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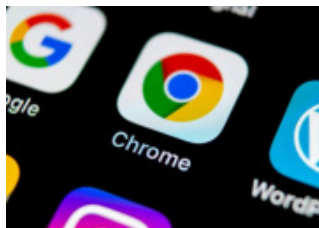
→ DEPARTMENTS



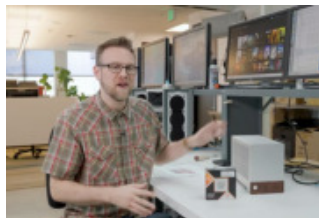
7 News



37 Reviews & Ratings

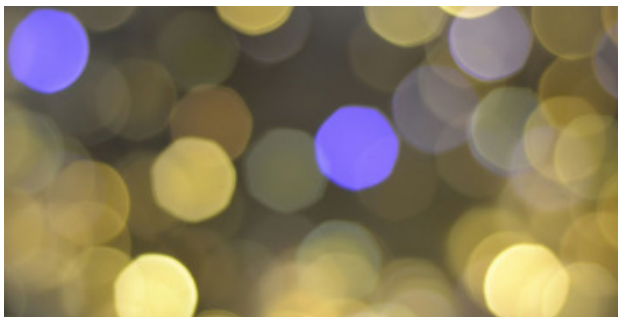


109 Here's How

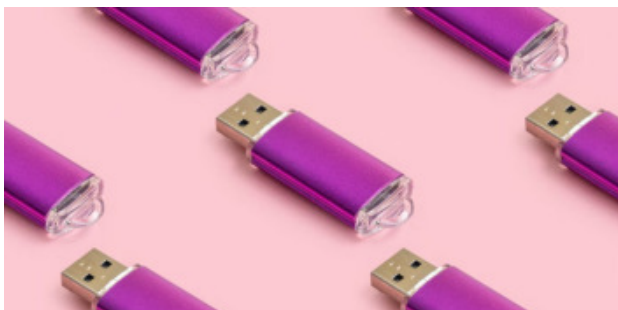


114 Tech Spotlight

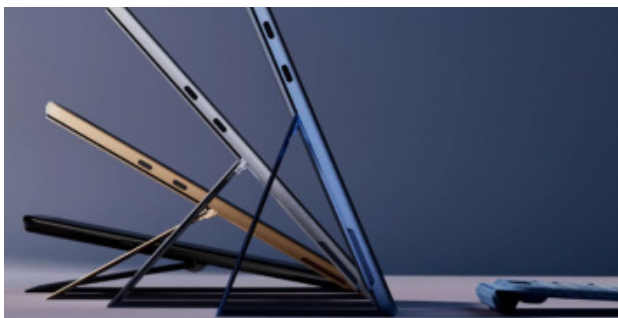
→ FEATURES



74 The best PC hardware and software of 2024–25



90 Turn your flash drive into a portable PC survival kit



100 Windows Copilot+ PCs aren't there yet

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**AM I
OKAY
TO
DRIVE?**

BUZZED DRIVING

IS DRUNK DRIVING


NHTSA

ad
COUNCIL



The U.S. Justice Department wants to break up Google and Chrome

Google hopes to delay the case until a business-friendly Trump gets control of the DOJ—but that may not be the blessing the company hopes for. **BY MICHAEL CRIDER**

One day after Bloomberg's initial report, it's now official (fave.co/3ZFRgo0): The Department of Justice has requested that the judge in the antitrust case order Google to divest itself of the Chrome browser. The prosecutors are also suggesting that Google be forced to offer its search result data to competitors in a syndication model

and no longer bundle Search with the Android mobile operating system. The original story continues below.

Back in August a U.S. federal court found Google guilty of violating anti-trust laws (fave.co/3OZIB9P), and the fallout could be the biggest antitrust action since the breakup of AT&T and Bell way back in the 1980s. But exactly what the enforcement action will look

like is still very much up in the air. Recent reports indicate that the U.S. Department of Justice is going to suggest that Google be forced to sell the Chrome browser.

That's according to Bloomberg ([fave.co/4gkFc0C](https://www.bloomberg.com/news/articles/2021-01-21/doj-wants-google-to-divest-chrome)), which has been rock-solid on this case for years. Previously the DOJ was said to be considering some kind of breakup of Google's big three corporate assets: Search, Chrome, and Android. Some or all of them were on the table, but the DOJ has apparently settled on Chrome as the piece of the monopoly puzzle that has to go.

The federal team will also suggest that Google be forced to refrain from making the kind of exclusivity contracts that have become a staple of its OEM partnerships ([fave.co/4gk3BDK](https://www.bloomberg.com/news/articles/2021-01-21/doj-wants-google-to-divest-chrome)) for Android and Chrome devices, according to the report.

The DOJ also wants Google to give websites more tools to effectively opt out of being used in the company's extensive data scraping for AI training.

Note that this doesn't mean it's a done deal. Assuming that Bloomberg is accurate, that means that DOJ attorneys will suggest Google be forced to divest itself of Chrome to District Judge Amit P. Mehta. The judge will have fairly broad authority on whether to proceed with that action or suggest some other way of enacting the ruling that Google is operating an illegal monopoly.

Whatever happens, Google's legal team will inevitably appeal for a lighter punishment, if not throw out the ruling entirely. A Google vice president accused the DOJ of "push[ing] a radical agenda that goes far beyond the legal issues in this case."

Google's appeal is a surprise to no one. But if you'll follow me along on a little tech pundit speculation, it's not hard to guess what the company is hoping for on the other end. With Donald Trump's election win and a second presidential term looming in less than two months, Google is hoping that the wheels of justice will turn slowly enough for a new



IMAGE: WACHIWIT/SHUTTERSTOCK

The Department of Justice has apparently settled on Chrome as the piece of the monopoly puzzle that has to go.

administration with total control of the federal government to take power. Given the pace of the case thus far—the antitrust case began just over *four years ago* (fave.co/49niFhB)—that seems like a safe bet.

With Republicans in general and Trump in particular, a stripping of federal power to regulate and prosecute corporations is a given. So the obvious hope is that a second Trump DOJ

would essentially forget about any kind of corporate oversight. Given Trump’s history of legal issues with real estate and dozens of other businesses, not to mention his early pick of Florida libertarian congressman Matt Gaetz as attorney general, Google might be hoping to get out of this with less than a slap on the wrist.

But there’s another wrinkle to this particular story. While American conservatives generally position themselves as anti-regulation at every opportunity, there are a few notable exceptions, and one of them is tech and social media. Republicans have long accused any and all technology companies of enabling bias against them. And Trump is no exception—indeed, he’s the *ur* example for the current climate.

