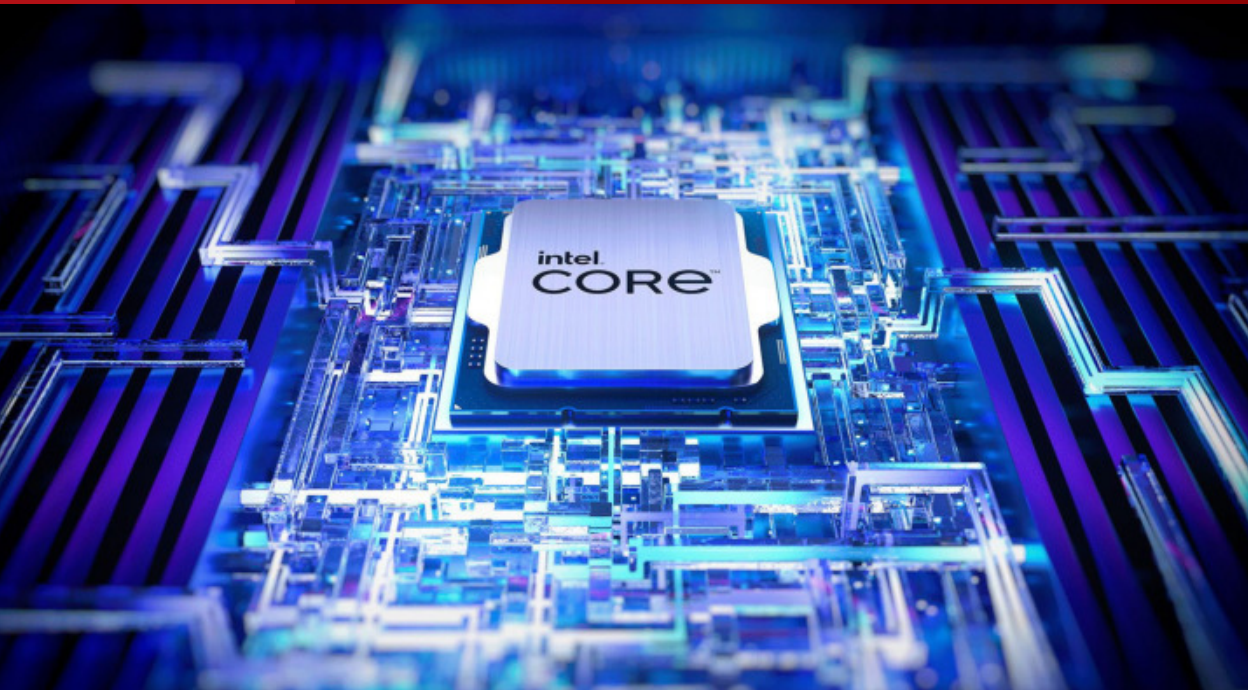
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Intel 'Downfall': Severe flaw in billions of CPUs leaks passwords and much more

There is a serious security flaw in billions of Intel CPUs that can allow attackers to steal confidential data like passwords and encryption keys. **BY HANS-CHRISTIAN DIRSCHERL**

Well, this is bad. "Downfall" is the name Daniel Moghimi, a security expert at Google, has given to a new vulnerability he has discovered in several generations of Intel processors. Attackers can exploit the vulnerability and read data from other programs and memory areas. The vulnerability has already been reported as

CVE-2022-40982 (fave.co/3OyUYcb), and Intel confirmed the flaw here (fave.co/3YyNjik).

Moghimi reported the vulnerability to Intel on August 24, 2022, but only made the vulnerability public today so that Intel had time to release microcode updates that can fix the vulnerability.

Intel's Downfall was closely followed by AMD's Inception, a newfound security hole

affecting all Ryzen and Epyc processors. We've included details at the end of this post.

INTEL'S 'DOWNFALL' FLAW IS SERIOUS

Moghimì explains the vulnerability in detail on a dedicated Downfall website (fave.co/3YxfqyG), including some examples. According to him, billions of Intel processors are affected, which are used in private user computers as well as in cloud servers. The expert describes the possible consequences of the gap as follows:

"This vulnerability, identified as CVE-2022-40982, enables a user to access and steal data from other users who share the same computer. For instance, a malicious app obtained from an app store could use the Downfall attack to steal sensitive information like passwords, encryption keys, and private data such as banking details, personal emails, and messages. Similarly, in cloud computing environments, a malicious customer could exploit the Downfall vulnerability to steal data and credentials from other customers who share the same cloud computer."

HOW THE INTEL DOWNFALL VULNERABILITY WORKS

While you should check out Moghimì's Downfall page for more detailed information, here's his high-level description of the bug:



The vulnerability has existed since at least 2015, when Skylake was released.

"The vulnerability is caused by memory optimization features in Intel processors that unintentionally reveal internal hardware registers to software. This allows untrusted software to access data stored by other programs, which should not be normally be accessible."

HOW TO PROTECT YOURSELF FROM INTEL DOWNFALL

Intel is already providing microcode updates to plug the security hole. "Intel recommends that users of affected Intel Processors update to the latest version firmware provided by the system manufacturer that addresses these issues," the company says.

This can lead to a loss of performance of up to 50 percent under certain circumstances, however, as Moghimì warns.

Intel comments on the side effects of the microcode updates here (fave.co/3s8l8df). There's an opt-out mechanism available to avoid applying the patch.

WHICH INTEL PROCESSORS ARE AFFECTED?

Both consumer and server processors from Intel show the gap. For consumers, all PCs or laptops with Intel Core processors of the 6th Skylake generation up to and including the 11th-gen Tiger Lake chips contain the vulnerability. This means the vulnerability has existed since at least 2015, when Skylake was released.

Intel's corresponding Xeon processors are also at risk to Downfall. Due to Intel's dominant position in server processors, virtually every internet user could be affected, at least indirectly.

Intel has published a list of all affected processors here (fave.co/3DWuVXe). You can read a detailed technical analysis by the Google security expert in this English-language PDF (fave.co/3DRghAH).

Intel's newer 12th-gen and 13th-gen Core processors are not affected.

The downfall vulnerability now discovered is reminiscent of the legendary Meltdown and Spectre (fave.co/3OR5qgh) vulnerabilities from 2018.

Intel's Downfall was closely followed by AMD's Inception: Many Ryzen CPUs from Intel's archrival also have a serious security hole (fave.co/453WCcS) that allows attackers to spy on third-party data. It is classified as CVE-2023-20569 (fave.co/3qoCz9X) and was discovered by scientists from ETH Zurich. Detailed information about this AMD vulnerability can be found on this website (fave.co/3OSmtij).

According to the researchers, all Zen processors are affected. This means all Ryzen and Epyc CPUs released by AMD over the years contain the Inception security vulnerability. AMD recommends installing microcode updates. Microsoft distributed a Windows update in July that closes this gap. "AMD believes this vulnerability is only potentially exploitable locally, such as via downloaded malware, and recommends customers employ security best practices, including running up-to-date software and malware detection tools," AMD says. 🔌



According to researchers, Zen processors are also affected.

Oops! Microsoft accidentally leaks tool that unlocks secret Windows 11 features

Links to the StagingTool.exe file were quickly removed, but it's making its way around power user forums now. **BY MICHAEL CRIDER**

```

Usage: StagingTool.exe [/enable <featureId>]
                        [/disable <featureId>]
                        [/query [featureId]]
                        [/reset <featureId>]
                        [/testmode]
                        [/setvariant <featureId> <variantId> [payload]]
                        [/serialize]

                        [/setlkg]
                        [/restorelkg]

                        [/trace <featureId1> [<featureId2> ... <featureIdN>]]
                        [/setbootconfigs <jsonFile> <registryPath>]

/enable                Enable the specified feature
/disable              Disable the specified feature
/query                Query the specified feature (or all features, if featureId
                    is omitted) for enablement and variant information
                    /v      Optional parameter to also print ImageDefault and ImageOverride features
/reset                Reset the specified feature to its default state

<featureId>           Specifies a feature by its feature Id
                    Example: Enable features with Id 1

                        StagingTool.exe /enable 1

/testmode             Used in conjunction with /enable /disable /reset
                    Applied feature configs will revert after reboot

/telemetry            Used in conjunction with /enable /disable /reset
                    Enables sending additional telemetry
  
```

Psst. Hey, you. Yeah, you. You wanna try out some of the latest Windows 11 features? The ones even Microsoft doesn't want hundreds of millions of users to have access to yet? Well, all you gotta do is tiptoe down one of the slightly less reputable alleys of the internet and download this here tool. Don't worry, this one fell off a truck coming right out

of Microsoft HQ, it's legit. Install it, run a couple of command lines, and you can skip right past the Windows Insider program A/B test and get the *good stuff*.

On August 2, Microsoft posted some instructions for its Bug Bash program (fave.co/3KEhYp8), a periodic event where it encourages developers and Windows superfans to track down bugs in the latest Windows

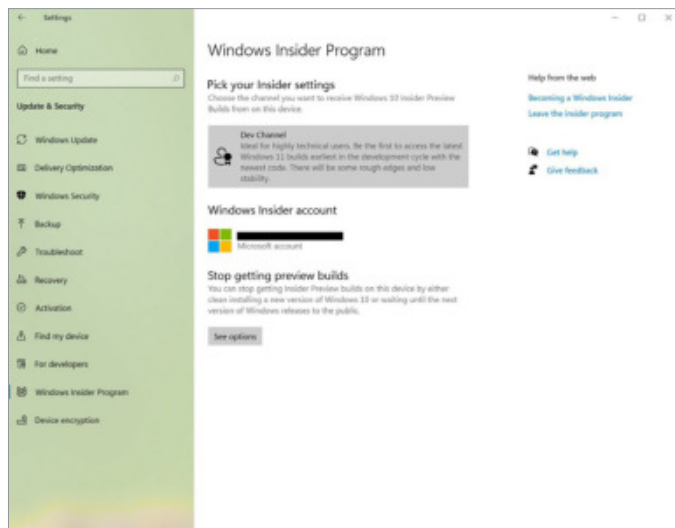
Insider builds and report them. But these instructions included a download link for an internal Microsoft developer tool, quickly spotted by users like @XenoPanther (fave.co/45otGMk). The StagingTool executable can be used in the command line to enable and disable hidden features in Insider builds that aren't normally visible, possibly bypassing the semi-random A/B testing that the most eager Windows preview users can find frustrating.

Update: BleepingComputer has released a tutorial (fave.co/45sMBp8) explaining how to use Microsoft's complicated, command line-centric StagingTool. Be sure to check it out if you wind up trying to unlock these secret Windows 11 testing features.

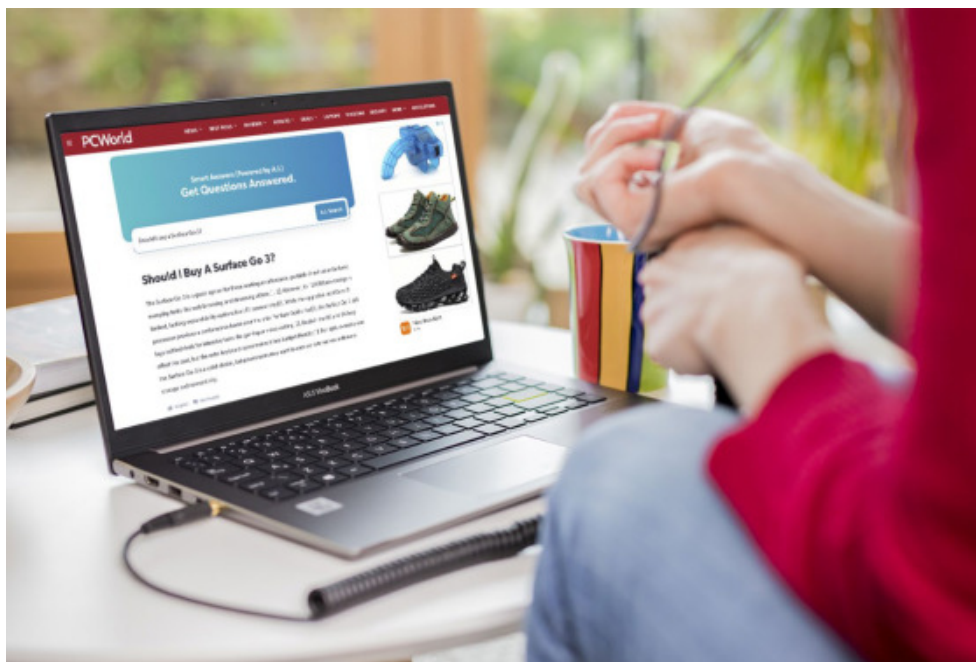
The links to StagingTool.exe were removed from public view in less than a day, but Windows Insider fans quickly distributed the program and are currently having a ball dissecting everything it can do. As The Verge notes (fave.co/4573Ooy), this isn't the only way to manually flip the hidden switches in Windows; user-created tools have enabled this sort of thing before. But this is undoubtedly one of

the biggest—and possibly most embarrassing—leaks to come directly from Microsoft in a while.

You can find the tool in various Windows groups and forums now (but be sure to exercise the usual caution in downloading unverified executables!). As engineering tools go, StagingTool.exe is fairly straightforward, allowing you to enable or disable various options and modes in Insider builds with text commands. Since the tool comes directly (albeit mistakenly) from Microsoft, tinkerers are having a blast trying out the various options with more confidence than usual. But as with all experimental features, proceed at your own risk if you want to try it out for yourself. ⚡



You will only be able to use the Staging Tool if you're running a Windows Insider build.



Smart Answers: GenAI tool makes it easier to find the info you need on PCWorld

Smart Answers puts you in the driving seat for content discovery.

BY MARIE BLACK AND NEIL BENNETT

Today PCWorld is launching Smart Answers, a chatbot tool that helps you get more from our content. It's built using Generative AI and existing content written by our human editors.

The way we interact with content is changing. It wasn't so long ago you would

have sifted through a printed magazine for advice on the latest consumer technology, yet it felt like a revolution when magazines switched to digital and online editions. These days, everything you could ever want to read is on the internet—or just as likely on YouTube or TikTok.

The difficulty comes in finding trustworthy, up-to-date information that precisely and immediately answers your question, and most of us tend to rely on search engines and algorithms to figure that out, with varying degrees of success. But faced with a page full of links to visually similar content, you're still at least one step away from the information you need.

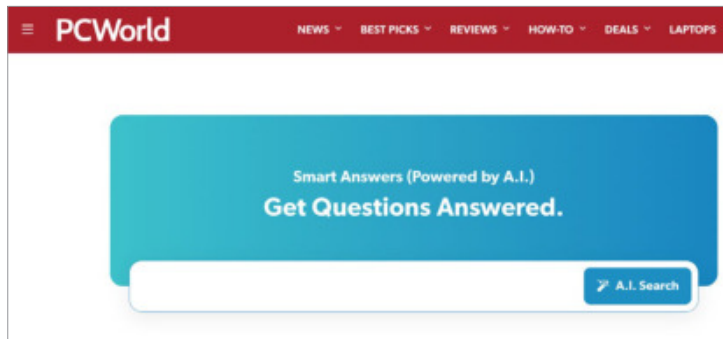
Smart Answers is our new reader service that turns content discovery on its head. You control the questions, the answers, and the delivery. It's like having a PCWorld editor at your beck and call, allowing you to request and receive specific content on demand. So, why wait for the content to find you? PCWorld's Smart Answers tool is now available in key regions across the globe.

We've worked in partnership with Miso.ai (fave.co/454HMCJ) to develop Smart Answers, a GenAI tool (see "What Is GenAI?" at fave.co/458cXgr) that draws *only* on Foundry's complete catalog of English-language content (written by humans) to answer your natural-language questions. You'll benefit not only from the expert knowledge of PCWorld editors, but from those of Macworld (fave.co/45sNLRw), Tech Advisor (fave.co/3YzEqFx) and TechHive (fave.co/47sF2AP) too, collectively covering the entire consumer technology sphere.

Smart Answers is fast and efficient, which means you don't have to scroll through pages of information to find what you need. You can ask it anything, from what the best laptop is for gaming to which printer you should buy for your home office, or even when the next CPU family is coming out.

Ask it a follow-up question, too, or browse the recommended reading for more detail on the topic. Smart Answers is clever enough to work out what you may want to ask next, and it will even show you the best pricing for related products and services.

Smart Answers has been trained on the type of tech-related questions our readers are likely to ask. Ask it a silly or irrelevant question (fave.co/3YF9Lqs), and you'll either get a silly or irrelevant answer, or no answer at all. Our priority is to ensure Smart



PCWorld's Smart Answers tool turns content discovery on its head.

Answers is able to adequately respond to questions on the topics we do cover.

Though Smart Answers is intrinsically linked to our editorial content, our editorial function stands independently. No article published on this site has been created using GenAI.

Extensive testing has been conducted by our editors over many months, with our feedback used to retrain the model. We wouldn't be rolling this out now if we were not confident that the answers it provides are as trustworthy as if they had come directly from our editorial team.

This cycle of testing, feedback, and retraining is ongoing, and will be an important element as we continue to add functionality to Smart Answers. Now that our Smart Answers page (fave.co/3OvPOO5) has gone live, you'll find a Smart Answers block on our home page and within our articles. And this is just the start of a process that will ultimately put you in charge of your own content experience across Foundry-owned sites.

Of course, the real testing comes from you. We'll be analyzing all search data collected by Smart Answers, as well as cross-checking the quality of responses, but we'd also love to hear your feedback. You can get in touch with our editorial director (EMEA & LatAm), Marie Black, or our director of product and data, Neil Bennett, over email.

FAQ

1. How does Smart Answers work?

Smart Answers is based on a GenAI platform, built by our partner Miso.ai. Unlike ChatGPT, Google Bard and other GenAI tools that source their information from all over the web, Smart Answers has been trained only on content written by Foundry journalists. It responds to queries posed in natural language with a summarized answer and links to related information.

2. What is GenAI?

Short for Generative AI, GenAI is a type of artificial intelligence that is able to mimic the neural networks of the human brain and, through machine learning of existing content, generate entirely new content in the form of text, images, video, and audio. When given a prompt, such as a piece of natural-language text, the computational power of GenAI allows it to deliver an answer much faster than can the human brain.

3. Can I trust Smart Answers?

Yes. Smart Answers provides answers based on articles written by Foundry journalists and does not use data from any external sources, which could be unreliable or subject to copyright concerns. Extensive testing has gone on behind the scenes to help train the model, so we are satisfied that it is able to provide reliable information. We've also worked hard with partner Miso.ai to eliminate

“hallucinations,” which are misleading or wholly incorrect answers that may be given when the answer is not known or the data required to answer the question is incomplete. If Smart Answers is unable to answer your question, it will tell you so.

4. Is Smart Answers a threat to our editorial team?

Absolutely not. Smart Answers cannot exist without the expert content written by Foundry journalists. Its ability to stay useful and relevant is entirely dependent on it being able to learn from their content, and thus it is not the first step in some evil plan to replace our team of editors and cut costs. Smart Answers is a supplementary service for our readers, designed to aid content discovery and


enhance the user experience. Though we will make revenue from any ads displayed on the page and earn commission on links to purchase some products and services, Smart Answers also costs us money to develop and run.

5. Is Smart Answers being used to create editorial content on PCWorld?

No. Editorial articles feed into Smart Answers, but Smart Answers is not used for the creation of editorial articles. But in the future we may use query data to help us come up with article or FAQ ideas.

6. What data is Smart Answers collecting?

We are recording queries submitted via Smart Answers to help us understand the

information our readers are interested in. Smart Answers also collects anonymized user data that allows us to better understand the interests and intent of readers visiting Foundry websites. Learn more about Foundry’s Privacy Policy (fave.co/3qskPpi), and Miso.ai’s Privacy Policy (fave.co/3KDK3wE). 



Generative AI is able to mimic the neural networks of the human brain.

Microsoft 365 makeover: Office docs are getting new default look

Significant changes are coming to your Office documents with Microsoft 365's new default theme. **BY HANS-CHRISTIAN DIRSCHERL**



Microsoft Office, which was renamed Microsoft 365 a while ago, is about to release a round of drastic visual changes. Microsoft is giving its Office suite a new standard theme across all individual applications such as Word, Excel, PowerPoint, and Outlook. Everything from

fonts to colors to even line weights is getting new default settings.

The changes are intended to make documents created with Microsoft 365 look more modern and accessible, Microsoft says (fave.co/455j2FX). Here's a brief overview of what Office users will need to adjust to in the new default theme.

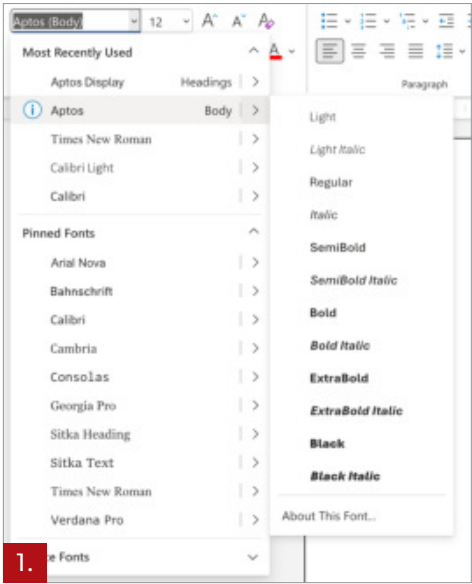
NEW STANDARD FONT: APTOS REPLACES CALIBRI

The first, most obvious change that every Microsoft 365 user will see immediately: Office will soon be using a new default font. Since 2013, Calibri has been the default for Office apps. But Microsoft users will now have five alternatives to choose from for a new default:

- Bierstadt
- Grandview
- Seaford
- Skeena
- Tenorite

Bierstadt won the race and is now the new standard font for Microsoft 365, albeit under the name Aptos (1). Aptos supports a variety of font styles (such as normal, italic, bold, and so on) and variants such as narrow, serif, and monochrome.

As usual, you can of course use any other font available in Microsoft Office.