“Google’s got a lot of power. They’re very bad to me. Very, very bad to me,” said Trump



IMAGE: ALEX PHOTO STOCK/SHUTTERSTOCK

Republicans have long accused any and all technology companies of enabling bias against them.

in an October interview (fave.co/3Bg9S4I), echoing previous statements against the search company. “I’m getting a lot of good stories lately, but you don’t find them in Google. I think it’s a whole rigged deal. I think Google’s rigged just like our government’s rigged all over the place.” JD Vance, the vice president-elect, has said that Google should be broken up entirely, calling it “one of the most dangerous companies in the world” (fave.co/3BegCzK).

So Google is in the sights of the current DOJ for abusing monopoly power, and it’s also being targeted by the incoming administration for perceived slights against specific individuals. Predicting Trump’s mood at any given moment, to say nothing of his actions, is a fool’s errand. But however the case shakes out, Google is between a rock and a hard place. 🔥

Intel CEO steps down after a disastrous 2024

While Pat Gelsinger says he's retiring, it's not hard to see it as getting the boot from Intel's board. **BY MICHAEL CRIDER**



There is no joy in Mudville Intel's corporate headquarters. The company has had an epically horrible year, with widespread issues plaguing its flagship chips, massive upswings from rivals AMD and Nvidia, and a stock downturn so dramatic it's been called one of the worst performers in the industry.

So maybe it isn't surprising that CEO Pat Gelsinger is leaving.

The announcement was made via press release (fave.co/3Zn5k4k), calling the move a retirement. Two current executives, David Zinsner and Michelle Johnston Holthaus, will function as co-CEOs while Intel's board searches for a more permanent replacement.

While Gelsinger has only been CEO since February 2021, he began working at Intel in 1979 as a technician, was instrumental as a programmer and architect for many notable Intel chips, and was a vice president by 1989 at the age of 32. He left the company in 2009 to work as an executive at EMC and later VMware, then returned to Intel three and a half years ago.

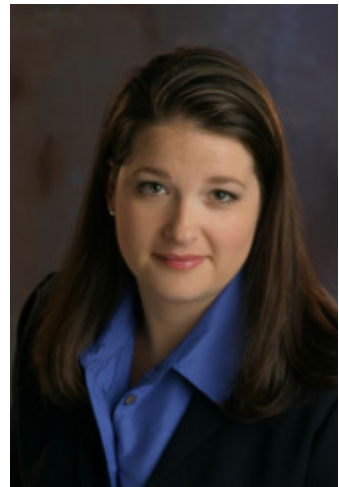
Gelsinger's career is an astoundingly accomplished one, and he's probably earned enough money that he never has to check the price of his eggs. But retiring at 63 is pretty unusual in the modern tech landscape, and it's hard not to see this departure as a reaction to Intel's incredibly bad performance as of late. The company is reeling from failing

13th- and 14th-generation Core processors (and several potential lawsuits, fave.co/4gk4bRW), an uptick from AMD (fave.co/4gfkyPy) in the high-end desktop CPU space, and a perceived inability to stop the meteoric rise of Nvidia (fave.co/4fWXSny) during the AI boom.

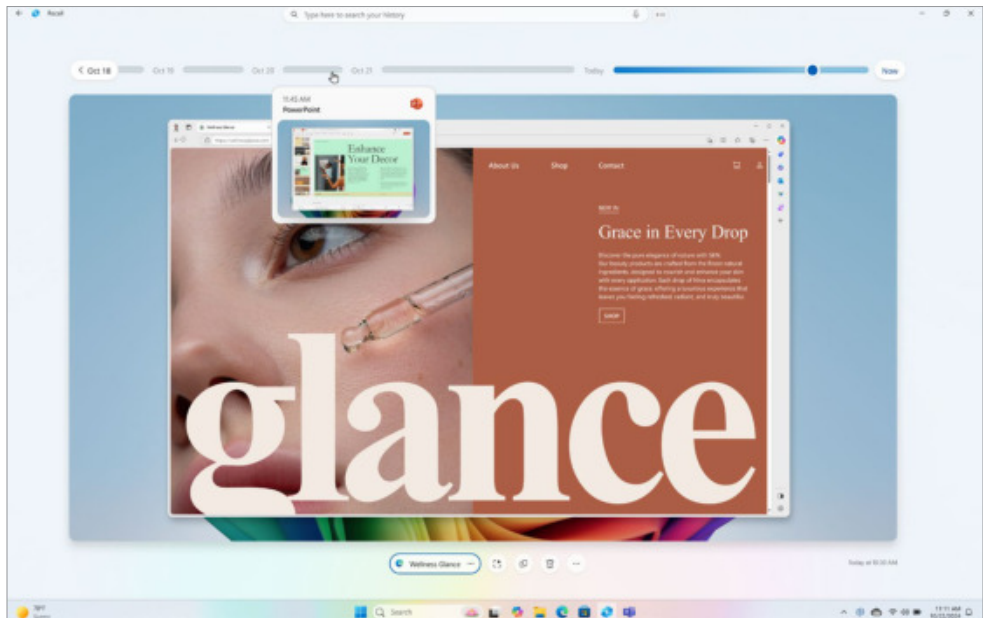
Intel's stock price has fallen by more than 50 percent in under a year (fave.co/4f0vzTJ), making

it one of the worst performers in an otherwise bullish space in the market. The situation is so bleak that rumors of a full or partial sale to another giant have been floating, with names like Qualcomm, Apple, and Samsung heard on the breeze.

Personally, I don't think any of that is particularly likely. Intel might be so essential to consumer tech's infrastructure that it's too big to fail, especially as a potential trade war with China looms. But it's hard to overstate how badly the company has been walloped in the last year, and I'm no macroeconomist. I don't envy any incoming CEO their job... though I wouldn't mind the golden parachute that they're sure to secure before they get in the big chair. 🛑



Two current executives, David Zinsner and Michelle Johnston Holthaus, will function as co-CEOs while Intel's board searches for a more permanent replacement.



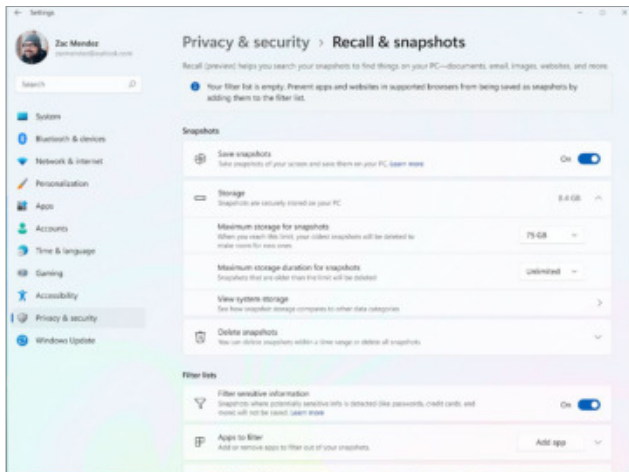
Windows 11's contentious Recall AI feature is finally ready to test

You can now try Windows 11's controversial AI feature on Qualcomm-powered Copilot+ laptops. **BY MICHAEL CRIDER**

Microsoft is positioning its contentious Recall feature for Windows 11 as a headline capability for Copilot+ laptops. So it's kind of weird that when the previously delayed tool went live, it only did so for x64-based machines and not the Arm-based Snapdragon laptops that made such a splash earlier this year. Well, if you have one of those, you can now

try Recall via the Windows Insider program (fave.co/3ZpbCjK).