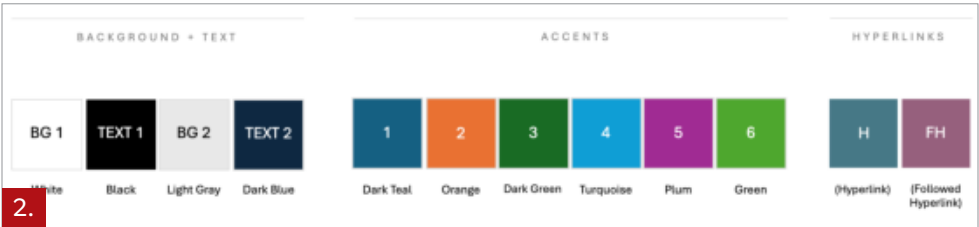
motivation behind the change is to make your documents feel more accessible. The new colors are suitable for content such as charts, lists, and shapes.

NEW COLOR PALETTE

Microsoft also researched popular color palettes and design trends and then created a set of standard colors that should work well in all Office applications (2). The

NEW STYLE

Microsoft wanted to make the default style for Word documents and Outlook emails both easier to read and more professional looking (3). This set of changes should





make it easier for users to navigate through their documents.

NEW LINE WIDTHS

Microsoft has also increased the line widths, so the lines are thicker (4). This should lead to better consistency between shapes and lines. Microsoft has also improved the contrast.

HOW TO USE THE NEW MICROSOFT 365 THEME

With the introduction of the new theme, all new documents, presentations, worksheets, and emails you create in Word, PowerPoint, Excel, and Outlook will automatically have the new theme applied. You don't need to take any special action to see it.

Your existing documents will not be changed to the new theme, however. They will continue to use the original design that was applied when they were created. You can continue to use the previous Office theme if you want to do so, but you'll need to manually change to "Office Theme

2013–2022."

AVAILABILITY


Currently, only Microsoft 365 Insider Testers can try out the new theme. These are the requirements:

Win32: Version 2308 (Build 16701.20000) or higher

Mac: Version 16.76 (Build 23070400) or higher

Android: Version 16.0.16701.20000 or higher

An iOS version isn't available yet.

Microsoft is not yet disclosing when all Microsoft 365 users will be swapped over to the new default theme. Until then, Calibri will remain the standard font in Office. 



Google now alerts you if your contact info appears online

Better decades late than never. **BY ALAINA YEE**

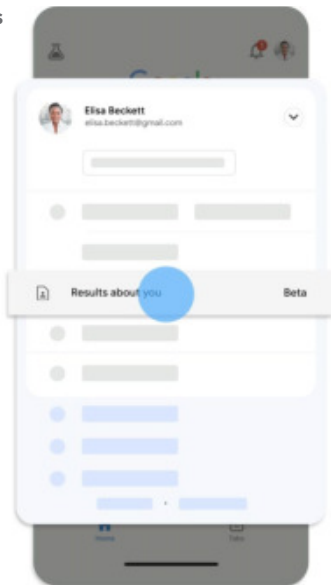


Back in September last year, Google launched a way to remove search results showing personal contact information—details like your home address, phone number, and email address. You could make the request from any method of accessing Google search, then monitor the status of your request(s) from its new Results About You tool. But you still had to stay on top of search results about you. Now the company has rolled out some

updates to the tool to alleviate some of that work (and stress)—as well as introducing a further way to protect your privacy online.

Promised to arrive in “the coming days,” the Results About You’s new dashboard (fave.co/3DXN9rD) will both show you existing search results containing your contact info and also automatically alert you if those personal details again pop up later on. You’ll still need to manually submit removal requests, however. And as noted by Bleeping

You can access “Results about you” tool in the Google app.



Computer (fave.co/3KJ3UdN), the company will still screen requests to make sure it doesn't take down results tied to information that is “broadly useful,” like in news articles.

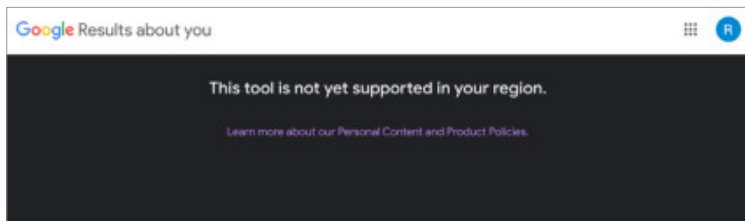
You can access the Results About You tool in the Google app by clicking on your Google account photo and choosing “Results about you.” Alternatively, you can visit [google.resultsaboutyou](https://google/resultsaboutyou). This update will only be available in English and within the U.S. to start, but other languages and locations are soon to follow.

Nonconsensual explicit imagery is

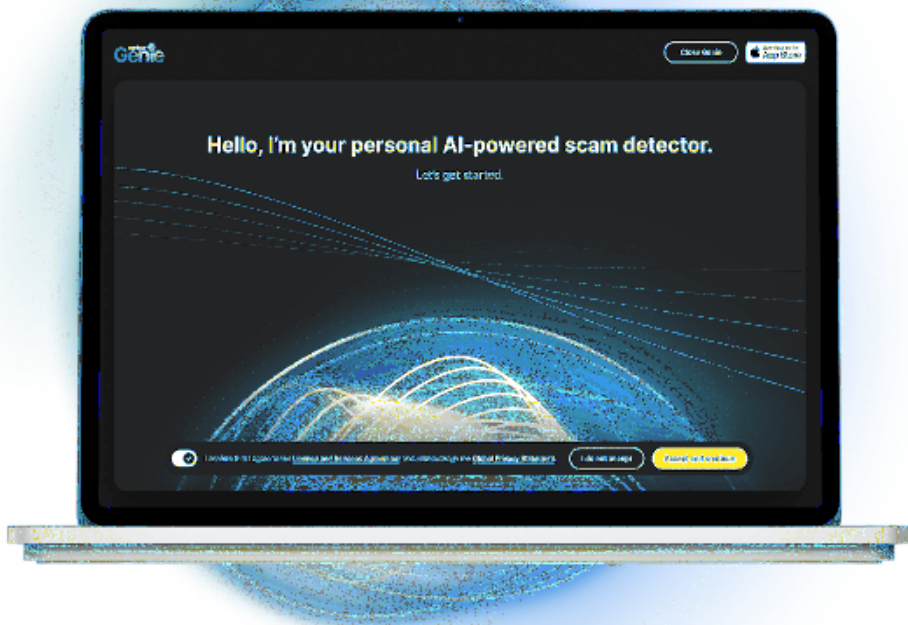
also becoming easier to remove from search. Google says it's streamlined the process for making such requests (fave.co/3qynFOP), though as part of the announcement, Vice President of Trust Danielle Romain stressed that the policy still does not extend to commercialized images (though presumably the redistribution of such material would fall under copyright protection if you were the one who created the content).

Google also will begin handling explicit images in a different manner—by default, these images will be blurred if they come up in search results. The company says this change, which will launch in August, is to help protect families from “accidentally encountering” adult or graphic violent images while searching online. Parental controls can now be directly found by typing in a search like “google parental controls” or “google family link” into the search box, too.

As before, removing search results linking to explicit material—or your personal contact info—doesn't actually take it off the web. Removal of the search info does limit how easily it's found, however. 🔌



Those living outside the U.S. won't be able to access the tool.



Norton's free AI-powered Genie tool helps you spot online scams

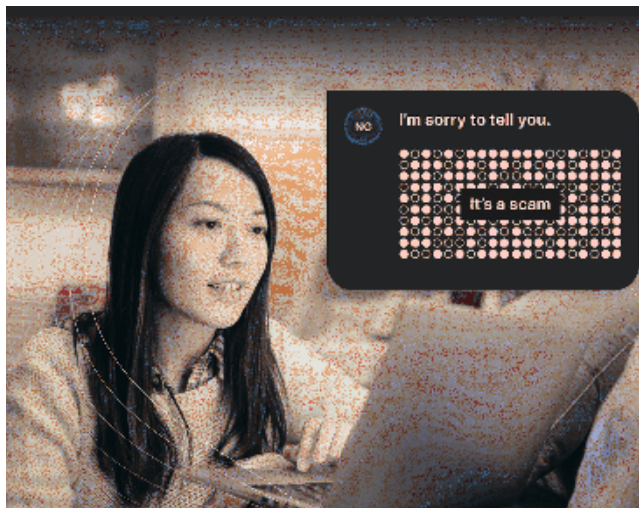
Not sure if the message, email, link or social media post you've received is a scam? The AI-powered Norton Genie is designed to help. **BY ANYRON COPEMAN**

These days, the sheer volume of scam attempts online makes it difficult to figure out what's genuine and what's not. Norton's AI-powered Genie tool is designed to help.

Norton says Genie uses artificial intelligence to analyze images and text, then tell you if it's likely to be a scam or not. If it thinks you're being scammed, you'll be offered advice on what to do next.

To get started, head to the web (fave.co/3si6bWQ on Chrome, Safari, Edge, or Firefox) or download the iOS app (fave.co/3scl5JK, version 14.0 or later), then upload a screenshot or paste text from a potential scam. This can be a message, email or link you've received, or a post on social media—the only requirement is that it's clear enough to read easily.

After a few seconds, Genie will come to a conclusion that Norton claims is based on



Genie will warn you if it detects a scam.

millions of scam messages and red flags it's already been trained on. But you may still get a "Not sure" result, as I did for an obvious-looking scam text that Google's messages app had identified as spam.

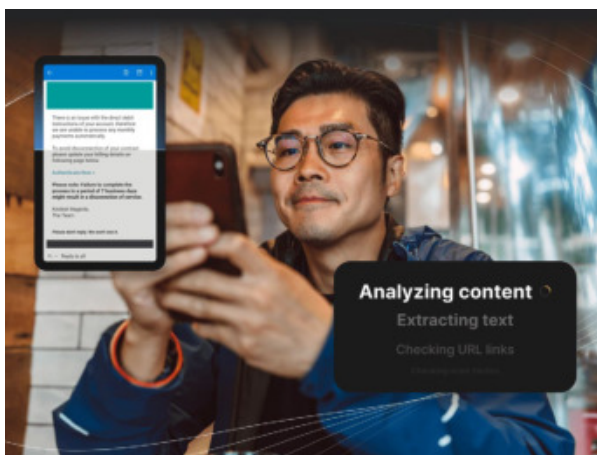
Norton has emphasized that Genie is in its early access phase, and it will continue to improve as more people use it.

But the need for a service like this is clear. According to Norton, the average Brit receives 10 scam attempts via email, text, or phone every week. And as of spring 2021, anti-phishing company Valimail estimated that around 3.4 billion phishing emails were received each day (fave.co/3qrxPJv).

Today's UK launch of Norton Genie follows its recent arrival in the US, Ireland, Australia, and New Zealand. The next stage of its development will include expansion into other countries, as well as an Android app—both of these are expected to arrive "later this year."

While Norton Genie draws on parent company Gen Digital's cybersecurity expertise, it's a completely free service that's

independent of other Norton software. That includes Norton 360 Deluxe (fave.co/30Bk59o), the best antivirus software you can buy (fave.co/3CnDHuk). 🔌



An iOS version of Norton Genie is also available.

Microsoft begins pulling the plug on Cortana

Cortana probably won't live for much longer. **BY MARK HACHMAN**

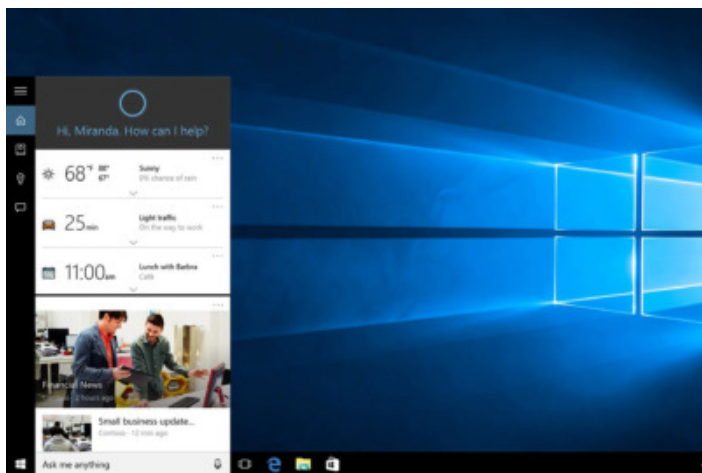


Microsoft has begun following through on its promise to kill off Cortana, the AI assistant that debuted in Windows 10.

Microsoft's recent Windows Insider build in the Dev channel turns off Cortana (fave.co/454ZExj), which only appears as an app within the Microsoft Store. If you apply an available update to the Cortana app, that will essentially turn it off: You'll receive a

message saying that Cortana has been deprecated—programmer speak for turning off a specific feature.

Microsoft had made its intentions clear earlier: In June, the company said that it would begin ending support for the Cortana app in August (fave.co/47xX0BM). That doesn't mean Cortana is entirely gone. Microsoft did say that Cortana will still be available within Outlook Mobile and various versions of



Microsoft's AI assistant debuted in Windows 10.

Teams, including Microsoft's conferencing solution, Teams Rooms.

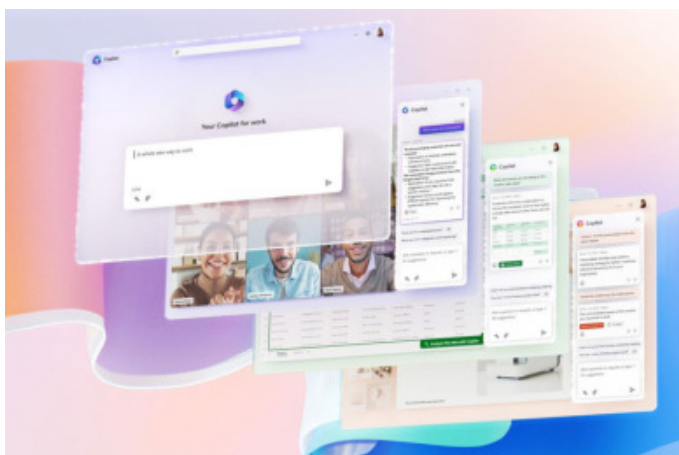
Instead, Microsoft appears to be backing Windows Copilot, which brings AI into Windows 11 (fave.co/3N0trzG) via a web interface to Bing Chat.

The problem is that while Cortana debuted in Windows 10 (fave.co/3qu3jG4) as an AI assistant that could author email, set reminders, and search the web, many of these features have yet to make it into Windows Copilot (fave.co/3saaN1k). Copilot, while it's a sophisticated search engine, can't really do

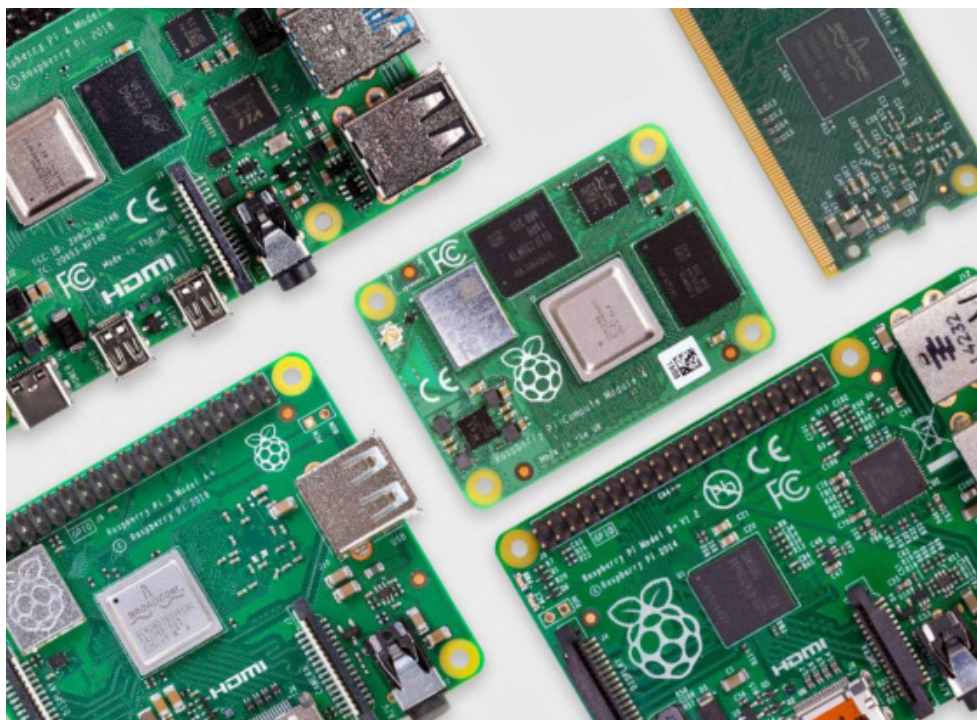
any more than the Cortana app can do right now.

Microsoft hasn't commented further on its decision to kill off Cortana, but it's likely testing the deprecation of the app in the Dev Channel to determine if its absence will provoke any additional bugs within your PC. The company still maintains a Cortana page,

including what you can do with Cortana on Windows. If the current deprecation process goes smoothly, however, expect Cortana to quietly fade away on the remaining user base of Windows PCs. 🔌



Many of Cortana's features have yet to make it into Windows Copilot.



Woohoo! You can get a Raspberry Pi again

Availability hasn't completely recovered, but it's looking much better already. **BY ALAIN YEE**

If you've been on the hunt for a Raspberry Pi in the last couple of years, you know just how hard it's been to get one.

Supply went down and prices shot up, and what used to be an affordable \$35 single-board computer became quite expensive. But earlier this year, the group that produces the Raspberry Pi said many more

would start hitting shelves by summer. And as promised, it appears that's finally happening.

For the first part of the year, output was relatively low—around 400,000 per month (fave.co/446fpmA), with most of them going to commercial buyers rather than tinkerers and enthusiasts. Then in June, the Raspberry Pi foundation announced that

number would double to 800,000 that month (fave.co/45cACfR), and then climb further to 1 million in July. This dramatic uptick in supply seems to be having an effect too, according to Ars Technica (fave.co/3YwfFtV): Availability appears to be returning to normal for some Pi models. In fact, a tracker for Raspberry Pi stock said that it's issuing fewer automated alerts (fave.co/44aeD8b) as of late.

Which boards are in stock will depend on your region—UK-based buyers seem to have more available to them, with retailers like UK-based Pimoroni doing away with quantity restrictions on 2GB and 4GB Raspberry Pi 4 and Pi Zero W boards at purchase. You can also pick up the 8GB RPi 4 through The Pi-Hut (fave.co/3KBAI8w). In the US, you can nab the 2GB Raspberry Pi 4

from Canakit (fave.co/3OAZCpT), the 4GB model from Sparkfun (fave.co/45KTCCf), and the 8GB board from Chicago Electronic Distributors (fave.co/3sdjF6r). Meanwhile, the Raspberry Pi Zero W can be picked up via PiShop.us (fave.co/47tmH6G), Sparkfun (fave.co/3DRLZ00), and Chicago Electronic Distributors (fave.co/45tHd5e). Fans of the newer Raspberry Pi Zero 2 W will have to keep waiting for now, unfortunately—that one remains widely out of stock.

The patchy availability of Raspberry Pi boards isn't the only lingering side effect of the pandemic—prices remain higher for the \$45 2GB RPi 4. You'll pay about \$10 per board compared to early 2020, when the 2GB dropped down to the \$35 price of the 1GB model. It's not too much of a markup—and it matches the original launch price (fave.co/3KEbkPy)—but it shows

that while nature is healing, it isn't completely done repairing itself yet.

But being able to get your hands on a Raspberry Pi 4 at a reasonable price is still exciting. Now we can all get back to making retro-gaming emulators (fave.co/47v1EAY), ultra-affordable PCs (fave.co/3OUvUgV), and other nifty projects (fave.co/3oi5JWD). 🔥

The screenshot shows the CanaKit website's product page for the Raspberry Pi 4 2GB. The page features a navigation bar with links to HOME, RASPBERRY PI, ARDUINO, EMBEDDED ELECTRONICS, KITS & MODULES, and PARTS & COMPONENTS. Below the navigation bar, there's a search bar and a breadcrumb trail: Catalog > Raspberry Pi > Boards. The main heading is 'Raspberry Pi 4 2GB'. Underneath, there's a section for 'Board Memory Size' with tabs for 1GB RAM, 2GB RAM (selected), 4GB RAM, and 8GB RAM. A large image of the Raspberry Pi 4 2GB board is shown on the left. On the right, there's a table listing four product bundles with their prices and 'Add to Cart' buttons.

Product Name	Price	Action
Pi 4 2GB Board Only PWA-20GB	\$45.00	Add to Cart
Pi 4 2GB Starter Kit - 32GB PWA-20GB-013C0F-CA-0001-1	\$109.95	Add to Cart
Pi 4 2GB Complete Starter Kit - 32GB PWA-20GB-013C0F-CA-0001-1	\$149.95	Add to Cart
Pi 4 2GB Extreme Kit - 128GB PWA-20GB-013C0F-CA-0001-1	\$154.95	Add to Cart

At the bottom of the page, there's a 'Raspberry Pi APPROVED RESALER' badge and a row of small images showing various electronic components.

Bundles are more widely available for RPi models, but they are a lot more expensive.



**WHEN IT COMES TO
MAKING PLANS
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TO PROTECT YOU AND
YOUR LOVED ONES FROM
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an emergency kit

✓ **Make**
a family
communications plan

Get started at ready.gov/plan

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MADDY TURNED HATE

Maddy Park
Founder,
@CafeMaddyCab

INTO HOPE

AND STARTED A MOVEMENT

In 2021, the rise of violence against the Asian community made even the simple act of taking public transportation unsafe. So, Maddy started a fund to pay for cab rides for those in the Asian community that needed it most, including women, the elderly, and the LGBTQ+ community. With over \$100,000 raised in just two days, she started a movement based on love that lives on today.

love
has
no
labels



Join Maddy's cause and get the tools
to support the Asian community now at
LoveHasNoLabels.com



Asus Zenbook 15 OLED (2023): Gorgeous, light, and packed with ports

There's a lot to like about this thin and light laptop. **BY THOMAS NEWTON**

The Asus Zenbook 15 OLED (UM3504) is a powerful laptop that's great for basic office and photo work, watching content, and even a spot of light gaming. While it doesn't have dedicated GPU, the USB4 port means that you can connect to an external GPU if you need extra grunt in that department. Asus says the 15-inch OLED display covers the entire sRGB and DCI-P3 color spaces, so for

budding creators looking to get started with content creation, this could be the one.

While it's not a budget laptop (fave.co/3KG8v0f), the Zenbook 15 OLED isn't priced exorbitantly either. But how does it stack up to the competition?

DESIGN & BUILD

Picking up the Zenbook 15 OLED for the first time, you'll notice how thin it both

looks and feels—thin frame, thin bezel, and thin keycaps.

You would expect a 15-inch laptop to be a bit unwieldy, but, at 3.1 pounds, the Zenbook 15 OLED is reasonably lightweight. There are less heavy ultrabooks out there—most of the Microsoft Surface Laptop 5 variants (fave.co/3DROYGy) are a touch lighter at around 2.86 pounds—but this doesn't feel like it's going to break your back carrying it between meetings.

It feels sturdy as well, with hardly any flex anywhere in the chassis. The display does wobble when you tilt it, which is the only thing that spoils the otherwise high-end look and feel.

While this shade of dark blue has been the norm for Asus Zenbooks for a while, in a sea of bland black and silver laptop conformity, it's refreshing to see something a bit different.

It follows on from the design reboot of last year's Zenbook 14 (UX3402) in that the Asus

"A" logo is etched into the back, but while the 180-degree hinge is slightly raised, the display isn't lifted off the desk as much as in previous models.

PORTS & CONNECTIVITY

Despite the super-slim dimensions, Asus has been able to pack in more than just a couple of ports here. There's an old-school Type-A USB 3.2 port, plus two Type-C USBs (one USB 3.2, one USB4) and an HDMI 2.1 port.

While you also get a 3.5mm audio jack, there's no dedicated port for the mains adapter, but both of those Type-C USBs support power delivery. In case you need to expand storage, there are plenty of docks and hubs, fave.co/30z4JBG (and cables, fave.co/3aLBOFj) out there, so you can put that USB4 port to good use.

Neither of the USB-C ports supports Thunderbolt 4 though, so keep that in mind if you're also looking to connect to Thunderbolt monitors or external GPUs.

A key point about the USB4 port is that it can, with an Ethernet adapter, support wired internet connections. For times when you're nowhere near a wired access point, you've got a Wi-Fi 6E unit sitting under the hood, allowing you to enjoy some of the fastest Wi-Fi speeds currently going.



Picking up the Zenbook 15 OLED for the first time, you'll notice how thin it both looks and feels.



Asus has managed to pack in more than just a couple of ports here.

Finally, the HDMI 2.1 port is a nice uptick from the HDMI 2.0b port in last year's Zenbook 14. It means you can connect to a monitor and play 4K video at 120fps or 8K video at 60fps.

KEYBOARD & TRACKPAD

The typing experience is impressive, with each letter key providing nice springy feedback and exhibiting travel of just under 2mm. It feels a lot deeper than you might expect, given the laptop's dimensions.

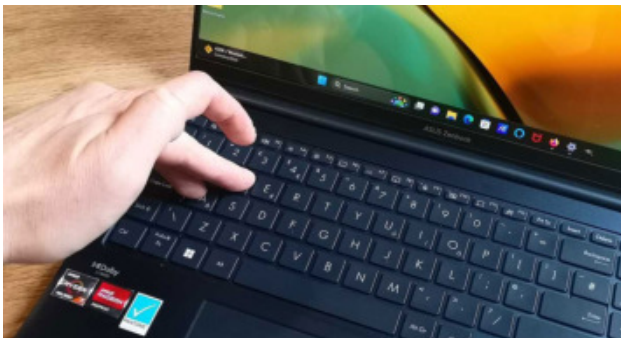
That said, the row of number keys requires a bit more

force to action than the letter keys do, making for a slightly inconsistent feel. The keycaps also feel a little thin, which could impact their effectiveness long term.

A number pad has been included, but whether this is a good thing or not is subjective. Generally, I don't like having number pads on laptop keyboards. I don't feel like they're a good use of space and they tend to feel cramped, as is the case here.

But I have larger hands, so it might not be an issue for some people. However, the

function keys at the very top are too small, to the extent that I would sometimes find myself accidentally raising the volume instead of dimming the brightness. I would also prefer it if



The typing experience is impressive, with each letter key providing nice springy feedback.



The trackpad is a decent size and very responsive.

navigation keys (home, page up, page down, end) weren't mapped onto the arrow keys, requiring you to hold the Fn key to action those commands. But this issue isn't unique to the Zenbook by any means.

The trackpad is a nice size (measuring 5.8in) and very responsive, allowing you to easily sweep through menus and execute precise gestures. Asus has done away with its ScreenPad here, a cool but confusing feature that saw a secondary display incorporated into the trackpad. This trackpad is just a trackpad.

DISPLAY & SPEAKERS

There are two display versions of the Asus Zenbook 15 available this year, one with an OLED screen and another with the more common IPS LCD panel.

The model I'm testing here is the OLED version, which has a resolution of 2880×1620. Asus calls this uncommon resolution 2.8K, but you might see displays with this resolution listed elsewhere as 3K.

We've promised peak brightness of 550 nits, full coverage of the standard RGB (sRGB) color space, and the DCI-P3 space. That, combined

with the rich contrast available from the OLED display, means websites, photos, games, and video content all look pretty fantastic. Testing with a colorimeter isn't quite as impressive. The max recorded brightness is just 376 nits—enough to comfortably work in most lighting conditions, but well short of Asus' claims.

An OLED screen means any black areas are essentially unlit pixels—things don't get



Websites, photos, games, and video content all look fantastic on the Asus display.

much darker than that. Recorded color temperatures were close to 6500 Kelvin—the color temperature that mimics natural daylight. At 25% and 50% brightness, the color temperature was 6600K, while at 75% and 100% brightness, it was 6500K.

DCI-P3 coverage hit 99% in testing, which isn't quite what was advertised but was very good nonetheless. It means that colors on websites and games look vibrant and rich, but are still brimming with detail.

Laptop speakers generally aren't worth writing home about, but the two Harman Kardon-certified ones here aren't bad. Bass and treble are both decent, while there's good separation on songs such as Radiohead's "The National Anthem," which has lots of layers to the sound.

However, both speakers are downward-firing, so your desktop will inevitably soak up a lot of that noise.

SPECS & PERFORMANCE

The Asus Zenbook 15 OLED models come with either the AMD Ryzen 5 7535U or AMD Ryzen 7 7735U processors, 16GB or 32GB of RAM, and 512GB or 1TB of storage. The version I was sent for testing featured the more powerful Ryzen 7 7735U chip, 16GB of RAM (15.2GB of which is



The Asus Zenbook 15 OLED fully opened.

usable), and a 512GB SSD (475GB of which is usable).

As expected, for daily computer use such as writing, emailing, and browsing the web, the Zenbook 15 OLED practically sailed through everything. It took just over two minutes (2:15) to open 500MB worth of photos in image editing tool GIMP, which is pretty speedy. Mundane tasks such as firing off emails to colleagues and contacts felt slightly decadent.

While the Zenbook 15 OLED is not a gaming laptop, I was pleased to be able to run an entire game of *Civ 6* on this (albeit on the lowest settings) without encountering any slowdown or crashes—not bad for a laptop without dedicated graphics. Then again, *Civ 6* isn't exactly a new game, so don't expect to be playing any recent titles with shading and texture settings cranked up.

Sadly, the fans have a tendency to kick in if you find yourself doing anything more advanced than browsing the web, and they're certainly not quiet. Luckily, there are plenty of great noise-cancelling headphones out there.

Compared with the Asus Zenbook 14X OLED, which uses an Intel Core i7-13700H processor, the Zenbook 15 OLED isn't as good when it comes to Geekbench 6—9469 versus 12024 on multi-core.

Looking at PC Mark 10, which simulates a range of real-world PC tasks, it's a different story, with the Zenbook 15 beating its counterpart. The Zenbook 15 OLED has the Microsoft Surface Laptop 5 beaten in this regard.

The Zenbook 15 OLED also fared better when running the 3DMark Night Raid graphics test, returning an average score of 22560—the Zenbook 14X OLED and Surface Laptop 5 scored 14151 and 16031, respectively.

For context, the Asus TUF Gaming A15 2023 (fave.co/3qo7Tpo), equipped with Nvidia GeForce RTX 3060 dedicated graphics, scored 47569 in the same test.

Battery life is average. Running a looped 720p video with the display at 120 nits brightness saw it last 10 hours and 3 minutes. Day to day, I could expect to get 8 to 10 hours off the battery doing simple office tasks and



For tasks such as writing, emailing, and browsing the web, the Zenbook 15 OLED sailed through everything.

having YouTube playing in the background. For simple PC tasks, that'll get you through fine, but for anything more demanding, forget about it.

After an hour of *Civ 6*, I was left with 41% in the tank. In other words, don't expect MacBook Air levels of battery longevity.

It charges back up quickly, or at least as quickly as most other laptops in this category do. Expect 30% from empty after half an hour, 65% after an hour, and 95% after two hours.

PRICE & AVAILABILITY

The Asus Zenbook 15 OLED is available to buy now in the US, UK, and many other countries around the world, although a full breakdown of which models were available in which markets isn't currently available. At the time of writing, it's not possible to buy the Zenbook 15 OLED directly from Asus in the UK or the Asus in the US.

Buyers in the US can snap up Zenbook 15 OLED with the Ryzen 7 processor, 1TB of storage and 32GB of RAM from Amazon for \$1,299.99 (fave.co/447rKXI). Microcenter has the same model on for \$1,299.99 (fave.co/3s3A3pU), as does Newegg, for a bit more at \$1,495.82 (fave.co/3QJ7997).

In the UK, AO has both the Ryzen 5 and Ryzen 7 versions of the Zenbook 15 OLED with 512GB storage and 16GB of RAM on for £929 (fave.co/3saqoxU) and £1029 (fave.co/3DYdA0I). Elsewhere, Scan is selling the Ryzen 7 512+16GB edition of the Zenbook 15 OLED for £1198.99 (fave.co/3qodDPZ).

While this is a premium device, there are certainly more expensive laptops (fave.co/3qL4oHf) out there.

BOTTOM LINE

The Asus Zenbook 15 OLED is fantastic in pretty much every way, with battery life the only real exception. Consider investing in a spare charger (fave.co/3s80YRA), just in case you leave your main one at home.

Think of this as a bigger version of the company's Zenbook 14X OLED, just with an AMD processor instead of an Intel one and USB4 rather than Thunderbolt 4 support. If any of those features are important to you, your decision between the two is made. It's a worthwhile alternative to the Surface Laptop 5, but the 15-inch MacBook Air might be more to your liking if you can do without Windows.

SPECS

Display: 15.6-inch 16:9 2.8K (2880×1620) 120Hz OLED/15.6-inch 16:9 Full HD (1920×1080) IPS LCD

Processor: AMD Ryzen 5 7535U 2.9GHz (6-core/12-thread, 12MB cache, up to 4.55 GHz max boost)/ Ryzen 7 7735U 2.7GHz (8-core/16-thread, 16MB cache, up to 4.75 GHz max boost) processor

Graphics: AMD Radeon graphics

Memory: 16, 32GB LPDDR5 6400 MHz

Storage: 512GB, 1TB SSD PCIe 4.0 x4

Ports: 2×Type-C USB with USB4, USB 3.2 (Gen 1), 1×Type-A USB 3.2 (Gen 1), HDMI 2.1, 3.5mm audio jack

Camera: 1080p webcam

Wireless: Wi-Fi 6E, Bluetooth 5.2

Battery: 67Whr

Operating system: Windows 11 Home

Dimensions: 354.8×226.6 x 14.9 mm

Weight: 1.4kg 

Asus Zenbook 15 OLED



PROS

- Lightweight and compact.
- Great OLED display.
- Lots of ports, including fast USB4.

CONS

- Mediocre battery life.
- Noisy fans.

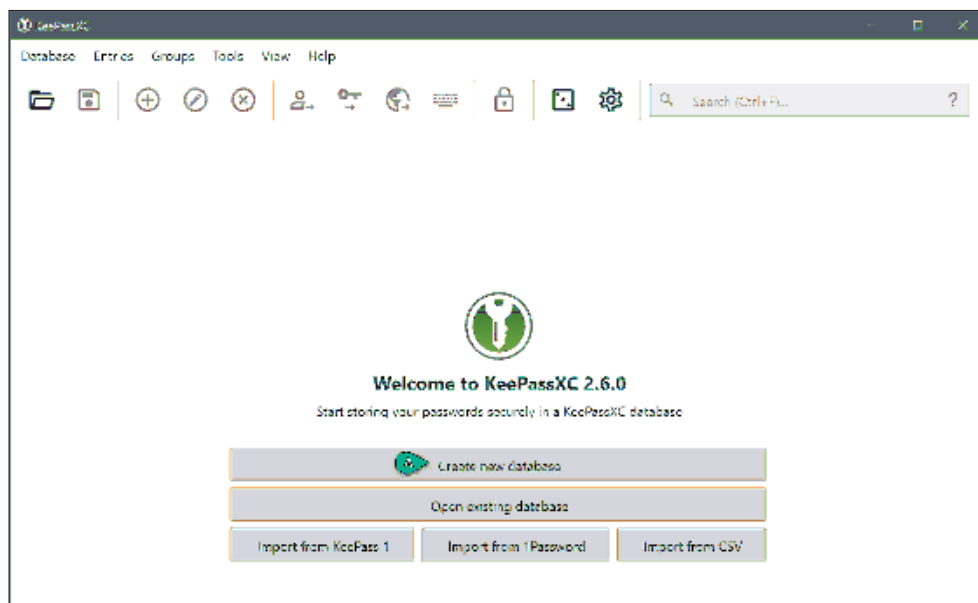
BOTTOM LINE

The Zenbook 15 OLED is a well-built, attractive laptop with decent performance, an excellent display and good connectivity. It's also reasonably priced, but you'll have to contend with underwhelming battery life.

\$1,299

KeePassXC: The friendlier free offline password manager

It's a heck of a lot easier to jump into than the official KeePass app. **BY ALAINA YEE**



Simplicity is an asset. It's what sells online password managers—they take the hassle out of managing dozens (if not hundreds) of unique, complex logins. You sign up, install a browser extension, and click a few buttons, and the service handles the rest. But online password managers require trusting a third-party with sensitive data. While most are worthy of such faith, it takes just one big slip-up (like LastPass's epic failure [fave.co/3XDTctq] to

strongly safeguard its servers and also to *fully encrypt all* customer data) to confirm everyone's worst fears.

An offline password manager is really the only way to fully control your logins...yet the most popular of them, KeePass (fave.co/47vrWCU), is not exactly simple. Learning its ins and outs can be a turnoff to all but the very patient, even if you're reasonably tech savvy.

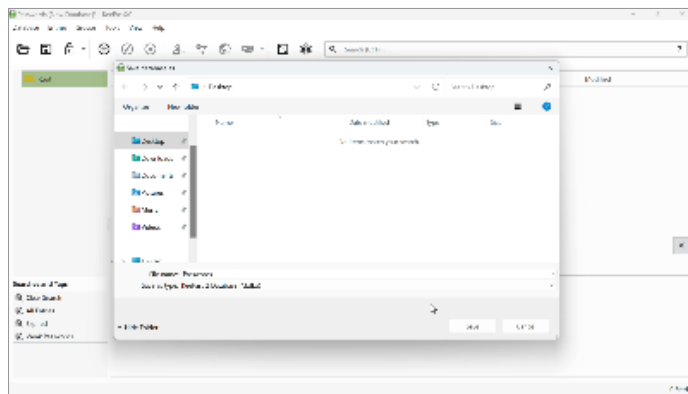
Fortunately, there's a streamlined alternative to the official KeePass app:

KeePassXC (fave.co/44bw7RB). It's also open source and free, but with its more modern interface, it's a far easier program to use. Basic features considered standard for password managers are baked into the software, unlike KeePass. You still need the stomach for maintaining and backing up your entire collection of passwords—no small responsibility—but you can be up and running with this app pretty quickly. And once you are, it's a great blend of secure password management with lower risk of a stolen password vault.

HOW IT WORKS

As an offline password manager, KeePassXC saves your login info in a database file. You can open these .kdbx files in any program capable of reading them (including mobile apps and version 2.x of the official KeePass app), as well as visa versa—it's the same principle as being able to open a .doc file in Word, LibreOffice, Google Docs, and so on. KeePassXC ships with built-in browser integration, too.

Database files can be saved anywhere you wish. You can keep them completely offline, choosing to make copies on every device you



You'll save your database files to your PC—which can be a local folder or one that's cloud-synced.

want access from. You can put them into the cloud and thus approximate the convenience of an online password manager. You can strike a middle ground and use a service like SyncThing (fave.co/3KBFI9) to keep copies of your database(s) synced across devices without using cloud storage.

But no matter how many databases you create and how you choose to store them, you're solely responsible for maintaining and backing up your files. You have no safety net. If you forget your master password, there's no recovery option. If your database file corrupts or is accidentally deleted, you've lost that data unless you made a backup. If you add a keyfile or hardware key as extra protection for your database, it's on you to always keep it on hand. This is the trade-off for having full control over all your login info.

THE BASICS

Opening the app for the first time drops you into a clean, uncluttered screen designed to get you started quickly. You can choose to create a new database, open an existing one, or import one from a CSV file, 1Password, or an older version of KeePass (1.x). The first two options are straightforward—even if you're not familiar with encryption settings, the app suggests defaults when creating a fresh database that should work well, especially if you're new to password managers. If you already know your stuff, it's easy to tweak things to your liking.

What can take longer is switching from a different password manager. You'll first export your vault to a file, then import that into KeePassXC. If your previous service has sloppy CSV exports, you'll have to burn time cleaning up the entries. You may also need

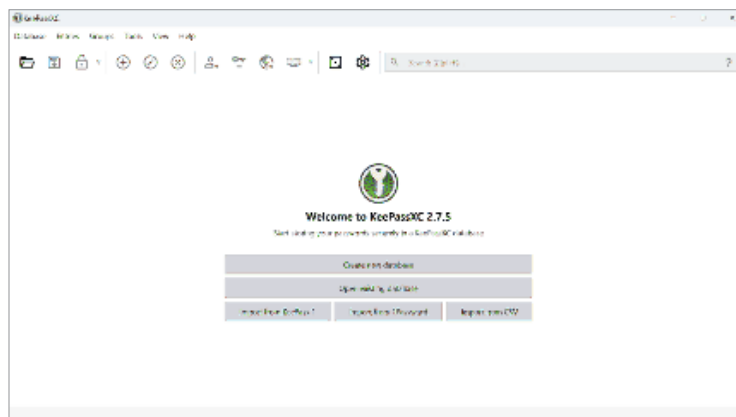
to spend time on cleanup if you import multiple files into KeePassXC, merge them into one database, and end up with some duplicate entries.

Tip: If you plan to export your existing password vault to a CSV file, use VeraCrypt (fave.co/3OAXUoL) to create an encrypted folder (what it calls a volume), and then save your CSV to that secure location. That way, your passwords remain protected at every step of the transition process.

Once you've set up your database (or databases—you can have more than one open at the same time), using it is easy to figure out. This is largely due to the pared-down number of options you have. KeePassXC does not support plugins, like the official KeePass app does. Instead, it gives you all the basic features you'd need from a password manager and leaves things at that.

Case in point:

You get just one kind of entry meant for logins. No other types like secure notes, credit cards, or identities are available. And when you fill out a password entry, there's just a handful of fields: user ID, password, URL, notes, and tags. You



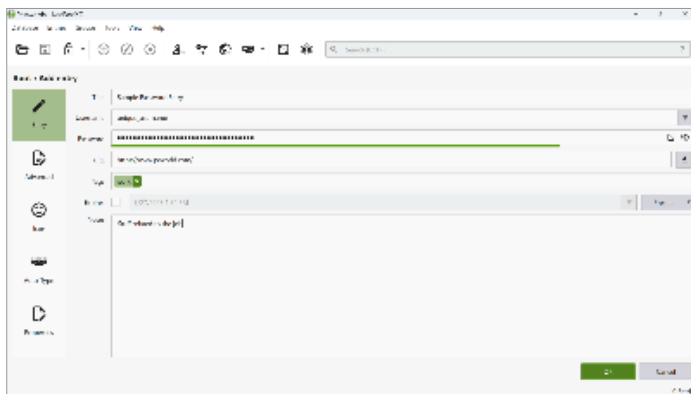
The startup screen when you first open KeePassXC will later show recent files after you open one—though you can turn that feature off if you like.

can set up two-factor authentication TOTP tokens as well, plus attach files or create custom attributes (text fields), but that's it. The fundamentals are covered, but you don't get more.

Those entries get stored in folders—either in the default “Root” directory, or in a subfolder you create—and you can only interact with them through the left navigation bar or the search feature. (The latter is much faster once you figure out how to use it efficiently; [fave.co/3OBHAE5](#).) Moving entries between folders requires dragging and dropping; you can’t also change the assigned folder within the entry itself.

Even the settings are fairly streamlined—though they’re split up so that you separately adjust them for applications and entries, you can’t really go too deep into the menus. You can also usually figure out through context what each setting is for, and whatever isn’t clear can be quickly looked up in the user guide (fave.co/47ukRT5) or answered through a fast online search.

One such thing I had to look up myself was auto-type—KeepPassXC's equivalent of auto-fill. It's very smooth, and it helps bypass



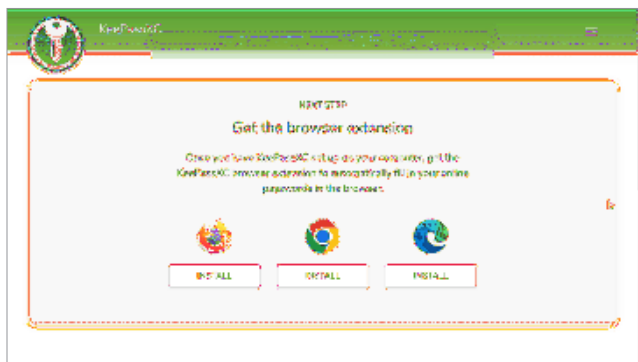
KeepPassXC's add-entry screen. There's just one type, and it doesn't offer many fields. You can further customize entries through the settings on the left of the screen.

the risk of copying passwords to your clipboard (which other apps on your PC can view) or using the browser extension (a practice that in general can expose a password database or vault to a little more risk). You load the website, click in one of the login fields, then switch to KeePassXC and choose the info you want to auto-type into the webpage. You can even create custom auto-type commands for individual entries, if their login page layout doesn't match the default auto-type options.