Microsoft just announced (fave.co/49ks4q6) that Recall, which records pretty much everything you do on Windows, is now available to Snapdragon-powered Copilot+ PCs. You'll need to get on the Insider Program (a fancy title for a beta) and join the Dev Channel if you want to see what all the hubbub is about. Fortunately, it's easy enough



Recall records pretty much everything you do on Windows.

to get back off when the updates reach stability (or you just don't want to be on that channel anymore).

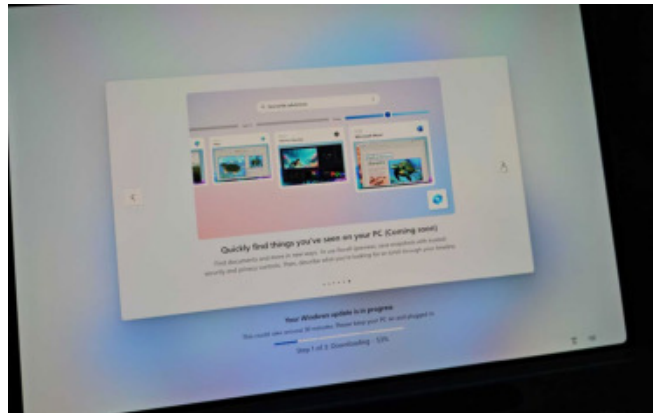
Recall has had a rocky road since its announcement as one of Microsoft's most dramatic new AI-powered tools. After being the focus of intense (and justified) scrutiny (fave.co/4d1eVDb) for its privacy and security implications, Microsoft delayed its rollout by months (fave.co/41m7gMX) and assured regular users that they could turn off its access to certain programs. Microsoft also made the decision to turn Recall off by default for enterprise

machines (fave.co/3ZhSC6R). If you want it on a compatible work PC, you'll need to clear it with your IT manager before manually opting in and turning it on.

At this point, it seems exceedingly unlikely that Recall will make it into the general release channel for Windows 11 before 2025. And even then, only a fraction of the market will have the ability to try it out since it's only available on Copilot+ PCs

from this year or newer.

Which, by the way, Microsoft *really* wants you to buy into—so much so that it's pushing full-screen ads for users still on Windows 10 (fave.co/3VnF74d). 🏻



After being the focus of intense scrutiny for its privacy and security implications, Microsoft delayed Recall's rollout.

Meet Wi-Fi 8, which will trade speed for more reliable experience

Wi-Fi 7 will remain until 2028, when Wi-Fi 8 is expected to take over. **BY MARK HACHMAN**



The next generation of Wi-Fi, Wi-Fi 8, is currently being developed behind closed doors. This time, the emphasis *isn't* on pure speed, but instead on improving the user experience.

Wi-Fi 8, known right now as IEEE 802.11bn Ultra High Reliability, still remains

years away. Wireless technology is in a constant state of improvement: Each progression in the evolution of Wi-Fi takes several years to discuss, approve, and then deploy. Wi-Fi 7, the current standard, hasn't even been formally ratified quite yet.

But that's not stopping the development of Wi-Fi 8 behind the scenes, and we already know some details. MediaTek's Filogic wireless division has released some of what you can expect, with the caveat that final details won't be nailed down until the final specification is released around Sept. 2028.

The key phrase that you should think of in the context of Wi-Fi 8? Not peak throughput, but *effective* throughput.

WI-FI 8 WILL LOOK A LOT LIKE WI-FI 7

According to the Wi-Fi Alliance and MediaTek, the United States isn't the driving force behind the wireless evolution. Instead, it's China: The country has 650 million broadband subscribers, and more than a quarter have 1Gbps broadband connections to their homes. Overall, the average connection speed is 487.6Mbps, which grew 18 percent in a year's time.

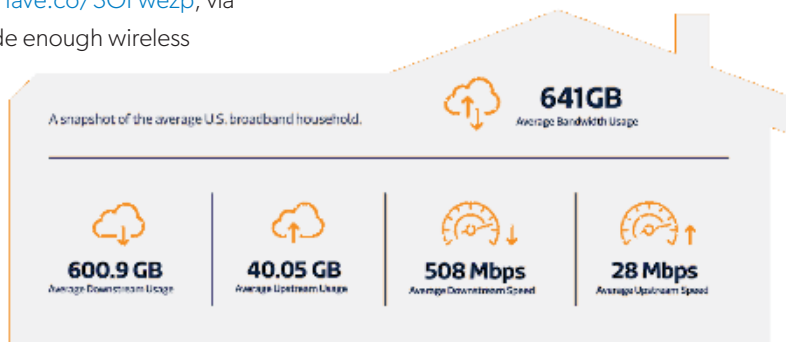
Theoretically, 802.11bn/Wi-Fi 8 set out (Word document, fave.co/3OFwezp, via the IEEE) to provide enough wireless

bandwidth to accommodate your broadband gateway supplying a few gigabits per second, and factoring in the

ability of Ethernet to provide even more. EverythingRF interpreted (fave.co/3ZocTrk) that 2022 document, known as Project Authorization Request (PAR), as one that would provide a minimum aggregate throughput of 100Gbps.

Since then, the PAR was approved in 2023, and the working group has begun hammering out more details. As of Nov. 2024, MediaTek believes that Wi-Fi 8 will look virtually identical to Wi-Fi 7 in several key areas: The maximum physical layer (PHY) rate will be the same at 2,880Mbps×8, or 23Gbits/s. It will also use the same three frequency bands (2.4, 5, and 6GHz) and the same 4096 QAM modulation across a maximum channel bandwidth of 320MHz.

(A Wi-Fi 8 router won't get 23Gbps of bandwidth, of course. According to MediaTek, the actual peak throughput in a clean, or laboratory, environment is just 80 percent or so of the hypothetical peak throughput, and actual, real-world results can be far less.)



OpenVault's Average Broadband Household Index—4Q23.

Still, put simply, Wi-Fi 8 should deliver the same wireless bandwidth as Wi-Fi 7, using the same channels and the same modulation. Every Wi-Fi standard has also been backward compatible with its predecessors. What Wi-Fi 8 will do, though, is change how your client device, such as a PC or a phone, interacts with multiple access points.

Think of this as an evolution of how your laptop talks to your home's networking equipment. Over time, Wi-Fi has evolved from communications between one laptop and a router, across a single channel. Channel hopping routed different clients to different bands. When Wi-Fi 6 was developed, a dedicated 6GHz channel was added, sometimes as a dedicated backhaul between

your home's access points. Now, mesh networks are more common, giving your laptop a variety of access points, channels, and frequencies to select between.

HOW WI-FI 8 WILL IMPROVE WI-FI TECHNOLOGY

MediaTek sees several opportunities to improve the coordination between access points and devices. (To be fair, we're identifying these as MediaTek's efforts, only because we can't be sure that they'll eventually be approved by the 802.11bn working group for Wi-Fi 8 as a whole.)

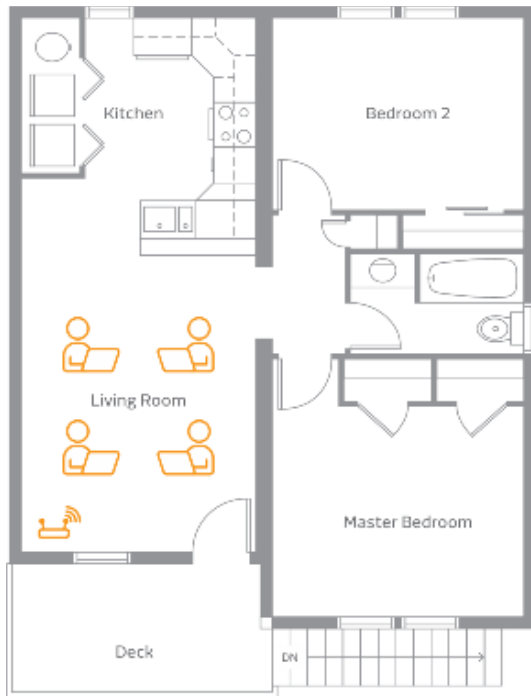
Coordinated Spatial Reuse (Co-SR):

This technology was first implemented in Wi-Fi 6 as Spatial Reuse. The problem occurred when

there was a difference in transmission power between an access point talking to a nearby device, and simultaneously communicating with a second access point a great distance away. If the first access point reduced its power to communicate with the nearby device, it couldn't be "heard" by the access point.

WI-FI FEATURES

FEATURE	WI-FI 4	WI-FI 5	WI-FI 6	WI-FI 7	WI-FI 8
Maximum Channel Bandwidth (MHz)	40	160	160	320	320
Frequency Bands (GHz)	2.4 and 5	5	2.4, 5 and 6	2.4, 5 and 6	2.4, 5 and 6
Maximum PHY Rate	150Mbps * 8 ~ 600Mbps	433Mbps * 8 ~ 4.3Gbps	1,200Mbps * 8 ~ 9.6Gbps	2,880Mbps * 8 ~ 23Gbps	2,880Mbps * 8 ~ 23Gbps
Modulation	64 QAM	256 QAM	1,024 QAM	4,096 QAM	4,096 QAM
Spatial Streams	4	4	8	8	8
MU-MIMO		DL Only	UL & DL	UL & DL	UL & DL
Target Wait Time			Individual, broadcast	Restricted	Coordinated
OFDMA (# RU per SATA)			Yes (single)	Yes (multiple)	Yes (multiple)
Multi-Link Operation				Yes	Yes
Multi-Link Coordination					Yes
DSO/NPCA					Yes
dRU					Yes
IEEE Standard	11n	11ac	11ax	11be	11bn



Congestion is the throughput killer.

Wi-Fi 8's Co-SR is a maturation of the Spatial Reuse technology and will solve the problem by allowing the access points to talk to one another and coordinate their power output, MediaTek said. "Our preliminary trials show that Co-SR could increase the overall system throughput by 15 percent to 25 percent," MediaTek says.

Coordinated Beamforming (Co-BF):

There's a trend here: extending earlier Wi-Fi technologies to multiple access points. Spatial nulling was a feature that was launched in 802.11ac (Wi-Fi 5), which allowed

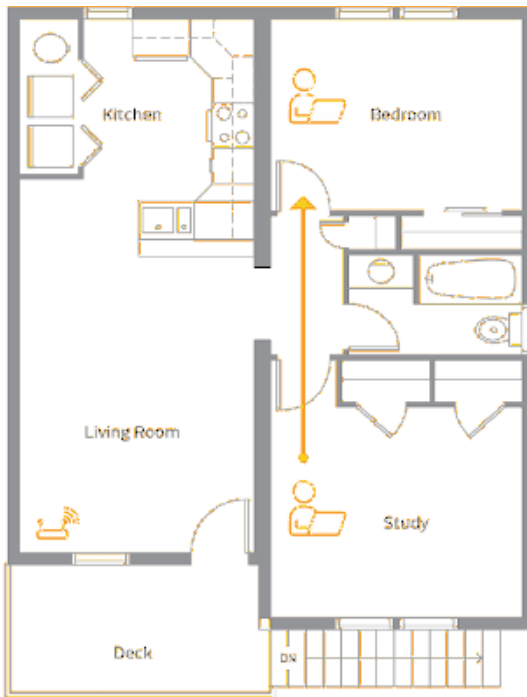
the router to basically stop signaling in certain directions. By doing so, the router would send the signals to where they were requested, and avoid jamming devices that didn't want to talk to the router.

This technique attempts to solve a fairly common problem in connected households, or in a public space served by Wi-Fi: two devices that sit very close to one another. Coordinated beamforming allows the access points to talk to one another, figure out which device wants the signal and which doesn't, and align the mesh access point to steer the signal away from the device that isn't communicating to the network by basically refusing to transmit to the region in which it sits.

"The throughput offered by Coordinated Beamforming (Co-BF) in next-generation MediaTek Filogic is significantly enhanced, with increases ranging from 20 percent to 50 percent in a mesh network setup with one Control AP and one Agent AP," MediaTek said.

Dynamic Sub-Channel Operation:

You're probably aware that the latest devices support for the latest wireless standards, like Wi-Fi 7. But certain devices may also have more or improved Wi-Fi antennas that allow them higher throughput. In the past, that information would be passed to the router and stored there.



A common Wi-Fi scenario: As you move around your home, your wireless data rate adjusts accordingly.

That wouldn't be a problem under most conditions. But in a scenario where a number of different devices were downloading the same file, DSO would create a dynamic scenario where a more advanced device would receive a subchannel for downloading the file faster. The difference between the older approach and Wi-Fi 8's DSO would be that the access point would be able to decide, knowing the capabilities of each device and what they were asking for, and route the data accordingly.

Here, MediaTek believes that DSO could push data throughput 80 percent higher than without the technology.