THE STUFF YOU'LL WANT TO TWEAK

By default, KeePassXC sticks to the most basic experience—and while that’s good enough, you can make the program even better if you dig into the settings.

For users who want an experience closer



KeePassXC natively supports browser extensions, but you'll have to first enable the feature for it to work.

to that of an online password manager, you'll need to flip on the built-on browser integration in the application settings. Installing the native KeePassXC browser extensions (fave.co/3s2unMT) won't work otherwise. You can limit it to specific browsers and even turn access to certain entries on or off in each one's settings.

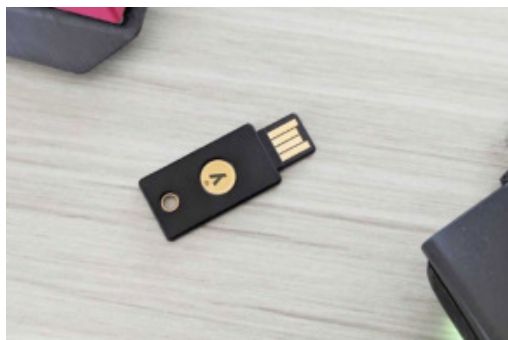
For folks who need to share their passwords with others, you'll want to set up KeeShare. It basically creates a separate database with passwords that get synced between you and other people, as well as your main database. It's how you can securely share your Netflix password with your household members. Any changes made to those shared entries will be seen by everyone with access.

For those who want stronger protection for their database files, you can add a keyfile or a hardware key to your

login process. (This can be done when first creating a database, or set up afterward.) A keyfile is a separate file that must be provided along with a password to unlock your database, while a hardware key must be physically inserted into your PC and detected by KeePassXC when you enter your password. It's not exactly two-factor

authentication (you can read why in this explanation [fave.co/3sclKOU] in KeePassXC's FAQ), but it does strengthen your password. It also can create a holy headache if you lose the keyfile or hardware key, or if you're dealing with mobile apps that don't have good support for hardware keys.

And for anyone who wants to access their database file (either via a local copy or



Adding a YubiKey to my database's password was a mild pain in the butt.

a cloud save) on mobile, you'll have to pick a third-party mobile app. Obviously, this isn't a setting to adjust—but because KeePassXC lacks a native mobile app, you'll have to do a little extra work to find a compatible Android or iOS app that you like.

Currently, the most popular options are KeePass2Android (fave.co/47zmMFM) or KeePassDX (fave.co/3KCfqYv) for Android, and Strongbox (fave.co/45ty5xz) or KeePassium (fave.co/47ymvmD) for iOS, but you may find your tastes don't run in those directions.

There are other smaller settings you may want to play with, too. For example, the database doesn't automatically lock after a period of inactivity—I changed that right away. I also decided to clear search queries after several minutes, and lengthen the automatic clearing of the clipboard from 10 seconds to 15. And you may want to keep your entries' usernames, passwords, and notes hidden from view. These details may seem small, but adjusting them and others to your exact liking can go a long way toward feeling comfortable using KeePassXC on a daily basis.



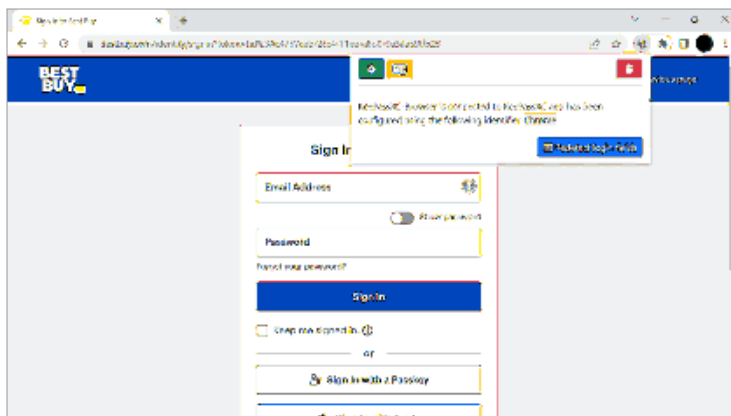
To access your database on a smartphone, you'll need to choose a third-party app to read your database file(s). KeePassXC does not offer native mobile apps.

WHAT'S MISSING COMPARED TO ONLINE SERVICES

As good as KeePassXC is as a self-contained password manager, its online competition still outdoes it in a few key areas.

Its biggest weakness: The browser extension is more of a way to autofill login info already in your database. It can capture and save new login info as you create it for a website, but it doesn't always recognize those situations. And when it does, the dialog banner often disappears incredibly fast—I had to be very fast on the draw to save my passwords.

KeePassXC also lacks features like password auditing, where it automatically checks if your passwords have been compromised in a data breach, as well as dark web monitoring. You're on your own on



The browser extension doesn't work as well as those for online services, but I found I didn't really need it.

this front.

Setting up a hardware key (like a Yubikey) is more complicated, too. For starters, you have to first configure it to work with KeePassXC. I also spent a lot more time troubleshooting mine than I expected—especially when I didn't initially realize that you have to start KeePassXC in Windows' administrator mode for it to recognize a hardware key. Add in the difficulties with the third-party mobile apps I tried, and I eventually just stripped it from my database to finish this review. If you use a strong, unique password at least 24 characters long, you should have enough protection, but I still wanted it to work anyway.

BOTTOM LINE

If you're fed up with online password managers, or you just have never trusted

them to begin with, KeePassXC is an excellent way to securely self-manage your passwords. You need far less elbow grease to get up and running (unlike with the official KeePass app), as most modern password-manager features are baked

in. It doesn't exactly replicate an online password manager, but it adequately covers the basics. Overall, its ease and flexibility of use make up for its shortcomings. 🔌

KeePassXC



PROS

- Full control over login data.
- Simple, straightforward interface.
- Native support for browser extensions.
- Free to use.

CONS

- Very basic browser extension functionality.
- Setting adjustments are necessary to get the most out of the app.

BOTTOM LINE

Whether you're fed up with online password managers or just mistrust them, KeePassXC is a great way to securely self-manage your passwords. It doesn't exactly replicate an online password manager, but that's kind of the point. Overall, it covers the basics, and its ease and flexibility of use make up for its shortcomings.

Free



Asus Chromebook CM34 Flip: 19 hours of battery life for \$499

It just keeps going and going. **BY ASHLEY BIANCUZZO**

It's no secret that I'm a big fan of Chromebooks. I adore their straightforward nature. I like the lack of fancy bells and whistles, which suits me just fine because I primarily use mine as a work machine.

Nowadays, Chromebooks come in just about every kind of variety, from gaming

machines to luxurious convertibles. Although convertible Chromebooks, aka 2-in-1s, aren't new to the tech world, there are a couple of real standouts. Asus' new Chromebook CM34 Flip is one such example.

The CM34 Flip is a good laptop for the everyday person. You'll find AMD hardware under the hood as well as a touch-enabled

display with skinny bezels, a 360-degree hinge, and phenomenal battery life. As far as features and functionalities go, this specific machine checks off a lot of boxes. Having used various Chromebooks for the last couple of years or so (I consider myself to be well versed in this category), I can confidently say that the CM34 Flip is well worth the money. Let's get into it.

SPECS AND FEATURES

Our review unit came equipped with an AMD R3-7320C CPU, AMD Radeon graphics, 16GB of RAM, and 128GB of PCIe SSD storage. It comes in the Ponder Blue color scheme, which is rather attractive. There's just one configuration, which is designed with everyday tasks in mind. Check out the bulleted list below for more information on the specs and features:



The subtle dark-blue color adds an air of sophistication.

CPU: AMD Ryzen 3 7320C

GPU: AMD Radeon graphics

Memory: 16GB

Storage: 128GB PCIe SSD

Display: 14-inch 1920×1200 touchscreen, 60Hz, 16:10, 300 nits

Ports: 2 USB 3.2 Gen 2 Type-C, 1 USB 3.2 Gen 2 Type-A, 1 HDMI 2.1, 1 3.5mm audio jack, 1 Kensington lock slot, 1 microSD card reader

Webcam: FHD 1920×1080

Weight: 4.07 lbs

Battery: 63 Wh

Wireless: Wi-Fi 6 (802.11ax) (Dual band) 2*2 + Bluetooth 5.3 wireless card

Price: \$499

DESIGN AND BUILD QUALITY

The dark-blue color scheme is definitely subtle, but that's not necessarily a bad thing.

There's an air of sophistication here. I know I wouldn't mind bringing this laptop to an important business meeting. It's not ugly, per se, but maybe it's just a touch on the boring side. We operate in a world of gray rectangular boxes, so I like seeing a nice pop of color every now and then, even if that color is somewhat understated. It's still a nice touch.

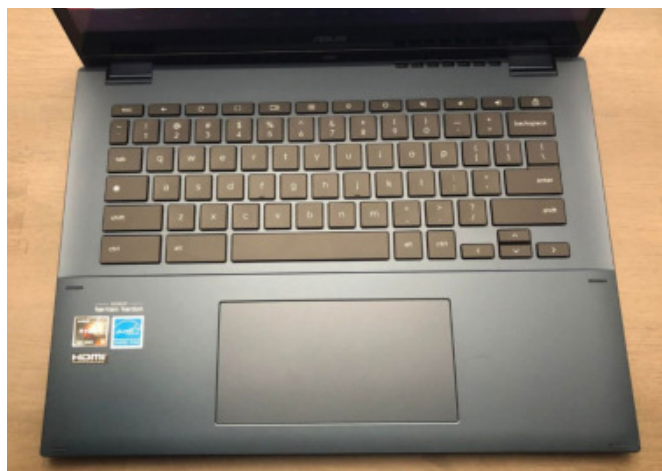
What surprised me was the weight of the machine. For a convertible laptop, it's pretty heavy. When I removed it from the box, I could feel all four pounds of it weighing down my arms. That's not what I was expecting. While I was disappointed in the general heaviness, it gets brownie points for durability, as it definitely feels well made. When I flipped the screen around 360 degrees,

the hinge holding the screen to the rest of the laptop was nice and tight. I didn't notice any creaking in the keyboard deck, either.

KEYBOARD AND TRACKPAD

Overall, the keyboard is nice to use. It's a full-size backlit keyboard that allows for 1.4mm of travel. I'm of the mind that if I use a keyboard long enough, I'll get accustomed to it regardless of whether it stinks or not. Fortunately, this keyboard is pretty good for a laptop keyboard. I like that it's full-size, which leaves a good amount of space between the keys, and the backlighting is nice for typing in low-light environments. It doesn't include a numpad, but that's a more common feature on gaming laptops.

The touchpad is phenomenal, however. It measures 5.55 inches and it sits right in the



The Asus' keyboard is pretty good for a laptop.

center of the keyboard deck. It registered my taps and swipes with ease. I could also zoom in and out in one smooth, seamless motion. If there were any misfires, they were few and far between. I found that I adapted to it right away.

DISPLAY, AUDIO

I really like the display's 16:10 aspect ratio as well as the ultra-slim bezels. You're getting a good amount of screen here. I found that it was super easy for me to scroll through a long article I was editing. It's also a good screen for watching Netflix, YouTube videos, and so on. When I watched the trailer for the new *Barbie* movie, the various shades of pink in Barbie's fantastically outrageous world were both vibrant and sharp. By the way, the display features a resolution of 1920×1080 and a

refresh rate of 60Hz. That's perfectly suitable for general-purpose use or office work.

My only gripe with the display is that it's super reflective in outside environments. I like to work from my deck on nice days, but it's almost impossible to do so with the Flip because it's so difficult to see the display under direct sunlight. In terms of brightness, it measures about 300 nits, which is fine for indoors, but outside is another story. That said, this isn't unusual for touchscreen laptops. If you don't typically use your laptop outside, then you probably won't ever encounter this problem.

I don't consider myself much of an audiophile, but even I can appreciate clear-sounding speakers. The Flip is outfitted with Harman Kardon-certified speakers, which

have a bit of a punch to them (that's a good thing). I'm a child of the '90s, so I've got a carefully curated playlist playing at all times. When I started playing music from The Cranberries, Dolores O'Riordan's (RIP) powerful vocals sounded crisp and full. I'd say the speakers are powerful enough to fill a medium-size room with sound.

WEBCAM

The 1080p webcam is a nice perk, that's for sure. With so many people working from home (hi!) these days, it just makes sense to equip laptops with 1080p webcams instead of the cheaper 720p fare. Frankly, I don't want to look grainy in videoconferencing calls. Overall, I was pleased with the quality of this webcam. Colors looked rich and warm,

and I didn't notice any blurring around my face. Background details were relatively clear, too.

CONNECTIVITY

The Flip has a nice selection of ports. You're getting one HDMI 2.1, two USB 3.2 Gen 2 Type-C, one USB 3.2 Gen 2 Type-A, one audio jack, one microSD card reader, and one Kensington lock slot. That's a good variety



You're getting a good amount of screen here.



The Flip has a decent selection of ports.

right there, so you don't really need to keep an adapter with you. This is good news for those times when you want to plug in an external mouse or monitor.

PERFORMANCE

The Flip is one of the first to include AMD's new line of Chromebook-specific CPUs. The AMD Ryzen 3 7320C CPU contains four cores and eight threads, which means it's capable of handling multiple tasks and applications at once. I didn't notice much slowdown when I was jumping from tab to tab within the browser. However, it's important to temper your expectations, as it's not the strongest performer out there. It's better than those systems with Snapdragon CPUs, sure, but it's not going to perform like the Acer Chromebook Spin 514 (fave.co/44cf3dU), which boasts an AMD Ryzen 5 5625C.

The Spin 514 has a CPU with six cores and 12 threads, which means it's more powerful in the processing department—the more cores, the better. However, the Spin is also more expensive due to that hardware. The Flip can handle everyday tasks just

fine, and if that's all you're looking for, it won't disappoint. Here's how the Asus Chromebook CM34 Flip performed in our browser-based benchmarks:

CrXPRT 2: 148

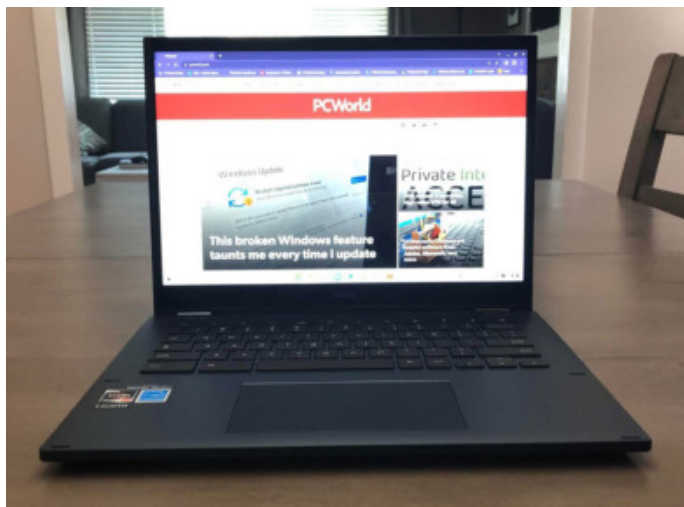
Speedometer: 73.7

Basemark Web 3.0: 725.03

Kraken: 716.7

Jetstream 2: 171.377

The Acer Chromebook Spin 514, for example, earned a score of 210 in our Speedometer benchmark, which measures the responsiveness of web applications. The Flip, on the other hand, scored just 73.7. If I had to guess, it's likely due to the Flip's CPU, which doesn't have as many cores or threads. In real-world use, I'm not sure you'd notice that much of a difference between the machines as far as performance goes, unless you intentionally run the Flip into the ground by overwhelming it with a bunch of open tabs



The Asus Chromebook CM34 Flip has a lot to offer at this price point.


and applications. It's not a powerful Windows machine, but then again it's not trying to be.

BATTERY LIFE

The Flip lasted a jaw-dropping 19 hours on a single charge, which is positively wild. In fact, I ended up running the benchmark twice because I was so surprised at the result and felt the need to verify it. Here at PCWorld, we run the CrXPRT 2 battery benchmark on a Chromebook, which cycles through various tasks until the laptop dies. The Flip's 60 watt-hour battery is a larger size, so I expected it to reach the 10-hour mark, but the final result exceeded my expectations. If you're on the hunt for a long-lasting everyday machine, you really can't get much better than this. Holy cow.

BOTTOM LINE

With its vibrant touchscreen, 2-in-1 form factor, and fantastic battery life, the Flip has a lot to offer at this price point. It's a good option for college students or those who just need an everyday machine. The touchpad is spacious and the 1080p webcam captures clear, colorful video. It's heavier than most convertible laptops, which may be a deal-

breaker for some folks. You may end up with a sore shoulder if you plan on lugging it around day after day. That said, if you don't mind the additional heft, it's a really good-value buy. 

Asus Chromebook CM34 Flip



PROS

- Spectacular battery life.
- Spacious touchpad.
- 1080p webcam.

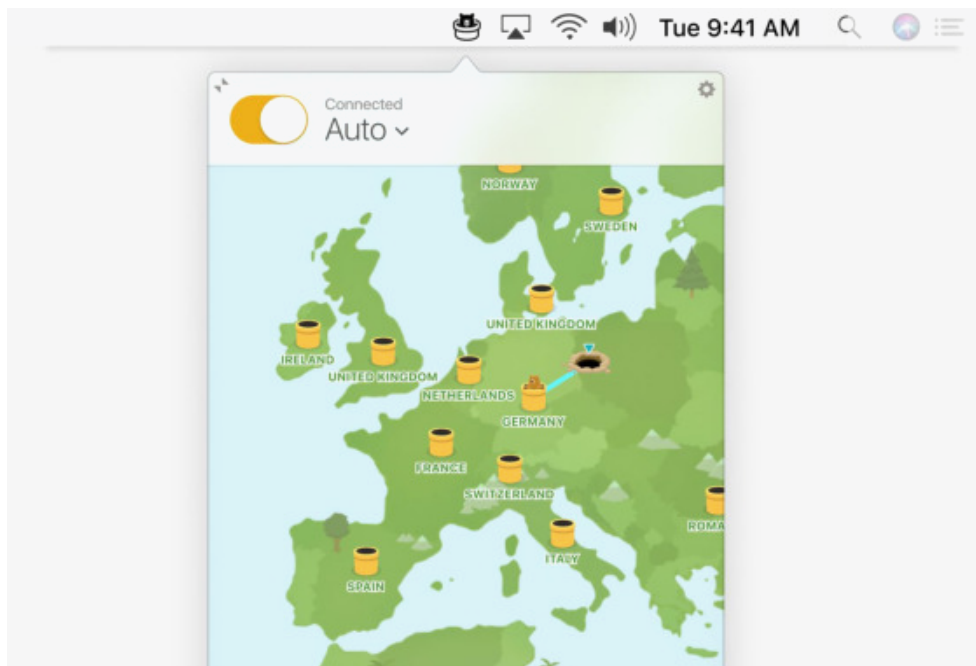
CONS

- Heavier than expected.
- Display is too reflective in outside environments.
- Middling performance.

BOTTOM LINE

From the long-lasting battery to the spacious touchpad and 2-in-1 form factor, the Asus Chromebook CM34 Flip is a fantastic laptop for the everyday person.

\$499



TunnelBear VPN: It's just right for beginners

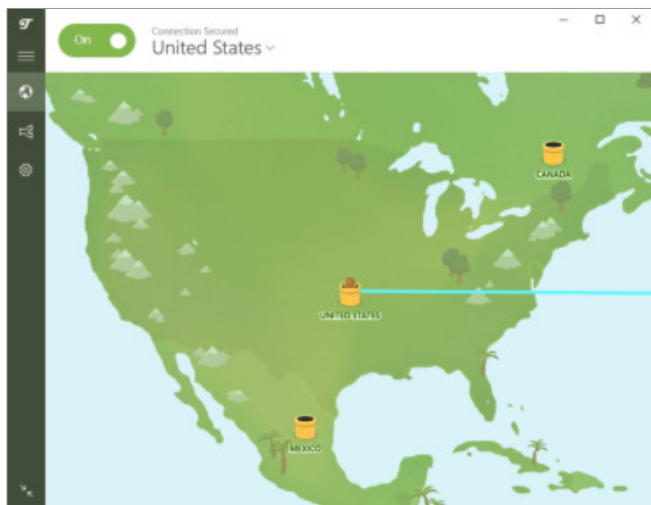
Come for the bear puns, stay for the security. **BY SAM SINGLETON**

TunnelBear (fave.co/3OuQDqm) is a popular VPN service owned by the McAfee security company and based in Toronto, Canada. It's been around for a while now and has always stood out due to its unique and kitschy bear-themed interface. The service has tried hard in recent years to add more features such as unlimited device connections in order to remain

relevant in an increasingly competitive VPN market. Certainly there are ursine puns aplenty to enjoy here, but is the VPN service just right for you? I took it for a walk in the woods to find out.

FEATURES AND SERVICES

When you first open TunnelBear, you can't help but notice how much work the designers



Your actual location is signified on the map with a sheep, but once you connect to the VPN it turns into a bear.

have put into it. The main interface is a world map geographically dotted with the available servers. As you scroll across the map, even the trees change based on the continent or region you're viewing (palm trees in the Middle East, umbrella thorns in Africa). Your actual location is signified on the map with a sheep, but once you connect to the VPN, it turns into a bear.

Each server location has an empty tunnel icon on it. To connect, just select the server icon you want. In addition to selecting the server from a map, there is also a drop-down list at the top with all of the servers as well. Somehow in the TunnelBear universe, sheep turning into bears and bears digging through tunnels makes sense, but the logic is lost on

us. Still, it's a fun and unique design element.

On the whole, TunnelBear is a simple service without a lot of frills, but it does provide some interesting key features worth checking out. Under Settings > Security, TunnelBear has its own version of a kill-switch feature called VigilantBear. It works a little differently than a normal kill switch in that instead of disconnecting your internet in the event of a VPN disconnection, it just blocks

all incoming and outgoing traffic until the connection is reestablished.