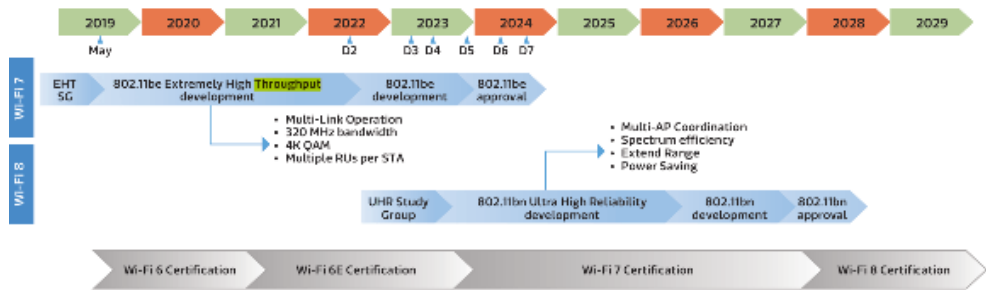
New data rates: You may not be aware of what's called the MCS Index (fave.co/3D09Caa), the Modulation Coding Scheme for Wi-Fi. It's basically a table to help your Wi-Fi router determine what the link speed should be, so that you can actually connect and stream data without errors. If your throughput slows down as you move around your house, that's in part due to your device and router deciding what connection speed your device should stream at.

The problem, MediaTek believes, is that the stepdown to slower rates is too profound, and additional gradations should be introduced, such as 16-QAM with a 2/3 coding rate. The idea would be to not introduce sharp drops and increases in throughput as

you moved your phone or laptop around the home, but rather introduce smaller increments. MediaTek believes these finer MCS divisions can improve overall transmission rates between 5 percent and 30 percent.

A CHANGE OF PACE

Again, the evolution of Wi-Fi 8 depends on how quickly the standard moves through the regulatory process. Wi-Fi 7 (802.11be) was expected to be approved this past



The probable road map for Wi-Fi standards approval.

September, and that hasn't happened. Sony's PlayStation 5 may not be approved for India (fave.co/3CS25tv) because the country has yet to approve the 6GHz wireless channel that the Wi-Fi 7 standard depends upon. That would hinder Wi-Fi 8, too.

Wireless standards take about six years to develop—and impatient hardware makers rarely wait. As MediaTek notes, Wi-Fi 7 products have shipped since the end of 2023, even though the standard hasn't been formally approved. In part that's because the IEEE committee in charge of the standard rarely makes dramatic changes between the approval of the draft and the final standard. For Wi-Fi 8, the first products are expected to be available in early 2028, even as the final approval should be due by the end of that year.

It's worth noting, however, that the race to perpetually higher and higher speeds is pausing, for now, in two different segments of the PC market. CPUs have slowed their rush toward higher clock speeds—at Qualcomm and at Intel—in favor of lower power. With Wi-Fi 8, the emphasis now appears to be on improving the overall user experience first and foremost. 🔌



Wi-Fi 7 products, such as Lenovo's Legion Slim 7i (pictured), are available even though the standard hasn't been formally approved.



I switched from X to Bluesky: What I love and hate about it so far

Bluesky isn't the perfect replacement for X, but I'm sticking with it. **BY DAVE PARRACK**

Along with millions of other people who no longer enjoy the social media platform formerly known as Twitter (fave.co/4eVKMFK), I recently switched from X to Bluesky. I still have an account on X, but it's pretty much inactive now that I'm spending my time on Bluesky instead. And despite having been present on Twitter since 2007, I'll delete my X account at some point.

There's a lot to love about Bluesky (fave.co/3ZB737f), and it truly feels like a return to

the glory days of Twitter, but there are also some obvious issues that may turn you off if you're switching from X. Here are some things you might want to consider before switching to Bluesky.

LOVE: IT LOOKS LIKE THE TWITTER OF OLD

Bluesky's layout, interface, and user experience are pretty much identical to what we had during Twitter's golden era. Feeds are displayed in the same way, and most of the

old Twitter features are here. In fact, the two apps are so indistinguishable that, during my transition phase, I had to remind myself which one I was using at any given moment.

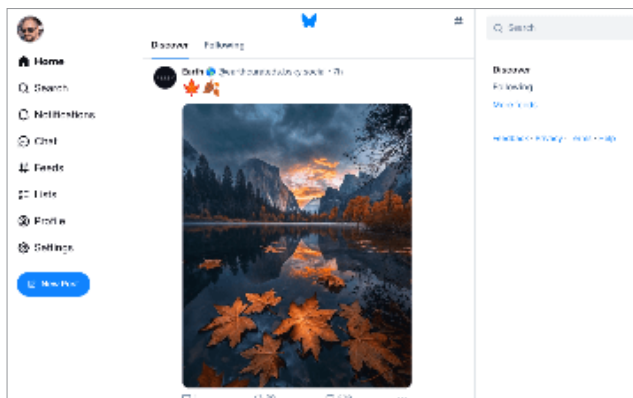
HATE: IT'S DIFFICULT TO FIND PEOPLE YOU KNOW

Bluesky currently has a big discoverability problem. The first thing I wanted to do after setting up my Bluesky account was find the people I followed on X and follow them anew on Bluesky (if they had accounts). But that proved to be harder than it should have been.

While Bluesky does have a search function, the naming conventions, the limited verification, and the relatively small user base all came together to make finding specific people a real chore.

LOVE: LACK OF TROLLING AND NEGATIVITY (SO FAR)

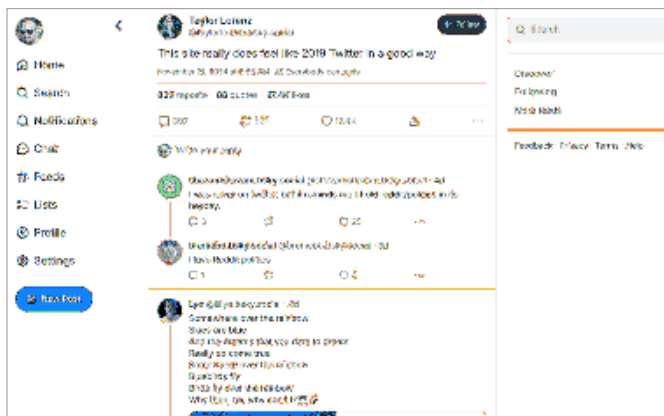
Twitter used to be a place where you could chat with like-minded individuals and respectfully disagree with those who held other



Bluesky's dashboard looks very similar to the one we had during Twitter's golden era.

opinions. However, over the years, it declined into a cesspool of trolls, professional contrarians, and people seemingly keen to express the most debased opinions regardless of how many people they'd upset.

That situation got even worse after Elon Musk acquired Twitter, changed its name to



Bluesky feels like a safe haven, with very little trolling.

X, loosened the rules on what would get you banned, and changed the way verification worked.

By contrast, Bluesky feels like a safe haven. There's very little trolling, and when it does happen, people aren't biting. There's a distinct lack of bots and paid users baiting for engagement. In fact, I'd say the interactions on Bluesky are generally quite pleasant!

HATE: IMPOSTERS ARE HARD TO SUSS OUT

Bluesky has an account verification system... sort of. You can self-verify your account by linking it to a particular domain (fave.co/3OCvFGH), and then confirming the link from the domain side (showing that you actually own it and approve the verification). That domain becomes your Bluesky handle.

That might be good enough for companies and organizations, but it

doesn't quite work for everyone else. Outside of this limited form, there's no account verification on Bluesky—and that means it can be hard to determine which accounts are genuine and official.

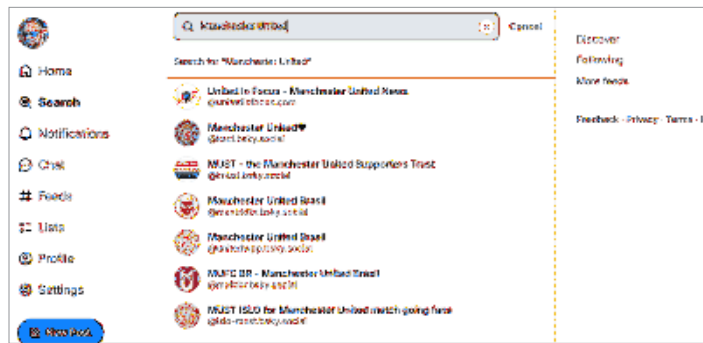
For example, a search for "Manchester United" throws up seven different accounts, none of which is run by the club itself. There are a couple of recognizable fan accounts, but even they may not be legit. Verification is a big task, but Bluesky will need it for widespread adoption.

LOVE: NO BIASED ALGORITHMS FROM ABOVE

All social media platforms employ algorithms to keep you engaged, generally by learning what you like and showing you more of that. However, X's algorithms have gone off the rails in recent years, with Elon Musk's politics influencing every feature of the platform.

Bluesky has its own algorithms, but so far

they remain unsullied by politics and nefarious purposes. So, even when browsing the Discover feed, which shows posts from accounts that you do and don't follow, your past activity is the only thing influencing what you see.



It can be hard to find genuine and official accounts. None of these accounts are run by Manchester United.

HATE: THE LIMITED USER POPULATION

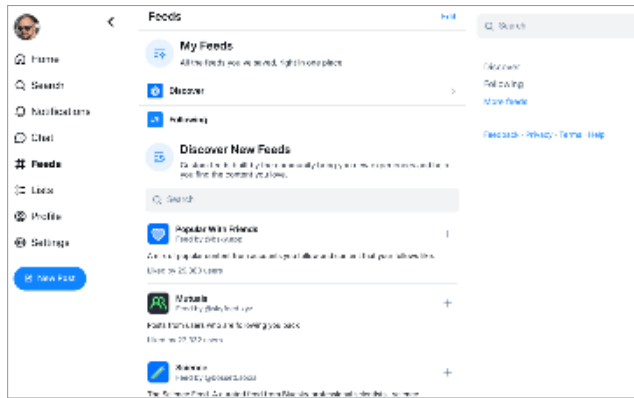
As of this writing, Bluesky has crossed 22 million total users (fave.co/41jLJV3) with no signs of stopping. But while that's certainly an impressive feat, it's still small compared to the other major networks: Facebook has 3 billion users, X has 500 million, and Threads has 200 million.

Yes, Bluesky is picking up thousands of new users every day. And yes, the smaller size might actually be a good thing in some ways. But don't come into it expecting Twitter levels of activity. There are fewer people you know, fewer people posting things you're interested in, and fewer people to interact and engage with.

LOVE: BUILD YOUR OWN FEED OR FOLLOW OTHERS

By default, Bluesky offers two feeds: **Following** and **Discover**. The Following feed shows only posts from accounts you're currently following, while the Discover feed incorporates posts from unfollowed accounts that Bluesky thinks you'll like based on your activity.

But that's not all. There are custom feeds—some created by Bluesky, others created by the community—that filter and tailor the posts



There are custom feeds that filter and tailor the posts you see according to different criteria.

you see according to different criteria. For example, the Popular With Friends feed shows posts liked by the accounts you follow.

And if you have sufficient coding knowledge, you can even build your own custom feed. Learn more in Bluesky's documentation (fave.co/49o1AUF).

HATE: THE GROWING RISK OF FILTER BUBBLES

For all of its flaws, X (and Twitter before it) boasts enough users that there's still a wide spectrum of views being expressed, so anything "This Magazine Free on Soft Archive .is" you post will be agreeable to some and disagreeable to others. Unfortunately, X has devolved into tribalism lately, so who knows how much longer that'll stay true. Bluesky may not have the same problem, but it does face a .different (potential) problem

For the most part, the people on Bluesky are those who felt compelled to leave X, and many of them left due to clashing political views. With every person who migrates over, X moves further in one direction while Bluesky moves further in the opposite direction.

But here's the kicker: Bluesky lets anyone create moderation lists (fave.co/3Zh8TsN)—lists of accounts to be blocked or muted—and anyone can subscribe to these moderation lists to instantly block or mute tons of accounts. You can see how this could be abused to silence people and create echo chambers of opinion.

LOVE: NO ADVERTISING (FOR NOW)

One of the most immediately noticeable differences after moving from X to Bluesky is the lack of advertising. While many companies have stopped advertising on X

over the last few years, you do still see ads between posts and after every video you play.


Bluesky hasn't yet turned to advertising to fund its existence, instead relying on venture funding while growing its user base. Advertising will likely come at some point, but right now, in this early stage, it feels great to use the app unencumbered by brands trying to sell you things.

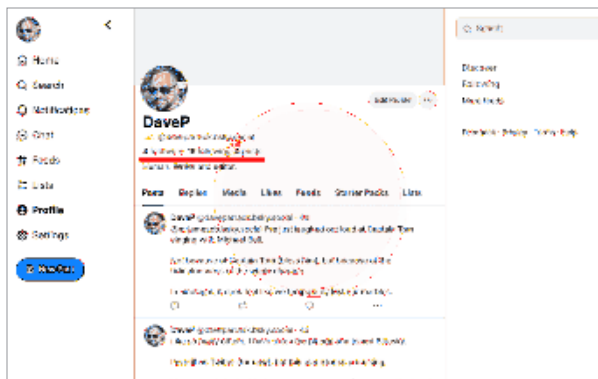
HATE: STARTING OVER FROM SCRATCH

Given how new Bluesky is and how small its user base is, switching means essentially starting over from scratch. For someone like myself, who joined Twitter back in 2007, that can feel a little overwhelming.

I never built a huge following on Twitter, and I've increasingly been feeling like I'm speaking into the void on X anyway. Still, starting with zero followers and struggling to even find accounts to follow makes the idea of

ditching X in favor of Bluesky tougher than it should be.