Additionally, TunnelBear offers a feature called GhostBear that makes your encrypted data less detectable. It does this by masking your VPN traffic and disguising it as HTTPS traffic, which censors are generally less likely to block. This can work well if you find that streaming services such as Netflix are blocking your connection. Turning on the GhostBear feature gives you a higher likelihood that your connection will be able to access these restrictive sites. Be warned, though, that using GhostBear will likely slow down your connection even further.

Another feature to note is SplitBear, TunnelBear's version of split tunneling, which

allows you to control which apps or websites have access to the VPN connection. Unfortunately, TunnelBear lacks many advanced features that competitors offer, such as multi-hop and dedicated servers specific to certain activities—streaming, torrenting, and so on. In the past, in fact, TunnelBear blocked access to P2P downloads, but it has since begun allowing them. Still, it is not something that it openly encourages with its service, and for that reason other VPN providers such as ProtonVPN (fave.co/3lwKVz5) and Mullvad VPN (fave.co/3Cywibv) are better suited for torrenting.

TunnelBear offers desktop programs and mobile apps for a number of systems, including Mac, Windows, Android, and iOS. There are also proxy browser extensions for

Chrome and Opera. And just recently TunnelBear has switched to allow for unlimited simultaneous device connections with its premium plans.

TunnelBear does offer a free service that comes with the full desktop app, but it has a 500MB-per-month data limit. It's a great way to test out the service to see if you like it, but the low data limit isn't likely enough for using it regularly—you won't even be able to stream an HD (1080p) video for more than 10 minutes or so.

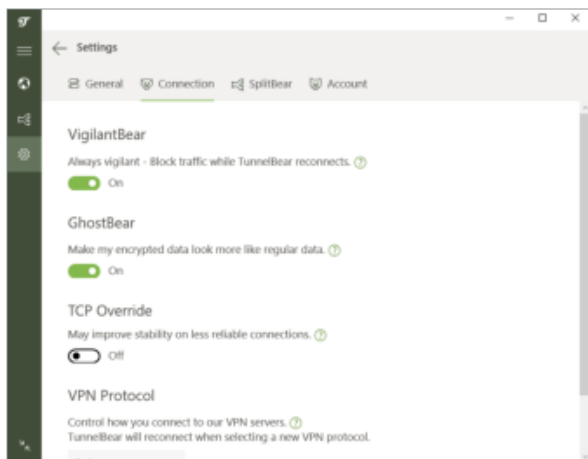
PERFORMANCE

During my testing, I rated speeds across TunnelBear's servers in five different countries all around the world, and then compared them to our baseline internet speed.

TunnelBear server speeds honestly weren't

great. Across all locations tested, the speeds averaged a mere 33 percent of the base download speed and a rather poor 20 percent of the base upload speed. Not only do these numbers not impress, but they fell way short of the services in our top five fastest VPNs (fave.co/3OWgSrf).

Still, online speeds can vary wildly in pure Mbps tests from day to day and even hour to hour. It's best to take any and all speed tests with a grain of salt. Your experience with TunnelBear may differ from



TunnelBear's settings include a VigilantBear kill switch and GhostBear features.

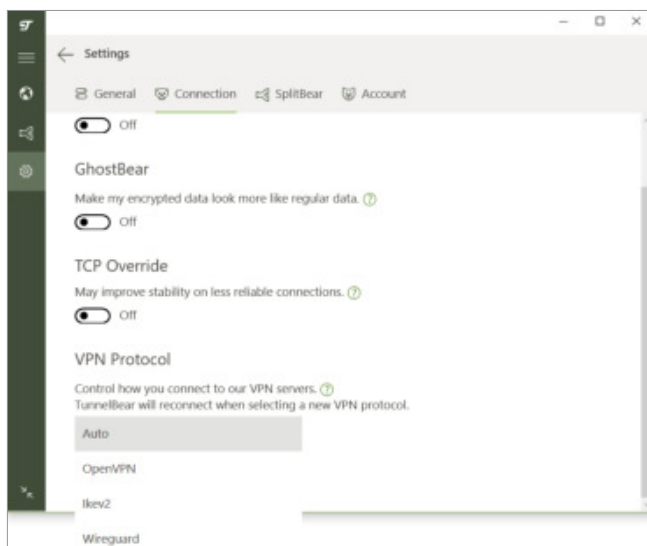
those we encountered in the tests for this review.

In regard to streaming, I did notice that TunnelBear wasn't able to consistently unblock sites such as Netflix and Amazon Prime. It was successful most of the time, but the odd server seemed to have trouble or was actively blocked.

When I turned on the GhostBear feature, that seemed to solve most of these unblocking issues.

Unfortunately, with GhostBear turned on, I noticed that my connection speeds plummeted and I wasn't able to stream HQ video because it was too slow. So GhostBear seems to work, but it wasn't really a viable solution.

Therefore, I personally wouldn't recommend TunnelBear as a reliable VPN for streaming. That doesn't mean you can't use it to stream, but I believe there are better options available such as NordVPN (fave.co/3wX9BwC), which works flawlessly with Netflix, or CyberGhost VPN (fave.co/3PidGnn), which has a ton of locations to choose from and optimized servers for streaming. (See our roundup of the best VPNs for streaming Netflix [fave.co/3KHEZaF] to learn more.)



TunnelBear's protocol options for its Windows app.

SECURITY AND PRIVACY

TunnelBear comes with your industry-standard AES-256 encryption, which is the strongest currently available and means you can rest assured your connection will be secure. The Windows app also supports WireGuard, IKEv2, and OpenVPN protocols. I prefer OpenVPN whenever possible as it's one of the most secure and flexible protocols available due to its open-source nature. But, if you're unsure, you can just select the Auto option in TunnelBear's settings, and the app will choose what it believes is the best protocol for your connection.

Also, to confirm that my actual IP address is obfuscated correctly, I used a DNS leak test (fave.co/44bvY0r). It confirmed that there

were no issues with accidental leaks of my IP address when my system was connected to TunnelBear's servers.

According to its privacy policy (fave.co/44e29w2), TunnelBear does not collect any DNS queries, IP addresses of users, time stamps, or other personal identifiable information. However, it does collect what it deems "operational data," such as user support and troubleshooting queries, total data used per month, and some sales data. It says none of this information can identify users and none is "related to the time and activity of VPN usage."

Additionally, upon sign-up, TunnelBear requires users to enter their email address and payment information. Payment options include credit cards, PayPal, and Bitcoin.

I was impressed with TunnelBear's comprehensive and forthright privacy policy. Not all VPN companies provide such detailed or thorough information about what data they specifically collect. Also, TunnelBear continues to conduct regular third-party audits by Cure53, a trustworthy and reliable Big Four auditing firm. It has successfully passed every audit for the last five years. That's impressive and a big selling point for privacy-conscious users.

TunnelBear's Toronto location means that all personal information is handled according to Canadian law. Canada does not currently have any mandatory data retention laws either.

BOTTOM LINE

TunnelBear is a VPN that sticks to the basics. It's an enjoyable service chock-full of bear puns that are fun and lighthearted. It's also extremely easy to use—it doesn't overwhelm with too many features or country options. And while it might be ideal for the average user, power users who like to tweak and optimize their VPN connections will feel that the service doesn't offer enough. The speeds are passable but not great—you might say they lumber a bit. Also, I did encounter some unfortunate issues with servers being unable to unblock streaming platforms—particularly Netflix. Overall, this approachable and cheerful service is a good option for users who are just getting started with VPNs or might not be the most tech-savvy. Otherwise, there are other services, such as those in our best VPNs (fave.co/3FtTMs), that might be better for more advanced users. 🔌

TunnelBear VPN



PROS

- Fun and easy-to-use interface.
- Reliable security features.

CONS

- Lacks some advanced features for power users.
- Customer support not the most helpful.

BOTTOM LINE

TunnelBear is an easy-to-use VPN that keeps things simple with basic but solid features. It offers reliable security but struggles with speed and unblocking issues. VPN novices might find its simplicity endearing, but advanced users will feel shortchanged.

\$59

Contour SliderMouse Pro: This mouse saves your hands

Unusual ergonomic mouse is here to save your hands. **BY MARTYN CASSERLY**



For those who suffer with repetitive stress injuries, arthritis, or general hand pain, ergonomic accessories can be a lifesaver. There are plenty of dedicated keyboards around, with split or angled keys, but most mice you see have weird shapes that alter how you hold and interact with the device. Contour has a different and novel approach.

Its SliderMouse Pro acts as a highly maneuverable bar across the top of a wrist-rest. So, does this method help or hinder? I put it to the test to find out.

DESIGN & BUILD

At first glance, you'd be forgiven for thinking that this is a pretty standard wrist rest. The SliderMouse Pro has a wide, curved surface



The real artistry is the row above the wrist rest which houses the 'mouse' mechanism.

for precisely that function, with just the top area giving away its actual purpose.

The rest area is covered in what looks like fabric, but once you touch it you realize it's a textured rubber top, which is also padded to make it comfortable when typing for long sessions.

There's an offset section along the upper edge of the rest area that's home to a scroll wheel, much like you'd find in the middle of a mouse (albeit much wider). This is surrounded by five programmable buttons that you can use to trigger typical mouse commands, and you can click the wheel itself to open a link in a new tab.

The real artistry is the row above the wrist rest, which houses the "mouse"

mechanism, not just another scroll wheel. Here you'll find the Sliderbar section, which can be slid vertically and horizontally to move the cursor as you would with a standard mouse. It contains a few horizontal lines to give some grip, and it all moves freely. There is a little noise that sounds like the material is slightly dragging on the

Sliderbar at times, but this doesn't translate into anything you can feel, nor does it affect the movement of the cursor.

A little button on the left side panel lets you adjust cursor sensitivity, and the setting is illustrated by a column of five lights just above the button. Connecting it to your computer is done in one of three ways: via



A little button on the left side panel lets you adjust the sensitivity of the cursor.

a wired connection, a USB dongle, or over Bluetooth.

A cable comes in the box (USB-C to USB-A), plus there is an included USB dongle and a converter that allows you to plug in a longer USB cable. Contour states that a fully charged battery will give you three months of normal use, so you won't need to bring the power lead with you if you're out and about.

The company also throws in a couple of adjustable plastic keyboard risers that you can put under your keyboard to lift it up. These are necessary, as the edge of the SliderMouse Pro sits quite high if you use a low-profile keyboard (such as the Apple keyboard). The risers work OK but don't feel that stable unless you find the perfect placement.

If you're using a taller keyboard, like a typical mechanical one, then the SliderMouse Pro actually sits at a good height already.



If you're using a taller keyboard, then the SliderMouse Pro sits at a good height already.

Contour offers the Slidermouse Pro in two colors, light gray and dark gray, and it also states that you can swap the covers out for others that attach by magnets, including a rather fetching wooden one. I have to admit I couldn't find the covers on the website, so they may be currently unavailable. This may have changed by the time you read this. If you don't want the large wrist-rest section, then there is the Slidermouse Pro Slim, which reduces the space taken up on the desk by getting rid of the flatter part of the rest. Alternatively, there's also the Slidermouse Pro Extended, which adds an extra section on the right side of the frame to give you even more room.

FEATURES & PERFORMANCE

One of the main advantages the SliderMouse Pro has for those with hand problems is that you don't have to position one hand off to the side as you would with a standard mouse. It

acts more like a laptop, with the controls directly beneath the keyboard.

The Sliderbar sits nicely under the thumbs and has very little friction, making it easy to manipulate. It does take a little while to get used to it, but once you've adjusted to the ergonomic design it's a nice way to control the

cursor. I'm left-handed, and I think it's better suited to right-handed people, as the offset position of the Sliderbar means that the right thumb has a lot more room to move.

The Sliderbar is also clickable, so you can make choices without moving your typing position. One thing you can't easily do with the bar is drag a page up or

down or do the same for list options. These are best handled via the scroll wheel instead. Again, this takes a bit of getting your head around, but due to the reachable location of the wheel it soon becomes second nature.

You can also avail yourself of the buttons around the wheel while you're there, giving you pretty much all the controls you'd get with a standard mouse. Downloading the accompanying drivers (for macOS or Windows) allows you to configure the buttons to do what you want, which is helpful. You do miss out on the gestures that you may be very attached to if you're a regular macOS user. This does take some adjustment, but there are key combinations that can achieve most of the quick navigation controls that you lose.

Having copy and paste on dedicated buttons is a nice shortcut that can reduce the



The SliderMouse Pro acts more like a laptop would, with the controls directly beneath the keyboard.

number of button presses you need to do, which again is beneficial for stopping hands from getting fatigued.

I did see some inconsistencies with the buttons, in that the copy-and-paste function worked happily in Microsoft Word but not Google Docs, so hopefully Contour will be able to fix this with an update. Otherwise, it's a really solid and impressive way of navigating your desktop.

PRICE & AVAILABILITY

As with most ergonomic accessories, the prices are higher than for a standard mass-produced model. Contour sells the SliderMouse Pro (wired) for \$259 (fave.co/45aoax4)/£274, while the wireless version bumps that to \$274 (fave.co/3s6XsGZ)/£289 (fave.co/3YHF1oD).

This is expensive when compared to ergonomic mice like the Logitech MX Vertical, fave.co/45a9tKn (\$99/£109.00) or the budget Anker 2.4G Ergonomic mouse, fave.co/45fdxjG (\$25/£30), but they still have the same problem of placing your hand and wrist to the side of the keyboard and requiring you to keep changing your position.

The SliderMouse Pro is a different category of device, bringing with it the cost of that exclusivity and comfort. See our chart of the best wireless keyboards for more options.

BOTTOM LINE

I have to admit I was a little sceptical of the design when I first saw it, but after only a few hours it began to really grow on me.

I've long suffered with arthritis and RSI, which means I haven't been able to use a regular mouse for over a decade. The SliderMouse Pro makes a comfortable change from trackpads, which can leave my hands aching after a while. The ergonomic layout, mixed with the responsive Sliderbar and multitude of buttons, allowed me to tailor the commands to those I use most, lessening the impact on my hands and joints that would normally occur.

You don't necessarily have to already suffer from pains in your hands to use the SliderMouse Pro, either. In fact, it might actually help prevent those conditions from ever appearing. Yes, it's a large amount to spend on a mouse, but if you use a computer

every day, then it could well pay for itself many times over if it keeps your hands and wrists healthy.


SPECS

- Multi-directional Sliderbar
- 10 levels (600 to 2,800 DPI) of sensitivity
- 5 levels of click resistance
- 6 programmable buttons
- Scroll wheel
- Curved wrist rest
- Wired or wireless connection

(depending on model)

- Driver app for customization features

(Windows and macOS)

- 3-month battery life
- 38.3 cm×16.5 cm×2.3 cm/15 in.×6.4 in.×0.9 in.
- 2 year guarantee 

Contour SliderMouse Pro



PROS

- Ergonomic design.
- Programmable buttons.
- Comfortable to use.

CONS

- Expensive.
- Takes up a lot of room on the desk.
- Some software inconsistencies.

BOTTOM LINE

If keeping your hands healthy or lessening the impact of conditions like RSI or arthritis are primary in your needs, the SliderMouse Pro is a very serious option to consider. Admittedly, it's expensive, but it could have the ability to save you a lot of pain, which, as anyone dealing with an injury will tell you, is worth every penny.

\$259

Best monitor arms 2023: The ultimate in flexibility

Free up valuable desk space. **BY MATTHEW S. SMITH**



A quality monitor arm is among the smartest upgrades you can purchase for your home office setup. Monitor arms greatly improve the range of positions a monitor can take on your desk, providing more comfort

and an attractive look. They also free up space on your desk, leaving it open for other use.

These perks are offset by a problem: the price. Most monitor arms worth buying are close to \$200, and heavy-duty arms are even more expensive. It's important to buy

the right monitor arm the first time—to that end I put several popular monitor arms through their paces. Here I offer the best monitor arms from my tests.

1. BEST MONITOR ARM: ERGOTRON LX

Price: \$269 from fave.co/47KU5Gn

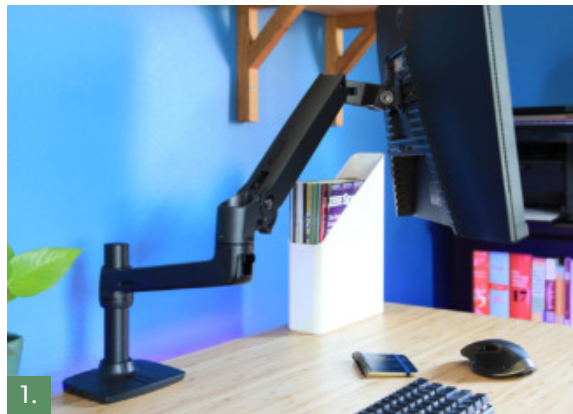
The Ergotron LX is a sturdy, practical monitor arm that can handle most monitors. It's easy to set up, easy to use, and (when purchased in its white or polished aluminum colorway) attractive.

Ergotron positions the LX as an entry-level monitor arm, but the company's definition of "entry level" exceeds that of most competitors. The arm is primarily constructed from metal, with some plastic cladding, and can support monitors that weigh up to 25 pounds. Ergotron recommends sticking to monitors 34 inches wide or smaller. The monitor arm is backed by a 10-year warranty.

The arm has a healthy range of adjustment that includes 13 inches of lift, 75 degrees of tilt, 360 degrees of rotation, and 360 degrees of pan (or swivel). While it was not as smooth as the Herman Miller Flo, I was able to adjust the monitor arm left, right, forward, and back without standing.

Setup is simple. The monitor has an included clamp and grommet mount. Installation is mostly handled with a bundled Allen wrench, though you'll still need a Philips head screwdriver to attach your monitor to the VESA mount. Most owners will be able to install smaller monitors (24 to 27 inches) alone, but help is recommended for larger displays.

Ergotron also avoids any serious flaws. I have a few nitpicks, sure. I think the clamp could be smaller. The white colorway doesn't have a color-coordinated VESA mount. And the arm's overall design looks a bit industrial. Still, this is a bomb-proof mount, and it's available for under \$200.



2. BEST UPSCALE MONITOR ARM: HERMAN MILLER FLO

Price: \$295 from fave.co/3QCPAaw

Want a monitor arm that gets the job done and looks good doing it? The Herman Miller Flo is for you.

The Flo's design sets it apart from the pack. Herman Miller ditches the angular, industrial

design of many competitors for a smooth, natural look. While clearly designed for a corporate office, it also fits in with a home office setup, where its friendly, approachable look helps it blend in with its surroundings. The Flo is backed by a 12-year warranty and offers 24/7 customer service.

It's easy to set up and use. The monitor's clamp works similarly to other monitor arms I tested, but it's more refined and requires fewer screws (a grommet is also available). The VESA mount is also excellent, providing a simple clip design that's secure and can be easily pre-mounted to a monitor for simple installation. The way this mount works accommodates monitors that have a slightly recessed mount position, which may cause problems for other monitor arms.

The monitor's range of adjustment isn't much different from those of other high-end monitor arms. It offers 13.3 inches of vertical adjustment, 80 degrees of tilt, and 360 degrees of swivel and rotation. That's essentially identical to the less expensive Ergotron LX. The Flo's operation is smoother, however: I found I could adjust a monitor's height with a mere nudge.

Surprisingly, the Flo has a listed weight limit of 20 pounds and recommends use



with monitors weighing at least 7 pounds. Most monitors fit within this range, but some heavier models won't be compatible with the Flo.

Herman Miller lists the Flo at \$295, which is a lot to ask for a single-monitor arm. The Ergotron LX offers similar features at a much lower price. However, the Flo is smoother and more appealing, and it's worth the upgrade if you want form with your function.

3. BEST HEAVY-DUTY MONITOR ARM: ERGOTRON HX

Price: \$355 from fave.co/3s71GOR

It's natural, given the only slight difference in name, to think the Ergotron HX is merely an uprated version of the Ergotron LX.

That's not the case. This is an entirely different monitor arm that pairs its greater capacity with improved build quality and a more professional look.

First, let's talk weight.

The Ergotron HX is rated to hold monitors that weigh up to 42 pounds and screen sizes up to 49 inches. That's an extraordinarily high weight limit—I haven't reviewed a single monitor in 2023 that exceeds it. I attached both a 32-inch widescreen and 38-inch ultrawide monitor, which weighed roughly 15 and 20 pounds, respectively, and the HX easily handled both.

The use of plastic is minimal and reserved for small portions of cladding that appear to be used only for cable routing. The arm's moving parts include larger, sturdier mechanisms, and felt extremely smooth in my use. Ergotron backs the arm with a 10-year warranty.

The range of adjustment is a bit limited compared to the LX's. The HX offers 11.5 inches of height, 75 degrees of tilt, 180 degrees of swivel, and 360 degrees of rotation. However, a somewhat more limited height adjustment is typical in this category due to the size of monitors these stands are expected to carry.

The monitor arm's impressive design also provides a more robust look. This could be a



con for some, however, as the arm can seem a bit...much in a home office setup. It's an expensive arm as well. Expect to pay about \$350. The Ergotron HX is an obvious choice if you want to mount an ultrawide, super-ultrawide, or large-format widescreen monitor on your desk.

4. BEST BUDGET MONITOR ARM: WORKSTREAM BY MONOPRICE

Price: \$28 from fave.co/3YDlc0C

The Workstream by Monoprice single monitor arm is a no-frills solution that delivers basic monitor arm features at an exceptionally low price.

The monitor arm has an all-metal construction that in some ways feels sturdier than the Ergotron LX's, as the Workstream doesn't include as much plastic cladding. It's

not entirely a win, though, as the plastic that exists feels frail (I even broke a small, though unnoticeable, bit while adjusting the monitor).

It provides a good range of adjustment, with 13.2 inches of height and 90 degrees of tilt, swivel, and rotation. The arm's height and tilt adjustment are comparable to others on this list, but it can't swivel in a full circle, which may prove annoying if you frequently move a monitor arm to share your screen with colleagues.

The Workstream's slim budget is felt in its difficult setup and stiff operation. Users will need to install several screws for a clamp or grommet mount. More screws may need to be adjusted once the arm is in place, as its default tension proved inadequate for supporting a 32-inch monitor.

Monoprice lists the monitor as capable of supporting 20 pounds, but I felt the 32-inch

monitor (which weighed 15 pounds) was pushing the Workstream to its limits.

Monoprice also skimps on the warranty, offering just one year of coverage.

These flaws are easily excused by the Workstream's \$60 price tag. It's clearly less capable, less attractive, and more difficult to use than Ergotron's LX, but it offers a good range of adjustment and durable construction for less than half the price. It's an ideal choice for shoppers on a tight budget, as well as those who plan to install a small, light 24-inch or 27-inch monitor.

5. BEST DUAL-MONITOR ARM: ERGOTRON LX DUAL MONITOR ARM

Price: \$405 from fave.co/3QyAnY6

Two monitors are always better than one, and the same goes for monitor arms. It's no

surprise, then, that Ergotron's LX Side-by-Side ranks as our best dual-monitor arm. The Ergotron LX Side-by-Side pairs two LX monitor arms together on one mount. The look, feel, and specifications of each arm is close to that of its standalone sibling.

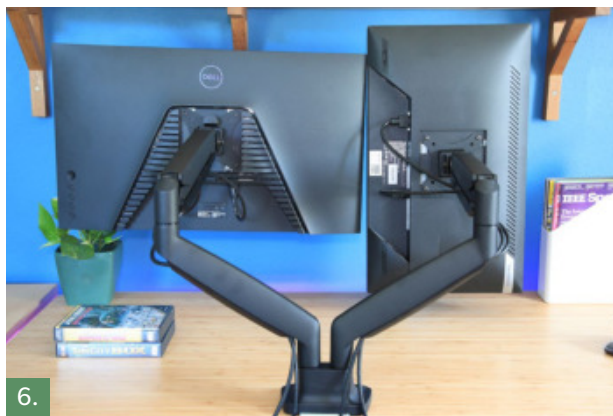
Monitor size is one exception: While the standard LX is rated for monitors up to 34 inches,



4.



the Side-by-Side's arm is only rated for monitors measuring up to 27 inches. The monitor arms aren't long enough to fit two 32-inch or 34-inch monitors side by side. Vertical arrangements are also supported, though only if one of the two monitors is small (less than 23 inches measured diagonally).



Look and feel is otherwise similar to the standard Ergotron LX, and that's why the dual monitor arm also earns a recommendation. The dual-monitor arm provides the same winning balance of build quality, adjustability, and smooth operation, and it's backed by the same 10-year warranty. Pricing is a bit higher at \$330, which is a slight savings compared to buying two LX arms individually.

6. BEST BUDGET DUAL-MONITOR ARM: WORKSTREAM BY MONOPRICE DUAL MONITOR ARM

Price: \$60 from fave.co/3YBNY2D

The same logic that applies to our favorite dual-monitor arm also holds for the budget model, giving Monoprice's Workstream Dual Monitor Arm a clear victory.

In fact, the dual arm's pricing is even more impressive. The Workstream Dual Monitor is four times less expensive than the Ergotron LX Side-by-Side. I'm a bit shocked by the quality Monoprice can offer at a \$100 price point. Ergotron's

alternative is more attractive and easier to use, but is it four times better? That's a tough call.

The Workstream's downsides are identical to those of a standard model. Build quality is impressive for the price, but the arm is difficult to set up and not as smooth in operation. I'm also doubtful the arm is capable of handling two 20-pound monitors, as its spec sheets claim. Fortunately, 27-inch monitors (the largest this arm can handle side by side) usually weigh less than 10 pounds, so weight capacity shouldn't be an issue.

WHAT TO LOOK FOR IN A MONITOR ARM

Purchasing a monitor arm is a bit different from purchasing most home office gear. A monitor arm, unlike a monitor, is a hefty, durable piece of equipment that never really goes obsolete. It must also support the specific functions you want out of the box, since upgrades and customization tend to be limited.

Adjustability and range of motion

The range of adjustability and motion a monitor arm can offer is a critical but often overlooked feature. A monitor arm should adjust for height, tilt, swivel, and pivot—and it should do so without tools.

All the monitor arms we recommend meet this standard, but some differences remain. Only some monitor arms provide 360 degrees of swivel, meaning you can rotate the neck of the monitor arm to any position.

That's handy if your desk is in the middle of your room since you can use the monitor from various positions.

Most inexpensive monitor arms ditch adjustability, sticking with simple tension mechanisms secured by a screw. It's an inexpensive approach but fixes the monitor's position in place once it's adjusted. We recommend avoiding such mounts.

Ease of installation and adjustment

None of the monitor arms tested was difficult to install, but the difference between budget and premium models was clear. Budget models require more screws to install, and the default tension of the arm's adjustment mechanism is less likely to be suitable out of the box.

The ease of adjustment varies greatly, too. All the monitor arms we surveyed require an Allen wrench to adjust tension (which is necessary if the arm seems too stiff or loose), but some were much more difficult than others. The Herman Miller Flo felt smooth and effortless, while the Workstream by Monoprice required serious torque.

Cable management

Proper cable management is important if you value a clean, clutter-free desk.

This is one aspect of design that didn't improve with pricing. The Herman Miller Flo's cable management was basic, while the Workstream by Monoprice hid cables well.

This did come with a trade-off, though, as the Flo's seemed least likely to cause cables to bind while moving the monitor.

While cable management is useful, none of the monitor arms I tested can handle the full complement of cables that might be attached to a high-end USB-C monitor (like the Dell U3223QE). This is an aspect of monitor arm design that manufacturers could improve.

Maximum supported size and weight

It's important to buy a monitor arm that can handle the monitor you own.

This won't be a major concern if you own a 24-inch or 27-inch monitor, as most such monitors weigh 10 pounds or less. With that

said, it's wise to double-check the monitor's weight before buying a monitor arm.


Remember that the monitor's weight can exclude its stand. Larger 32-inch, 34-inch, and 49-inch monitors are more difficult to handle and may require an upgrade to a heavy-duty monitor arm.

Monitor size limits should be respected as well. It might be possible to attach a 40-inch monitor to an arm that's meant for a 32-inch monitor. The 40-inch monitor may even come within the arm's weight limit. A larger monitor will distribute weight differently, however, which could cause an arm's tension mechanism to fail.



We personally tested each monitor arm reviewed here.

HOW WE TEST MONITOR ARMS

Every monitor arm we recommend was personally tested firsthand at a PC World contributor's home or the PC World office. We examine the quality, ease of installation, and range of adjustment of each arm to verify it meets the manufacturer's claims. The monitors we use to test arms can vary over time, but generally include at least one 27-inch and one 32-inch widescreen monitor. Monitor arms rated for heavy-duty use were tested with at least one monitor that weighs 20 pounds or more. 

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5 COMPARISONS TO WIN LAPTOPS OF A M

MACBOOKS ARE POWERFUL
ALSO TRUE OF MANY
AND THEY HAVE COMPARISONS
MACBOOKS

BY TH



IMPELLING REASONS TO BUY A WINDOWS LAPTOP INSTEAD OF A MACBOOK

POWERFUL AND CHIC. THAT'S WHY MANY BUY WINDOWS NOTEBOOKS—OTHER ADVANTAGES THAT SOME PEOPLE CAN'T COUNT ON.

BY THOMAS RAU



MacBooks and Windows laptops used to have more in common than they do today: An Intel processor was at the heart of both mobile systems. Since November 2020, Apple has equipped its laptops with its own system-on-a-chip—the M1, which was followed by the M2 about a year ago.

This made the differences that have always existed between MacBooks and Windows notebooks even more obvious. But each platform has certain advantages and disadvantages that can be decisive for a

purchase decision. Here we present the most important reasons why you should prefer a Windows laptop, while our friends at Macworld have a companion list of the reasons you might want a Mac (fave.co/3OW2JdB).

1. HUGE RANGE OF SOFTWARE FOR WINDOWS LAPTOPS

You can really do everything with a Windows laptop: Because there is suitable software for every purpose—from productive programs for work, study, and school to creative applications in the multimedia field; from

robust databases to smart mini tools with few functions.

Thanks to this large selection, you can choose among several alternatives within each software category. Take Office programs, for example: You can go for Microsoft 365 (fave.co/3qvi4IL), but also try Libre Office, Open Office, Softmaker Office, and other programs with similar functions. (We've got a roundup of the best free Office suites available; fave.co/3KxJjxG.)

The same applies to security tools (fave.co/3CnDHuk) and actually every other software area. Last but



Gamers should definitely go for a Windows laptop.



Windows fans have a wide selection of laptops to choose from.

not least, most programs that are central to MacBooks, such as Adobe software (fave.co/3QGSivO) for multimedia editing, are also available for Windows notebooks.

That's why you're not locked into one software source with a Windows notebook: Microsoft may like to direct you to its own store in Windows, but you can also download and install programs directly from software manufacturers that run smoothly on a Windows laptop. In addition, there is a huge range of free Windows programs (fave.co/3J9elFk) based on open source or as freeware.

Gamers in particular should definitely go for a Windows notebook: Those who have higher demands than browser games will get a wide selection of current games from the most diverse categories there.

2. LARGE SELECTION OF DIFFERENT MODELS

Apple's MacBooks cover the most important display sizes from 13 to 16 inches and performance classes, but there is always only one model series for one area of use. With Windows laptops, on the other hand, you can choose from a wide range of suppliers and notebooks—whether you're looking for an ultra-mobile lightweight for traveling or need a large screen and high performance for photo and video editing. So you can find the device that perfectly suits your needs without having to compromise.

Because of this wide range, there are also Windows notebooks for which no MacBook alternative exists—because they are lighter, smaller, or larger, for example: The Microsoft Surface Pro 8 (fave.co/

[31UYIG9](#)), for example, weighs less than 2 pounds, and the Dell XPS 13 ([fave.co/3TPKp5F](#)) and the Lenovo Thinkpad X1 Carbon ([fave.co/3jidbtE](#)) each weigh less than 2.75 pounds. This means they all undercut the MacBook Air in terms of weight.

Size is not a problem either: If you need a lush screen, go for a Windows notebook with a 17- or 18-inch display. Creative workers who work intensively with photos and videos will find optimal models with class-leading display technology, such as the MSI Titan GT77 HX 13V ([fave.co/39LsbRb](#)) with a Mini-LED screen, or the spacious 4K Dell XPS 17 ([fave.co/3YFeNDq](#)).

Apple undisputedly sets design trends with the MacBooks that other manufacturers follow, but Windows PCs can also go the extra mile in their designs. Take, for example, the Asus Zenbook Pro 14 Duo ([fave.co/44dKQLM](#)), which combines two touchscreens in one case. Indeed, there are no Apple notebooks with even a single touch-enabled display, to say nothing of convertible and 2-in-1 form factors, such as



Windows laptops, such as the Acer Aspire Vero 14 (pictured), are a lot more affordable than Apple's MacBooks.

the Lenovo Yoga 9i ([fave.co/3OEzL0f](#)). If you want to operate an Apple mobile device with your finger, you have to reach for the iPhone ([fave.co/3sdY4uy](#)) or iPad ([fave.co/3KHRrqX](#)).

With Windows laptops there is a large selection of devices with touchscreens ([fave.co/3OBKlp4](#)) that you can control flexibly with a tap of your finger on the display as well as via the touchpad and keyboard.

Most touchscreen laptops are convertibles: With them, the screen can be folded onto the keyboard via a 360-degree hinge, so that you hold a tablet in your hands, which you then operate as usual via the touchscreen. These devices also support pen input for writing, drawing, and painting, so

you get the functions of a notebook and tablet in one device.

And, of course, Apple completely ignores one huge target group: gamers. They absolutely need a Windows laptop: Only here can you get a powerful GPU—usually from Nvidia—that can display current games in complete graphic splendor. Here, too, they benefit from a huge range of models with different features and in different price ranges. (See our roundup of the best gaming laptops to learn more; fave.co/3n3aNKv.)

3. WINDOWS NOTEBOOKS ARE CHEAPER

The large selection of Windows notebooks has another advantage: You are guaranteed to find a Windows laptop that is significantly cheaper than a MacBook or offers better features at a similar price.

The cheapest MacBook Air—as of August 2023—is currently available starting at \$999 (and features the last-gen M1 CPU). But you can easily find a Windows notebook, such as the Acer Aspire Vero 14 (fave.co/3QHcOMF), for \$100 less that features more CPU cores, more memory, and a bigger SSD. Even creative professionals who

have to spend a lot of money for top performance can save at least a little with a Windows notebook.

4. WINDOWS NOTEBOOKS ARE EASIER TO UPGRADE AND REPAIR

Windows notebooks are not only cheaper to buy, but also in the long term: Most models are easy to upgrade and repair. For example, you can easily install a larger SSD if you run out of storage space, upgrade to additional, faster RAM if performance drops, or replace the Wi-Fi module if the wireless connection fails. This allows you to use your Windows notebook longer, and you don't necessarily have to buy a new device.

With almost all Windows notebooks, the SSD can be exchanged and replaced (fave.co/2Z26gQg) with a larger one, as current



You can't upgrade a MacBook's RAM or SSD.

laptops use the standardized M.2 slot for this purpose. Larger laptops in particular offer a second M.2 slot for an additional SSD. With many models it is just as easy to change the RAM by removing the SO-DIMM bars and inserting new ones.

Only in flat ultrabooks is the LPDDR RAM often soldered directly onto the board. The Wi-Fi module is also often replaceable because, like the SSD, it sits in an M.2 slot.

In current Macbooks, however, the RAM and SSD are soldered to the circuit board and cannot be exchanged and replaced by the user with larger and faster memory. Replacing the battery is also complicated. No wonder repair experts like [ifixit.com](https://www.ifixit.com) criticize MacBooks for this.

Tuning enthusiasts also have an easier time with a Windows notebook: gaming notebooks are equipped with additional tools and UEFI functions for overclocking, which can be used to get more performance out of them.

5. WITH A WINDOWS NOTEBOOK YOU NEED FEWER ADAPTERS—OR NONE AT ALL


Admittedly, this advantage of Windows laptops over MacBooks is narrow: Both now rely mainly on the flexible Type-C port with Thunderbolt to connect peripherals.



You'll find a wider selection of connectivity options on Windows laptops.

To connect multiple devices via one cable, such as USB storage and monitors, you definitely need a suitable docking station. Many flat ultrabooks, like the MacBook Air, have no ports other than an audio jack in addition to Type-C. On larger and more powerful notebooks, you will also find HDMI and a card reader—this applies to Windows models as well as the MacBook Pro.

However, most Windows notebooks still offer at least one USB type A socket: This is surprisingly helpful in everyday life because you can quickly connect a stick or an external hard drive (fave.co/3n5NIMC) without having to look for an adapter.

Gaming notebooks also almost always have an Ethernet port with Gigabit or 2.5Gbit speed—the best option for a fast and stable network connection. Business users looking for a notebook with a built-in LTE or 5G module or companies that want to secure device access via smart card also need a Windows notebook. 



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WI-FI 7

A DEEP DIVE INTO THE BLISTERING NEW WIRELESS STANDARD

WI-FI 7 IS NOW BEING LAUNCHED, AND THE NEW WI-FI STANDARD IMPROVES THE SPEED AND STABILITY OF RADIO TRANSMISSION WITH NUMEROUS INNOVATIONS. **BY THOMAS RAU**



A Wi-Fi standard is like a blueprint for technology companies. It defines the specifications according to which Wi-Fi routers and networking gear transmit wireless data to PCs, smartphones, and more. Each standard intends to achieve two goals: faster Wi-Fi speeds for every connected device and a smooth connection to as many devices as possible.

The new **Wi-Fi 7** (with an official name of **802.11be Extremely High Throughput**) aims to achieve this by building on the groundwork of the last two Wi-Fi standards and extending them. From Wi-Fi 6, it borrows functions such as OFDM (Orthogonal Frequency-Division Multiplexing) and BSS Coloring, which ensure that even in very large networks every device can transmit data without delay. Wi-Fi 6E (fave.co/47waZYV) also contributes the 6 GHz transmission frequency, which enables Wi-Fi WLAN speeds.

The advantages of Wi-Fi 7 are already wooing device manufacturers; many companies are offering Wi-Fi 7 devices on the

market now. Some, such as AVM in Germany, are even skipping Wi-Fi 6E and immediately opting for Wi-Fi 7 in new products.

We explain the advantages of the new Wi-Fi 7 standard, present the first devices, and say for whom and when the switch to 802.11be will prove worthwhile.

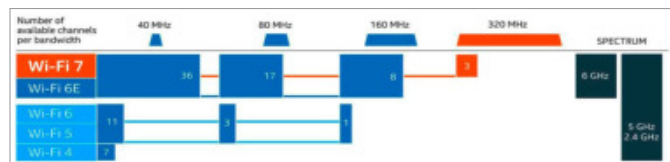
THE ADVANTAGES OF WI-FI 7

The IEEE standardization body has been working on Wi-Fi 7 since 2019. The new standard is scheduled to be ready in May 2024, but manufacturers of Wi-Fi chips and the routers, repeaters, and modules equipped with them aren't waiting for the official release. The first Wi-Fi 7 products are based on a highly developed preliminary version of Wi-Fi 7, and the manufacturers will deliver details that are still changing via later firmware updates.

Wi-Fi 7 is compatible with the predecessor standards, so you can be sure that all existing devices in your home network will connect to a new router. In many cases, it

also provides faster speeds for Wi-Fi connections than Wi-Fi 6 or Wi-Fi 5 because it uses better antennas or more powerful hardware than your current router.

Every new Wi-Fi standard promises **faster**



Wi-Fi 7 increases the bandwidth for Wi-Fi transmissions: Like Wi-Fi 6E, the standard supports the frequency of 6 GHz but can use 320 MHz channels above it.

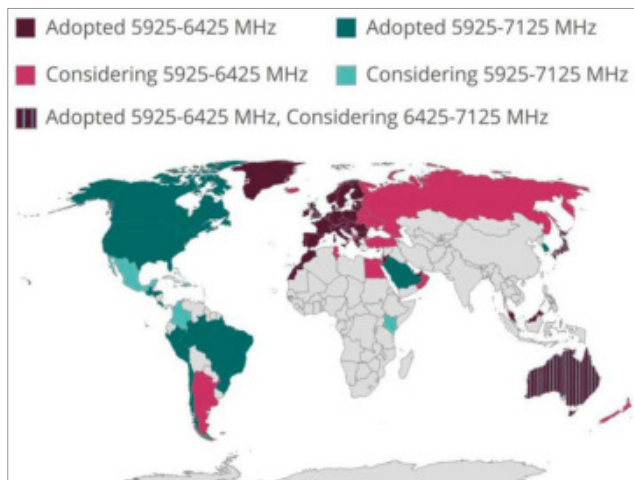
data transfers and more stable connections: These improvements seem more urgent than ever because even in private homes, more and more devices rely on a powerful wireless network—not only mobile ones like smartphones and notebooks, but also PCs and peripherals as well as devices for smart homes, TVs, and audio systems.

And all those connected devices need ever greater bandwidth for current and future applications; to be able to use an internet connection with gigabit speed or more without breaking, for example, or for uninterrupted video calls in the home office and the wireless connection of AR and VR glasses. Fast, low-latency Wi-Fi also enhances cloud gaming or virtual collaboration on large files in real time.

To achieve all this, Wi-Fi 7 offers a comprehensive set of tools: wider radio channels and more and faster MIMO streams, as well as numerous features that ensure that many devices can transmit simultaneously without interfering with each other.

MORE SPACE: 6 GHZ WITH 320 MHZ CHANNELS

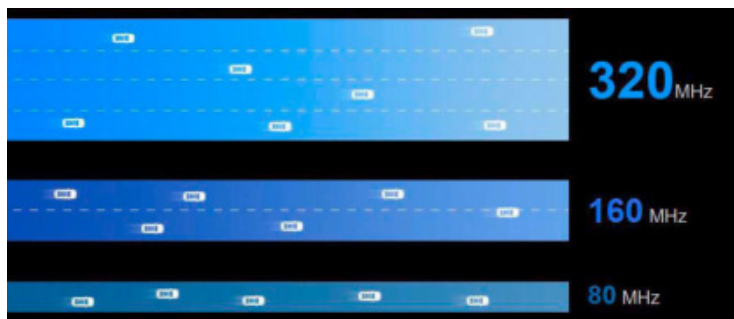
As with Wi-Fi 6E, Wi-Fi 7 allows devices to use a third frequency for wireless transmission: In



Many countries (the ones marked dark green) have released a large amount of spectrum in the 6 GHz band. In Europe (the ones marked dark purple), there is less space and there are fewer radio channels.

addition to 2.4 GHz and 5 GHz frequencies, they also operate at 6 GHz. Since only a few Wi-Fi products have been designed for this frequency so far, a **6 GHz** connection usually runs without interference and thus faster.

Wi-Fi 7 accelerates the 6 GHz frequency by allowing radio channels with **320 MHz** over this frequency—twice as wide as the 160 **MHz** channels over 5 GHz, and thus twice as fast. Devices for the European market can use a single 320 MHz channel because the EU has only released the frequency range from 5945 to 6425 MHz for 6 GHz wireless. In the U.S., the spectrum is wider at 5925 to 7125 MHz, which is why three Wi-Fi connections with a 320 MHz channel can transmit side by side over 6 GHz without interference.



The additional 6 GHz frequency offers enough space for radio channels with 320 MHz bandwidth—twice as much as Wi-Fi 6.

An advantage of the European solution? Since no other radio technologies operate in this frequency range, a Wi-Fi 7 router can use 6 GHz without restriction and does not need DFS (Dynamic Frequency Selection).

Routers with Wi-Fi 7 must support a channel bandwidth of at least 160 MHz over 6 GHz: This means that three Wi-Fi products can transmit simultaneously on this frequency without interference, even in Europe. At 5 GHz, only two 160 MHz channels are possible—if a router supports this channel bandwidth at all.

WI-FI 7 TRANSMITS UP TO 46 GBIT/S

The speed of a Wi-Fi connection depends primarily on the number of data streams (MIMO streams) going from the transmitter to the receiver. With Wi-Fi 5 and Wi-Fi 6, there are a maximum of eight per frequency; Wi-Fi 7 offers twice as many. This results in a

theoretical transmission rate of around 46 GBit/s if a Wi-Fi 7 connection uses 16 MIMO streams and a 320 MHz channel over 6 GHz—almost five times as much as with Wi-Fi 6.