But despite all the cons, I'm certainly intrigued by Bluesky and will be sticking with it. Perhaps you will, too. As more users migrate over, even more users will follow in their footsteps. Not quite ready to quit X yet? Check out these ways to make it more tolerable for now (fave.co/3Bb0wqG). 



Moving to Bluesky means you'll need to start all over again.

Disposable addresses would make Gmail a privacy powerhouse

Your email address can be a liability for online security, but it doesn't have to go that way. **BY ALAINA YEE**

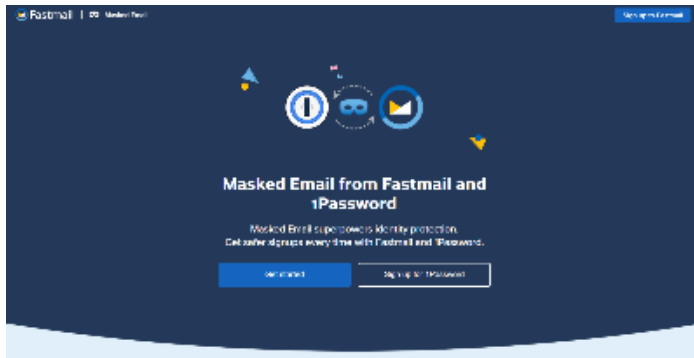


Your email address is a liability when yet another of your accounts get hacked. After your login credentials are leaked, attackers can use those same credentials to try logging into different services across the web to see what else they might unlock.

But there's a better way—and Google seems poised to bring it to the masses. As

spotted by Android Authority (fave.co/3CVU0oj), a new Shielded Email feature in the Gmail app for Android devices is seemingly on the way. It would let you create disposable email addresses, temporary burner email addresses that forward email to your real account.

My colleague Michael Crider covered how Shielded Email could serve as a defense



Using a random, unique email address for every account is the same principle as masked email.

against spam (fave.co/4gfozU8), but there's another payoff to this privacy protection: stronger online security.

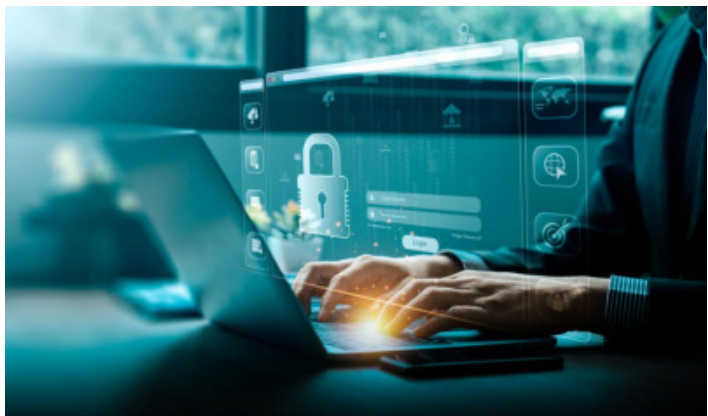
Using a random, unique email address for every account you have would make it harder for hackers to use data leaks to break into other accounts of yours. This is the same principle as masked email (fave.co/3aS7pzQ), but with one big advantage: You don't need to sign up for a separate service.

With almost 2 billion users already signed up for Gmail, the new Shielded Email feature would level up standard privacy, big time. If offered for free, it would also eclipse

Apple's equivalent feature, Hide My Email, which is only available to paying iCloud+ subscribers.

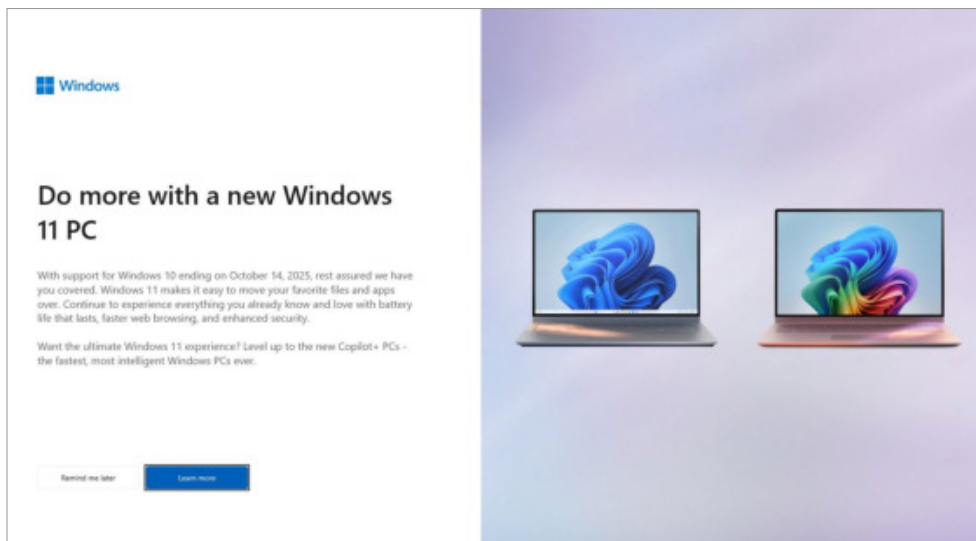
I'm rooting for this feature to make it out the starting gate. Google's been strengthening its security and privacy features, like dark web monitoring (fave.co/

[49kUoso](https://fave.co/49kUoso)) and improved passkey support in its password manager, without gating it behind a Google One subscription. With how bad data leaks and breaches have gotten lately, the smart way to avoid hackers who are exploiting current conventions is to change them altogether. 🔌



Google has been strengthening its security and privacy features, such as improved passkey support in its password manager.

IMAGE: SUTTHIPHONG CHANDAENG/SHUTTERSTOCK



Windows 10 gets full-screen ads that say buy a new PC already

Microsoft continues to insist that you move to Windows 11, this time by telling you to buy a Surface Laptop. **BY MICHAEL CRIDER**

Microsoft wants to be done with Windows 10 and have everyone move to Windows 11. It's given the nine-year-old operating system an official expiration date next year (fave.co/3ZAThkZ), and it's not shy about leaving those users behind. But its latest attempt to spur them on is its most brazen yet: full-page ads telling you to just go buy a Copilot+ laptop.

This isn't Microsoft's first alert to users that Windows 10 is being retired, and it's not even

the first time it has resorted to full-screen alerts (fave.co/41e65iH) to drive the message home. But the newest flavor of the, ahem, *helpful message* is much more blatant about being an advertisement. It isn't telling users to upgrade their current operating system, which would be a legitimate and fairly easy option for any machine sold in the last three years or so. It's something that similar alerts offered earlier this year.

Rather, this new alert spotted by The Verge (fave.co/4igqU2V) is just a full-on

advertisement for a brand-new laptop. Specifically, it's Microsoft's own Surface Laptop line, though it's merely pictured instead of named. "Want the ultimate Windows 11 experience?" asks the message. "Level up to the new Copilot+ PCs—the fastest, most intelligent Windows PCs ever."