Don't expect to see other Wi-Fi 7

devices try to hit those maximum throughput speeds, however; even with Wi-Fi 5 and 6, manufacturers did not develop routers with eight streams per frequency. Some providers claim that their top models support eight or even twelve streams. Similar to advertised Wi-Fi speeds, however, this information refers to the sum of the streams over all frequencies—for example, in the case of a tri-band router with four streams each for 2.4, 5, and 6 GHz frequencies.

In practice, this information is irrelevant, because wireless transmission between two devices only takes place over one frequency, not simultaneously over several. So far, in any case, because that too is changing with Wi-Fi 7—more on that later.

As with previous Wi-Fi standards, the top routers for Wi-Fi 7 therefore support a maximum of four MIMO streams per frequency, and notebooks and smartphones

will mostly be equipped with Wi-Fi modules that use two MIMO streams.

Compared to similar Wi-Fi 6 devices, however, the new Wi-Fi 7 products can be more than twice as fast in the best cases. For one thing, they can use the 320 MHz channel over 6 GHz, which is twice as wide. In addition, Wi-Fi 7 works with the improved 4096-QAM modulation. This allows data that passes over the radio link to be packed more tightly, which increases the transfer rate. A MIMO stream from Wi-Fi 7 therefore also works faster than a Wi-Fi 6 or Wi-Fi 5 stream with the same channel width.

But the higher the modulation, the better the radio quality must be for the tightly packed data to arrive reliably. Wi-Fi 7 devices can therefore only use 4096-QAM in practice under optimal conditions and at short distances.



AVM is also fully committed to Wi-Fi 7: Germany's Fritzbox 6670 Cable with cable modem uses the new WLAN standard but does not work with the 6 GHz frequency.

Top routers with Wi-Fi 7 manage a maximum data rate of 11.5 GBit/s with four MIMO streams (4×4) and the 320 MHz channel. In contrast, the fastest routers with Wi-Fi 6 achieve only up to 4.8 GBit/s with 4×4 MIMO and 160 MHz channel.

Wi-Fi 7 clients in smartphones and notebooks achieve a similar speed advantage. They work with 2×2 MIMO streams and a 320-MHz channel, which results in a maximum data rate of 5.8 GBit/s. That's more than twice as much as the 2.4 GBit/s of Wi-Fi 6 clients with 2×2 and a 160-MHz channel.

MULTI-LINK OPERATION

With Multi-Link Operation (MLO), Wi-Fi 7 debuts a completely new feature never been seen before in any Wi-Fi standard.

MLO overrides a basic rule that used to apply to every Wi-Fi transmission: data transfer between two devices takes place via exactly one connection (link): that is, a specific radio channel on a specific frequency.

If, for example, you have given the Wi-Fi connections over 2.4 and 5 GHz different names on a dual-band router, you can only select one for a client like your notebook, although both radio networks establish a connection between the same

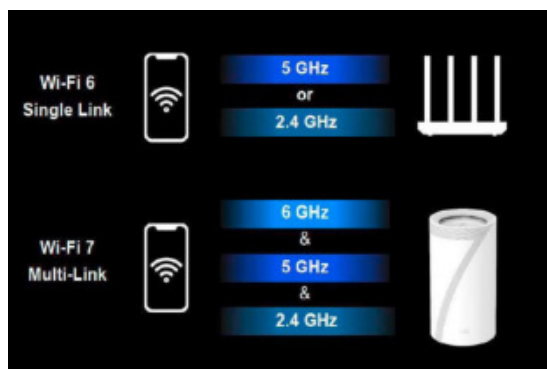
devices—router and notebook. This also happens if the client only displays a Wi-Fi SSID because you've activated functions such as mesh or band steering in your router. In this case, the router decides whether the link to the client is via 2.4 or 5 GHz.

With MLO, both devices can establish multiple links at the same time. Two tri-band devices, for example, then communicate in parallel over the frequencies 2.4 GHz, 5 GHz, and 6 GHz. To use MLO, both devices must support this function.

Then they can send data simultaneously over all links to increase the overall Wi-Fi speed. Alternatively, MLO reduces latency and stabilizes the Wi-Fi connection because the devices can flexibly switch to the link with the least interference. If the sender sends the same data over each link, it arrives at the receiver with greater reliability and without interference. If router and client have several radio units, they can also send and receive data simultaneously via MLO: The router then sends data via 5 GHz to the notebook, for example, which in turn sends other data to the router via a 6 GHz link.

MULTI-RU: EVEN MORE EFFICIENT WI-FI

If the Wi-Fi on your smartphone or PC seems slow, this is often not because it cannot transmit faster, but because it should not



Multi-link operation makes a Wi-Fi connection faster and more stable because two devices can transmit simultaneously over several frequencies.

transmit faster. That's because Wi-Fi transmission only takes place when the radio channel is free: the devices fight for access to it, and whoever doesn't get it first has to wait. Since these waiting times are only fractions of a second, this is hardly noticeable for extensive downloads, normal web surfing, or sending e-mails.

On the other hand, it becomes problematic if many Wi-Fi devices in your home network always have to transfer only small amounts of data, but in the shortest possible time—like for video calls, for online gaming, for smart home devices, or for working together on files via Teams, One Drive, or Google Docs.

Wi-Fi 6 already addressed this problem with the OFDMA function: This allows the router to divide the radio medium into small units—so-called resource units (RU)—which

it assigns to different clients. With this method, it transmits data to several clients at the same time to make efficient use of the Wi-Fi connection. Think of it as something like a mail-order company that doesn't deliver orders from three customers in three barely filled trucks, but packs all the orders into one truck.

Wi-Fi 7 improves OFDMA with multi-RU: Routers with the new standard can then assign more than one RU to individual clients. This increases the transfer rate for these clients, and the radio channel can be used even more efficiently.

POWER-SAVING WI-FI OPERATION

Devices with a battery or rechargeable battery can use a wireless connection even more economically with Wi-Fi 7. Here, too, the new standard extends a function of Wi-Fi 6: 802.11ax, introduced as the **Target Wake Time (TWT)**, which the router uses to agree on fixed transmission times with mobile devices. They must only be reachable at this time. Otherwise, they remain in the power-saving sleep state.

Wi-Fi 7 introduces the **Restricted Target Wake Time** to ensure that the radio channel is always free for transmissions that absolutely must take place at a fixed time. It stipulates that only the designated client may transmit at this time and all others must vacate the radio channel.

NEW ROUTERS WITH WI-FI 7

To be able to use the numerous innovations packed into Wi-Fi 7, you need fresh hardware—that is, routers and repeaters with Wi-Fi 7, as well as notebooks and smartphones that have a suitable radio module. Numerous manufacturers have announced routers and mesh systems for Wi-Fi 7, and you can already buy some. The available offerings will increase significantly by the end of 2023, including for repeaters as well as notebooks and smartphones.

Switching to Wi-Fi 7 is particularly worthwhile if you rely on high Wi-Fi speeds—for gaming, for example, but also if you frequently transfer large amounts of data in your home network for backups or for video editing. Since Wi-Fi 7 also makes Wi-Fi transfers more stable, devices with the new standard are also a good choice if you have a home network with a large number of Wi-Fi clients or if you want to cover the area of a large home wirelessly.

Last but not least, a router with Wi-Fi 7 is also a prerequisite for bringing online connections beyond the gigabit limit into your home network without restrictions: Most models have a WAN connection with 2.5 or even 10 GBit/s for this purpose.

TP-Link router with Wi-Fi 7

TP-Link announced seven mesh systems and routers with Wi-Fi 7 earlier this year, and two models are already available: The \$700

Archer BE900 (fave.co/3QFqQhM) is a quad-band router that can establish four Wi-Fi connections over 6 GHz, twice 5 GHz and 2.4 GHz. It can use four MIMO streams on each frequency, which allows data transfers with up to 11.5 Gbit/s over 6 GHz, just under 5.8 Gbit/s each over 5 GHz, and just under 1.4 Gbit/s over 2.4 GHz.

Its two 10-GBit ports can be used for wireless or LAN connections; you can equip one with an adapter module (SFP+) to connect a fiber optic cable for internal networking. Other extras include an LED display that can show the time, Wi-Fi speed, or self-created graphics, among other things, as well as a small touchscreen that shows



The Archer BE900 from TP-Link has an LED display and a touchscreen on the housing. As a quad-band router, it is supposed to deliver top speed in large WLANs, according to the manufacturer.

visitors the QR code for accessing the guest Wi-Fi network.

The \$900 Deco BE85 (fave.co/3Ozcltr) is a mesh system for Wi-Fi 7 with two base stations. Each has two 10-GBit and two 2.5-GBit connections, which can be used for Wi-Fi connections to a modem, for LAN connections to home network devices, and for direct connections between the stations (backhaul). Wi-Fi transfer takes place via four MIMO streams per frequency (6 GHz, 5 GHz, 2.4 GHz), resulting in maximum data rates of around 11.5 GBit/s, 5.8 GBit/s and 1.4 GBit/s respectively. According to TP-Link, the high-end mesh system achieves around 9 GBit/s over the 6 GHz link in practice,

provided the stations use the 10 GBit link for backhaul. TP-Link also promises a firmware upgrade in autumn that will upgrade the smart home standard Matter.

The Deco BE85 will be followed by cheaper TP-Link mesh systems, such as the Deco B75 and the Deco BE65. Both are tri-band systems. The B75 uses four MIMO streams over 6 GHz and two over the other frequencies, while the BE65 uses two MIMO streams for all three frequencies and uses Wi-Fi 6 instead of Wi-Fi 7 over 2.4 GHz.

TP-Link also offers two top routers with tri-band support and four MIMO streams each: the \$600 Archer BE800 (fave.co/3qwOcvq) and the Archer GE800 (fave.co/3E3xK8Y), with additional



The first mesh system from TP-Link for Wi-Fi 7 is the Deco BE85: The two stations can be directly paired via 10-GBit LAN.

settings for gamers. Less expensive will be the Archer BE550 (fave.co/3YJg1NW), which also transmits over three frequencies, but only with two MIMO streams each. According to TP-Link, all routers with Wi-Fi 7 support the Easy-Mesh standard: this allows a mesh Wi-Fi network to be set up even with Wi-Fi routers from different manufacturers.

WI-FI 7 ROUTERS FROM ASUS AND NETGEAR

Asus' first two Wi-Fi-7 routers, the ROG Rapture GT-BE98 (fave.co/3qxOouy) and RT-BE96U (fave.co/45sGyB6), are aimed primarily at gamers and network professionals who want to benefit from

higher Wi-Fi speeds. Both use all three frequencies with four MIMO streams each, and thus come to maximum data rates of around 11.5 (6 GHz), 5.8 (5 GHz) and 1.4 GBit/s (2.4 GHz).

The GT-BE98 gaming router offers four LAN ports with 10 GBit/s, the RT-BE96U two, and both also have four gigabit ports each.

Netgear's Nighthawk RS700 (fave.co/45xq62s) Wi-Fi 7 router also aims for maximum speed, with three frequencies and four MIMO data streams each as well as two 10-Gbit ports.

SMARTPHONES AND NOTEBOOKS WITH WI-FI 7

The advantages of Wi-Fi 7 can only be fully utilized if your client devices support it, too. But you still have to be patient about that.

There are already some high-end smartphones available with suitable hardware for Wi-Fi 7, such as the Samsung Galaxy S23 Ultra (fave.co/45aouMt), the Asus ROG Phone 7 (fave.co/47x221A), and the OnePlus 11 (fave.co/44dN79M).

They use Qualcomm's Snapdragon 8 Gen 2 processor, which understands the new standard. That said, until recently, Wi-Fi 7 was not activated on any smartphone. Some manufacturers promise to activate the new

standard soon via firmware upgrade, while others haven't committed to doing so. The range of Wi-Fi 7 smartphones will increase by the end of the year, as CPU manufacturer MediaTek has also announced hardware compatible with Wi-Fi 7, in the form of the Dimensity 9200.

The first notebooks with Wi-Fi 7 should also

be available for purchase at the turn of the year. Intel will probably present a suitable Wi-Fi module together with its 14th Core generation Meteor Lake processors, possibly under the model name BE200.


THE WI-FI STANDARDS ARE STILL TO COME

It takes a long time to develop Wi-Fi standards, so it's not surprising that the corresponding working groups at the IEEE already have many plans for the successors to Wi-Fi 7. The next standard, for example, should include multi-AP operation, which was already planned for Wi-Fi 7. It should enable several routers or access points to transmit

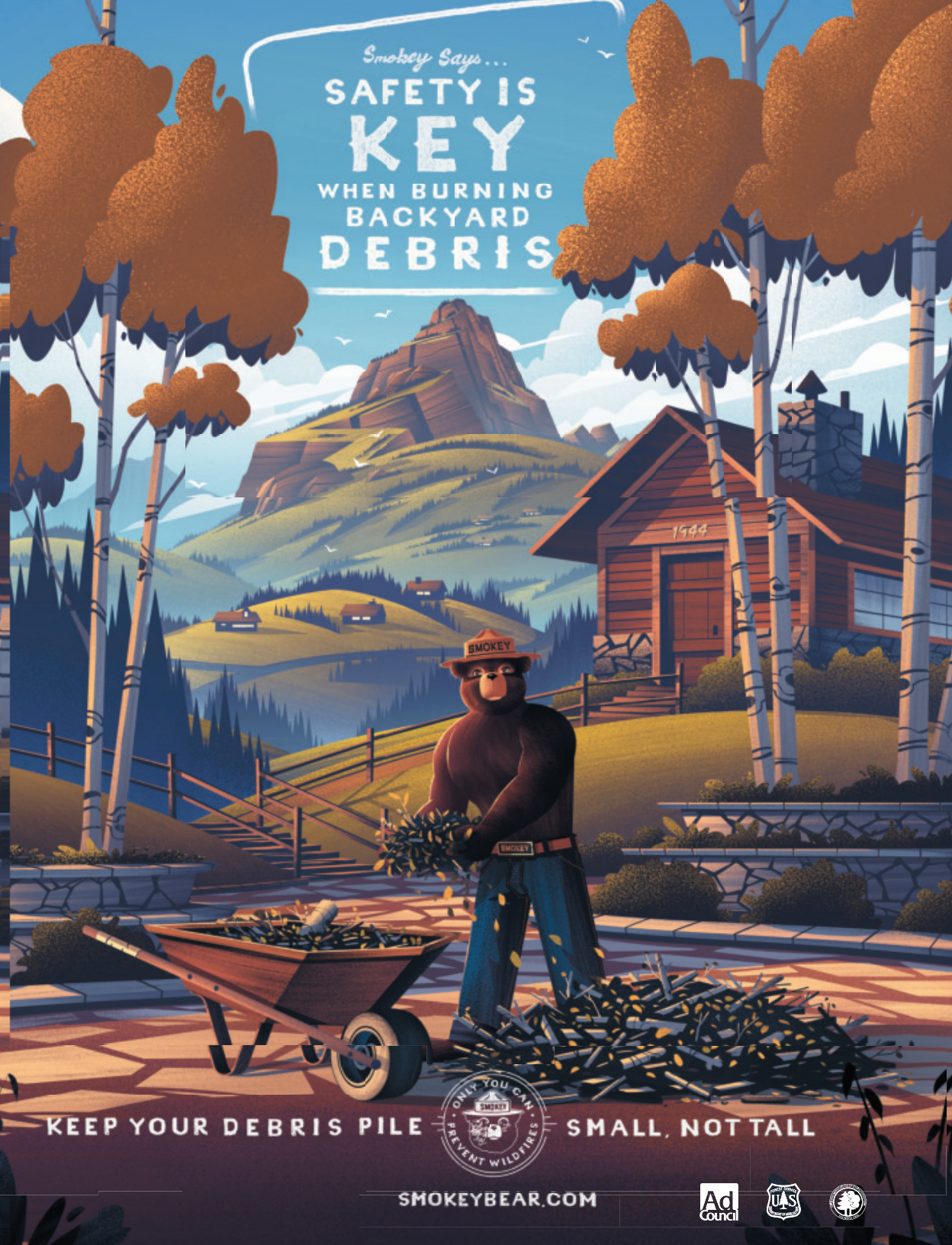


Many high-end smartphones, such as the Asus ROG Phone 7, already have hardware for Wi-Fi 7, but only a forthcoming firmware update will be able to activate the new Wi-Fi standard.

data jointly to a Wi-Fi client. This would make data transfer significantly faster and more stable. Furthermore, data rates of over 100 GBit/s are being discussed for a possible Wi-Fi 8 standard, as well as the additional frequency of 60 GHz, on which extra-large radio channels with 640 MHz could be used.

The 802.11bf standard is currently being developed as "Wi-Fi Sensing." It's intended to evaluate the propagation and deflection of Wi-Fi signals in order to detect, for example, whether people are in a room or moving around. This technology could be used to build Wi-Fi-based alarm systems or smart home devices that automatically switch on or off when someone is nearby or leaves. 

Smokey Says...
**SAFETY IS
KEY**
WHEN BURNING
BACKYARD
DEBRIS



KEEP YOUR DEBRIS PILE SMALL, NOT TALL



SMOKEYBEAR.COM



A photograph of a woman with brown hair tied back, wearing a grey and white striped sweater, smiling warmly as she looks down at a young person with long brown hair lying on their back. The young person is wearing a light pink shirt and has their eyes closed. The background is a soft-focus indoor setting with a green plant visible on the right.

Vaping can
cause irreversible
lung damage.

Talk About Vaping.org

Get the facts
about youth vaping.



**#DoThe
VapeTalk**



10 essential tips to make Google Chrome more secure

Are you aware of your browser's security settings? Here are the most important Chrome tips to help you surf more safely. **BY MARTIN APPEL**

The browser is the most commonly used program, and there are many ways to increase your security while you surf the Internet. Here we have collected the most important tips for staying safe and secure. Our examples show how to do it in the main browser, Google Chrome,

but it works in much the same way in its competitors.

CHECKING SECURITY

Google Chrome's Security Check and Privacy Guide tools allow you to quickly check that the browser is secure enough.

HOW? Tap the three dots in the top right. Select Settings > Privacy and security. Select the Security control and then Privacy Guide.

CLEARING DATA

Our browsers store cookie files that are used, among other things, to personalise advertising. However, you can delete these.

HOW? Open Privacy and security (as above). Select the Clear browsing data > Basics. Choose what you want to clear, such as browsing history, cookies or files. By default, everything is deleted, but you can also press the Time interval to change it. Confirm with Clear data. To get more options, you can select Advanced. Here you can delete saved passwords and website settings, for example.

BLOCK FUTURE COOKIES...

You can choose to block cookies in the future.

HOW? Open Privacy and security (as above). Select "Cookies and other site data"

and decide what kind of cookies to save **(1)**. You can also enable "Delete cookies and site data when you close all windows" and "Send a Do Not Track request with your web traffic." The latter signals that you do not want to be tracked. You can also go to "See all site data and permissions" to manage individual files.

...BUT ADD EXCEPTIONS

Whatever rules you have created, you can add exceptions.

HOW? Open "Privacy and security" (as above). Select "Cookies and other site data" and "Customized behaviors." Here you can add sites that are always (or never) allowed to use cookies.

SEARCH MORE SAFELY

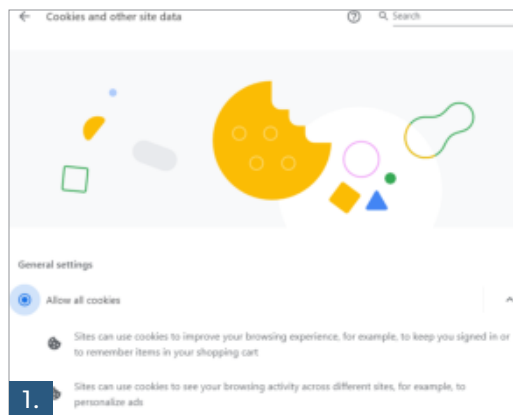
Google Chrome has a feature called Safe Browsing that warns you if, for example, you visit malicious websites or download dangerous programs.

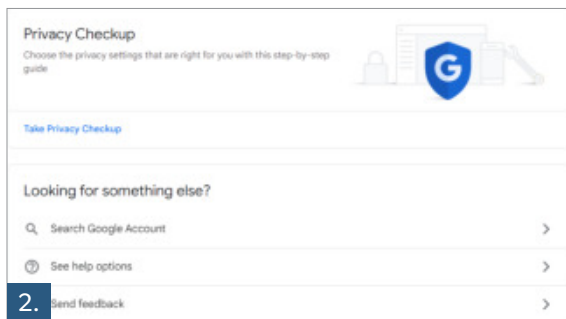
HOW? Open "Privacy and security" (as above). Select Security and set the level of protection. You can also go to Advanced and change more settings.

CHANGING RIGHTS

Different sites may be authorized to use your camera and location data, for example. You can change this afterward.

HOW? Open up "Privacy and security" (as above). Select the Site settings and click on what you want to adjust.





also need to confirm the login with your mobile phone.

HOW? Open Google Account (as above). Select Security and tap on Password if you want to change it. You can also tap “Two-step verification” and follow the instructions to increase your level of security.

CONTROL YOUR PRIVACY

All Google services use the same login account, which stores a lot of information about you. But you can control exactly what it stores.

HOW? Open your Google Account by going to fave.co/3OBmWUK and log in. Go to “Data and privacy” and select Privacy Checkup (2). Go through the wizard and choose which options you want to change. For better control, you can instead select Data and privacy > Your data & privacy options. Here you can see what you have done and enable or disable different features.

CHROME PRIVACY CHECKUP

Given how much sensitive information is accessed through your Google account, it’s important to have a secure password. You can also increase security with something called two-step verification. This means it’s not enough to just have access to a password to sign in on a new device; you


UPDATE YOUR PHONE NUMBER

To ensure that you can always access your Google account, it is important that you have entered the correct recovery information. These are phone numbers and email addresses that you can use to restore control to your account if something happens. Make sure this important information is correct!

HOW? Open Google Account (as above). Select Security and tap “Recovery phone” and “Recovery email” to check and update them.

OPEN THE AD CENTER

Of course, one important thing is to control your advertisements in Google. You can do this in your company’s Ad Center.

HOW? Open your Google Account (as above). Select the “Data and privacy” option and scroll down to Personalized Ads. Here you can choose in different ways what information will be used in your personalized ads. 



Windows 11: How to improve your security and privacy

We show you how Windows 11 keeps you safe and how to maximize your privacy.

BY MARTIN APPEL & ANDERS LUNDBERG

Microsoft has made a big deal about the increased security in Windows 11. According to Microsoft, the surprisingly high system requirements that prevented many users with even fairly new computers from installing the Windows 11 are mainly due to security features. So what's the deal and how can you make sure you benefit from it?

We provide the answers and show you how to better protect your privacy—both from Microsoft and others. The more our lives are lived digitally, the more important it is.



**VIDEO: SECURITY
EXPERT EXPLAINS TPM
2.0 & SECURE BOOT**

Watch now at fave.co/45a3wgj

WINDOWS 11 SECURITY FEATURES YOU DIDN'T KNOW EXISTED

Many of Windows 11's system requirements relate to security features that have been around for years in Windows 10, but few outside of corporate IT departments paid attention to. Some of these won't turn on automatically if you update from Windows 10 but will be enabled on all new computers sold directly with Windows 11. Some are very sensible and don't affect your computer's performance at all, while others can have a negative impact. We'll show you below how to turn them off if you value performance more.

SECURE BOOT AND TPM

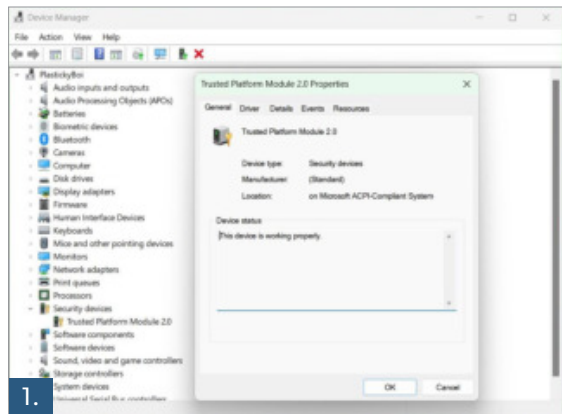
To install Windows 11 on your PC at all, you'll need a modern processor (Intel 8th-generation or AMD Ryzen 3000 or newer) and two security features: **Secure Boot** and a **trusted platform module (TPM)**.

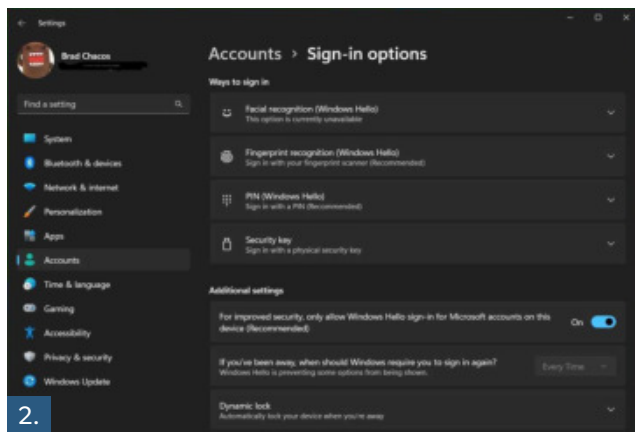
Secure Boot has been around for many years, but most PC users haven't had it running because it hasn't been compulsory and mostly felt like an unnecessary hassle. The feature is part of UEFI, the modern replacement for BIOS. It allows the computer's basic software to detect—and stop—a modified operating system by checking its cryptographic signatures.

Enabling Secure Boot effectively stops sneaky malware that, for example, installs itself under Windows as a so-called bootkit and can covertly read everything that happens on the system. You enable Secure Boot in your computer's BIOS settings, but activating it is not actually a requirement for installing or running Windows 11 — the requirement is for the computer to be able to use Secure Boot.

TPM, on the other hand, is a requirement for installing and running the new system. There are ways around it (fave.co/3L6WM9a), but Microsoft warns that you may miss out on future updates and it's unlikely that the TPM requirement is the only thing preventing you from installing Windows 11 as almost all Intel and AMD processors from 2013 onward have a built-in TPM module (1).

Unlike Secure Boot, whose benefits are a bit more esoteric, it's clearer why TPM is a great idea. The basic functions of TPM are the





secure storage of encryption keys, certificates and the like, and the secure creation and control of new keys. For example, it could be the encryption key for Bitlocker that secures all data on your hard drive, or the encryption key used with Windows Hello for quick login with PIN or facial recognition (fave.co/3lmacXy). Third-party applications like Firefox and Chrome also use TPM if it's present, even in Windows 10.

This works much like Apple's "secure enclave" that has protected the iPhone and iPad for many years, and similar features in mobile processors from Qualcomm, Samsung and other manufacturers.

With a TPM enabled, Windows and individual programs that need to generate encryption keys can ask the TPM to do so. The generated keys are only stored there and can never be extracted or copied to other locations. This is much more secure than

when keys are generated by the regular processor because a Trojan or other malware could theoretically intercept such keys.

A good example of how TPM protects you is Windows Hello. In Windows 11, Microsoft recommends that you use a Microsoft account and turn off sign-in with the account password so that you can only sign in with

Windows Hello—normally a PIN, but you could also use facial recognition or a fingerprint scanner (2).

Let's say you are hit by a malware with a keylogger that captures everything you type on your keyboard. This includes your PIN, but because the PIN is linked to an encryption key on this particular computer, the malware creators will not be able to log in to your Microsoft account on another machine. If you had logged in with your account password instead, you would have been left with only two-factor authentication to protect you from a hacked account.

VIRTUALISATION-BASED SECURITY

The hardware requirement that is really behind Windows 11 requiring such a new computer is something called **virtualization-based security** or **VBS**. This

means that the system uses the ability of modern processors to run code in virtual machines with their own separate parts of working memory.

Virtualization was first used to run other operating systems inside Windows or another system so that you can, for example, test software or run a program that doesn't work on your regular system. A common example is Mac users running Windows with a virtual machine to access Windows-specific programs.

Virtualization-based security uses the same techniques to separate certain parts of Windows so that other parts of the system cannot access them. It consists of several different components, some of which are only available in the enterprise versions of Windows and not in the Home version.

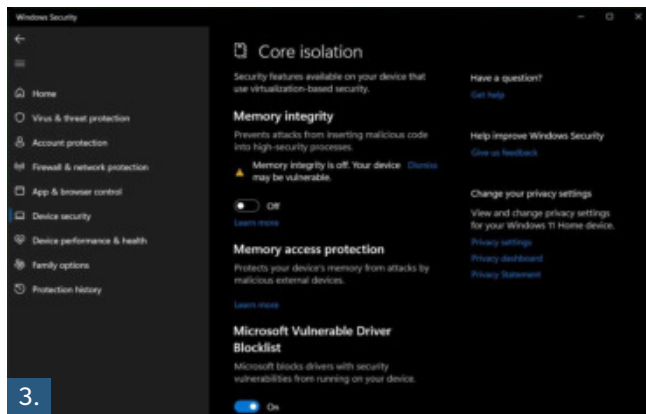
Memory integrity

Open **Windows Security** and select **Device Security**. If VBS is active, you will see a green

tick next to **Core isolation (3)** and it says "virtualization-based security protects the core parts of your device." Click on the **Core isolation information** and you'll be taken to a submenu where you can enable or disable something called **Memory Integrity** (the technology behind it is called "hypervisor-enforced code integrity" or HVCI).

This is one of the features VBS enables, which means that Windows places sensitive code in a virtual machine that the rest of the system cannot access, even with admin permissions. This increases security and provides better protection against some malware, but can also lead to lower performance—up to 25 percent less on some machines. Because of this, gamers or people who use their computer for intensive work often choose to disable the feature despite its security benefits.

If you have updated from Windows 10, Memory Integrity is not enabled by default. On new computers that come with the system, it is enabled. If you are experiencing performance issues with your computer, check whether the feature is active and try turning it off. If you don't have a problem with it, it is of course best to keep it active so that your computer is as protected as possible.



PRIVACY PROTECTION— MICROSOFT HAS IMPROVED

One of the things Microsoft was most criticized for after the launch of Windows 10 is how the system sends analytics data to the company and how difficult it is to turn off this sharing, as well as how the Start menu was full of ads.

In Windows 11, Microsoft has listened to the criticism and the settings for privacy protection and user data sharing have been significantly improved. The settings for both Windows itself and the authorization of third-party applications to access features such as the camera and your image library are located in **Settings > Privacy & Security** (4). Here's how to use them and turn off any sharing you don't want.

The settings panel has three major sections: **Security**, **Windows Permissions**, and **App permissions**. Security is mostly

shortcuts to the separate program Windows Security, so it's the other two that you will use the most.

Windows permissions

General has the important setting for Advertising ID, the unique code that, if you allow it, can be used to track you, so that advertising buyers can, for example, trace a purchase of a product to an advertising banner you clicked on. If you don't like adverts in your system, turn this off.

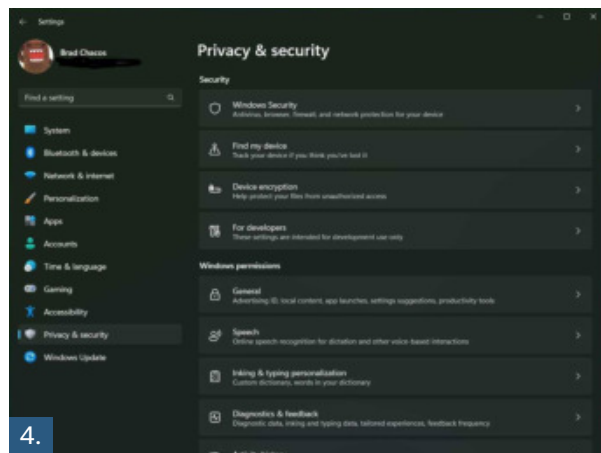
Inking and typing personalization: If you use a pen and sometimes write directly on the screen, this setting lets you decide whether Windows should create a customized dictionary for you.

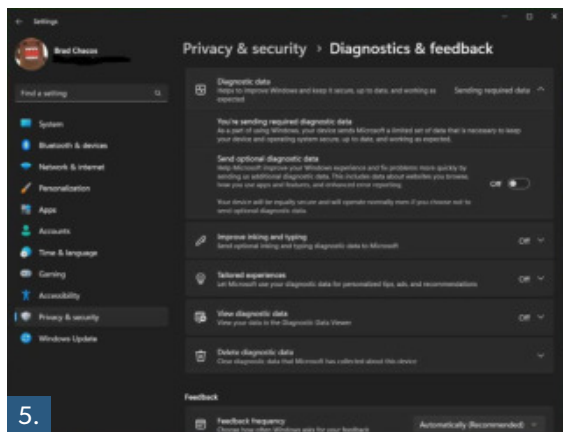
Speech controls whether you want to use Microsoft's more advanced online speech recognition, which of course sends what you say to Microsoft's servers. If you switch it off,

you'll have to make do with the less advanced speech recognition directly on your computer.

Diagnostics & Feedback:

Here (5) you'll find settings for how your use of the computer can be used for analytical purposes. The data is anonymized and is intended to help Microsoft improve Windows and other products. The system always sends "required data," but you can





choose to send additional data, which is a requirement if you want to connect your computer to the Windows Insider program. An important feature here is Delete Diagnostic Data. If you have had diagnostic data sharing switched on and have now turned it off, it may be a good idea to delete all data that has already been collected.

Activity history is a feature of your Microsoft account that allows you to continue what you have done on one device while sitting at another that is logged in to the same account. Switch it off if you only have one computer, as it is completely unnecessary if so.

Search permissions: There are two important settings here: whether you want filtering for adult content in the Windows

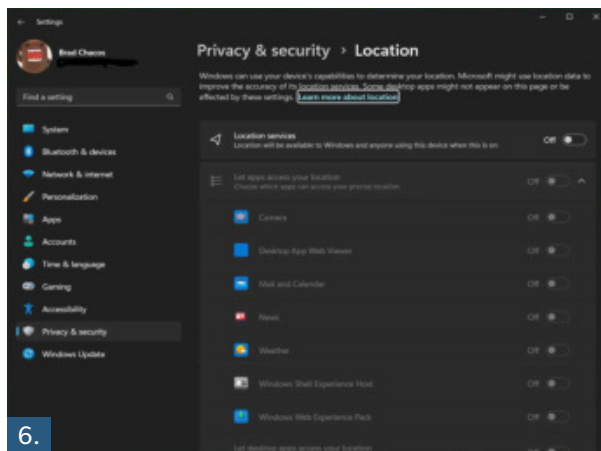
search function, and whether you want to save your search history so you can find things you've previously searched for more quickly.

Search in Windows has other settings for the search function that we don't really think belong in the privacy settings, such as which folders should not be searched. If you're wondering why it's not under System in Settings, we don't have an answer, but this is where you can set Windows Search to look for files

outside your home folder.

App permissions

There are a number of subsections for everything on your computer that relates to privacy matters. The most important ones are conveniently located at the top of the app permissions section: **Location** (6), which



deals with whether Windows and applications can find out where you are, **Camera** and **Microphone**, which are pretty obvious, and features like **voice activation**, **messages** (notifications), and **account information**.

Under Camera and Microphone, you can easily turn off or on access to individual applications. We recommend being sparing in granting access and switching off both for the applications you no longer use. The fewer programs have access, the better.

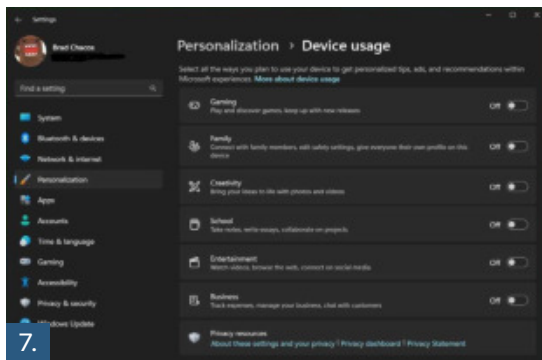
Location data is not nearly as useful on a computer as it is on a mobile phone. For many users, the only benefit of having Windows read your location is that online stores can more easily display your nearest physical store, and web searches for shops, restaurants, and the like can instantly display results from your neighborhood. If that's not something that appeals to you, we recommend switching off location tracking altogether.

OTHER SETTINGS YOU MAY WANT TO CHANGE

In addition to the settings in Privacy and Security, there are a bunch of other things related to what Microsoft knows about you that you may also want to change.

Don't tell me about your habits

Microsoft wants to know how you use Windows. The feature is called Device Usage



and Microsoft uses it to customize the system—and give you advertising. You can turn it off, however.

Open **Settings, Personalization** and go to **Device usage** (7). Put everything in **Off** if you don't want to supply this information to Microsoft.

Adjust your Microsoft account...

If you want to have full control of your Microsoft account, you can visit your Privacy Panel via your browser.

Go to fave.co/3qwQ5rZ and sign in with your Microsoft account. At the top you can select **Get started** to launch a wizard that controls your settings. You can also select **Manage your activity data** to make the changes manually.

...and control other programs

You can also make similar settings in other Microsoft products, such as Xbox or Microsoft Teams. Open your Microsoft

account's **privacy panel** (as above) and select **Privacy settings in our products**.

Do not share the clipboard

Nowadays, Windows has a powerful cloud clipboard manager that saves the clipboards of all your device and allows you to synchronize them in a common clipboard list. It's incredibly handy, but if this feels like a privacy issue, you can turn it off.

Open **Settings, System** and select **Clipboard (8)**. Switch off the **Clipboard history** or choose not to synchronize clips between devices. You can also select **Clear** to delete the history in the cloud.

Be anonymous with VPN

To be more anonymous while browsing, you can use a virtual private network (VPN) service. It makes it harder to track you and allows you to switch countries on your connection, which can open up locked

streaming services. A VPN is a paid service that you subscribe to, however. Once you subscribe, you can install a special Windows program (or mobile app) to switch the service on or off and choose which country you want to surf in. Our guide to the best VPNs (fave.co/3FtTTMs) can point you in the right direction.


Hide what you've done

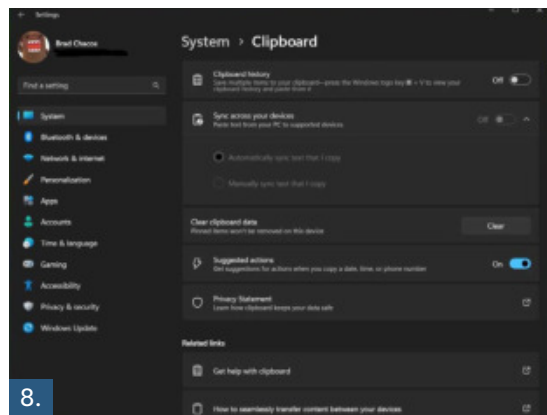
Windows can show what documents and other things you've recently opened. However, this can be hidden, which can be useful if other people you use your computer.

Open **Settings** and select **Personalization, Start**. Here you can switch off the feature **Show recently opened items...** As you can see, there are also other notifications you can disconnect.

Stop sharing between devices

A new feature in Windows deals with synchronizing software settings and other data between different computers where you are signed into the same Microsoft account. If you have a desktop and a laptop, for example, this can be very handy, but if you only have one computer, sending data to the cloud may seem unnecessary.

Open **Settings** and select **Apps, Advanced app settings**. Tap on **Share across devices** and switch off the feature or choose how to use it. 



5 tips to make Gmail more secure

Our email services are full of personal information and it's important to protect it. Here are tips to make your email more secure. **BY MARTIN APPEL**



Bank statements, contracts, tickets, love letters...most things in this world can be sent via email, and protecting your email is extremely important. We show you how to do it in the world's most popular email service, Gmail, but the basic concepts apply to other services.

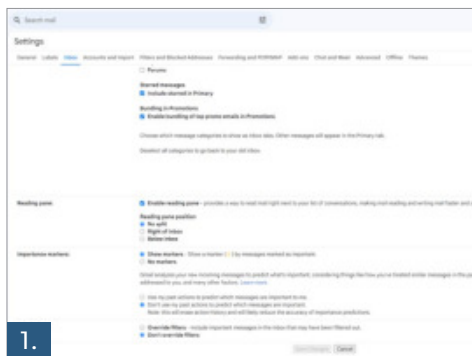
SKIP SMART FEATURES

Gmail has many smart features that give you suggestions based on what you and others have written in the past. If you find this monitoring uncomfortable, you can remove it.

HOW? Go to Gmail, click on the wheel in the top right corner, and select See all settings > General. The list shows a number of so-called smart features that are all based on monitoring. Deactivate them! Then also select Inbox and go down to "Importance markers" and change to "Don't use my past actions to predict which messages are important" (1).

SKIP EXTERNAL IMAGES

In theory, the images in an email can be a security risk, as they can track your usage. The



same goes for Dynamic Email—that is, emails that contain a questionnaire, for example. Both can be switched off.

HOW? Open General, and select Images. Switch to “Ask before viewing external images.” Directly below is Dynamic email; here you can uncheck Enable.

SEND CONFIDENTIAL EMAILS

Gmail has a confidential mode that prevents the recipient from forwarding an email. You can also protect the email with a password and make it self-destruct after a certain time.

HOW? Tap on Compose to create a new email and click on the padlock and bell icon. Select the expiry date and password requirements and click on Save (2). Now you can write and send as usual.

STOP SPAM...

Spam, unsolicited email advertising, is a source of irritation. But there are ways to protect yourself from it.

HOW? If you have received a spam message, you can mark it as spam with the “Report spam” button on the top toolbar above the email.

...AND SAVE REAL EMAILS

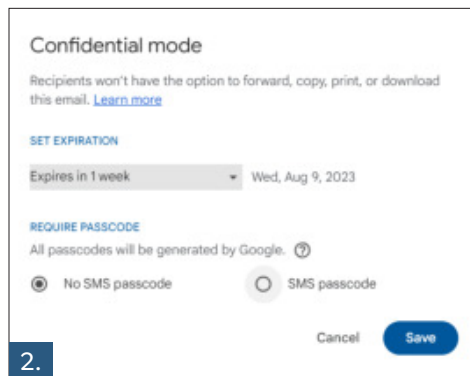
Sometimes honest emails end up in the Spam folder, so check occasionally.

HOW? Open the Junk Mail in the left menu, select or open an email, and select “Not spam.”

USE SPAM ADDRESSES

A good way to reduce the problem of spam is to have a main address that you use with great care and a junk address that you use in risky situations. If the latter becomes overloaded with spam, you can delete it and create a new one.

HOW? Get an extra email address: for example, through Gmail (fave.co/45aSSpY), Microsoft Outlook (fave.co/3OYSg0T), or Yahoo Mail (fave.co/457z5Yo). 🔒





Amazon scams: How to spot fake order confirmations

Criminals are trying to steal the personal information of Amazon customers with fake order confirmations. Here's how you can see through the scam. **BY MICHAEL SÖLDNER**

Amazon delivers billions of packages every year, and criminals are taking advantage of it. With phishing emails, text messages, or phone calls, the fraudsters claim that supposedly unauthorized orders are on the way to your house. That creates fear and a feeling of stress in recipients, potentially tricking you into divulging your bank

account information or Amazon login details through a fake landing page, or installing malicious software when you land on it. The attackers then exploit that mistake for further scams.

Nevertheless, people who react calmly and prudently can quickly unmask the tricksters. Here's how to spot a fake Amazon order confirmation scam.

CHECK YOUR AMAZON ACCOUNT

The most important thing to know: Most reputable companies, including Amazon, never ask for confirmation of payment information by phone or email. Therefore, the first way to deal with order confirmation messages should be to go to your Amazon account. There, under “Returns and orders,” you’ll find a list of the orders you have actually placed. If you don’t see a record of the fake order, the scam is quickly exposed. (If you do see an unauthorized order there, contact Amazon customer service and change your password immediately.)

DO NOT DISCLOSE PERSONAL DATA BY EMAIL OR TELEPHONE

The same thing applies to a request to confirm personal data by email or telephone. If Amazon actually requires personal information, you’ll find a notification asking for it in your Amazon account. That is the *only* place you should divulge sensitive information such as account data, or where addresses should be confirmed and changed.

REPORT FRAUD

Amazon and many other companies offer the possibility to report any



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suspicious communication. Go to your account, and then head to Account > Customer Service > Security & Privacy > Report Something Suspicious. 🔌



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