The message reminds you that Windows 10 will no longer be supported after October 2025. There are ways around that (fave.co/4iySBo3), but they're expensive and temporary. Microsoft seems increasingly insistent—or possibly desperate—to get users off the older operating system.


While Microsoft tells users they're running out of time, you might say the same for the company itself. Less than a year away from its ultimatum, just under 61 percent (fave.co/3ZA9MOu) of Windows machines are still running Windows 10, while Windows 11 only makes up about 35 percent. The numbers are shifting—six months ago, Windows 10 was almost 70 percent of the Windows market—but it's a slow drift.

Let's compare that to the same figures for Windows 8.1 and Windows 10, respectively, a year before Windows 8.1 was retired for Windows 10. According to Statcounter (fave.co/3CVgjR8), at the same point in January 2017, Windows 8.1 was just 9.65 percent of the market while Windows 10 was 32.84 percent. There's an X factor here in Windows 7, which was still running on an

astonishing 47.46 percent of machines. It would take another year for Windows 10 to overtake it.

Microsoft has had a tumultuous time with the last few major releases of Windows, even while it maintains its dominance of the desktop and laptop market. In brief, people hated Windows Vista, loved Windows 7, hated Windows 8, tolerated the less-radical Windows 8.1, and loved the more conventional and powerful Windows 10 again. I wouldn't say that people hate Windows 11, but it's definitely gotten a much colder reception (fave.co/3MKARbu) than its predecessor due to some major interface shifts and a lot more in-your-face advertising and promotion. The forced integration of Copilot AI features (fave.co/3BcPJWu) is also turning off a lot of power users.

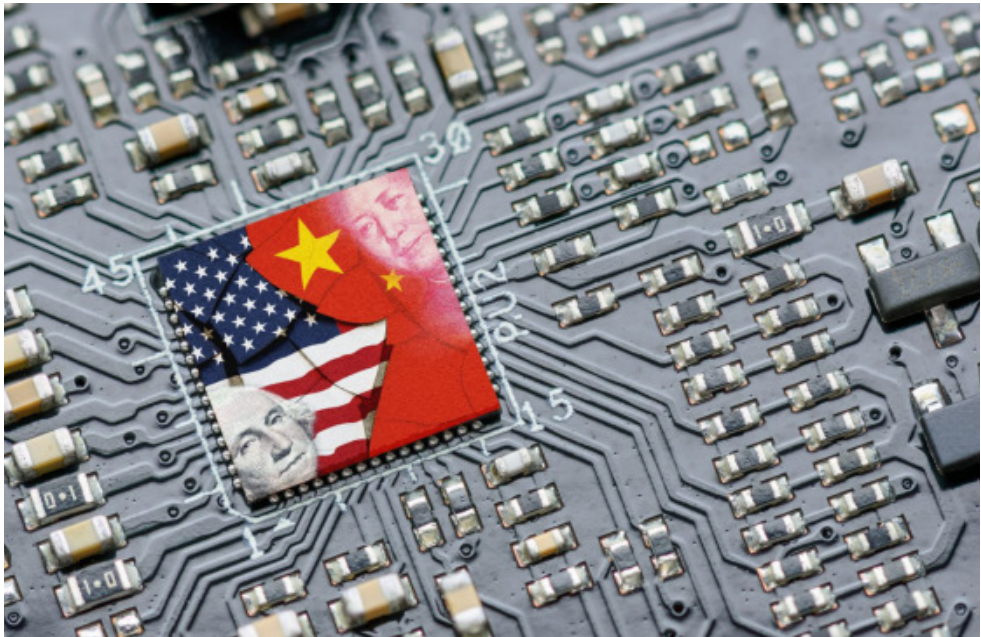
Microsoft probably feels comfortable trying to strong-arm users off its older OS—it's no stranger to doing that, after all. But 2024 is a very different time than 2017. A lot of users (possibly even the majority?) now interact with their phones more than their primary PCs, and both Macs and Chromebooks are more competitive.

Microsoft still has a stranglehold on the business market, but general consumers have a lot more options in a lot more form factors. I wonder if trying to nag people off an operating system they like and onto one they don't is the wisest move to make. 

Trump's tech tariffs could slam your wallet, bigly

If Trump levels a 60 percent tariff against China, that will hurt your wallet in a big way.

BY MARK HACHMAN



The Trump administration will arrive in Washington this coming January with an enormous question mark over its head: Will Trump deliver on his promise to impose tariffs of up to 60 percent, and how will that affect the technology products that Americans buy?

The short answer? No one really knows. For now, however, we have to take Trump's

words at face value, even if he eventually changes his mind. And if we do that, we can point you to where you'll be paying more.

Specifically, Trump's statements indicate that two tariffs would be imposed: a flat tariff of about 10 percent on all imports, plus an additional 60 percent tariff on goods imported from China. The Consumer Technology Association has estimated that,

based on current levels and patterns of trade, the effective tariff on Chinese goods will go up as high as 80.6 percent.

Major consumer organizations, though, have begun calculating what these tariffs will cost American consumers. Prior to the election, the Consumer Technology Association (CTA) said that the tariffs would raise laptop and tablet prices by 46 percent (fave.co/3Bp3J5T). On Nov. 4, the National Retail Federation (NRF) estimated that prices on household appliances would rise by 19 to 31 percent, and the price of toys would rise between 36 and 56 percent (fave.co/4fVxYAE). The Center for American Progress calculates that the average American family will pay up to \$3,900 more per year across the board under the plan (fave.co/4ihLboV).

Though Congress has the power to impose tariffs, it can cede the power to the

president. Trump used Section 301 of the Trade Act during his first term, when he levied a smaller retaliatory tariff against Chinese imports, specifically solar panels, steel, and consumer goods (fave.co/3Zyxuul). The Tax Foundation considered that to be an \$80 billion tax hike on the American taxpayer (fave.co/4g3Akgl). However, President Joe Biden left virtually all of those tariffs in place, the organization found.

WHAT IS A TARIFF?

A tariff is a fee imposed by a government to import goods. Economically, it's a lever that a government can pull to push its citizens into buying more domestically. It works most effectively, however, when the countries in question both produce a common good, such as wheat. If a country like China manufactures a television or motherboard

that an American citizen can't buy from an American manufacturer, the American buyer has no choice; they must pay the tariff regardless.

Here's the way a tariff works: A tariff is a fee imposed at

SUMMARY OF ESTIMATED IMPACTS OF PROPOSED TARIFFS ON CONSUMERS

	SCENARIO A: 10/70		SCENARIO B: 20/120	
	INCREASE IN CONSUMER PRICE	LOST CONSUMER SPENDING POWER	INCREASE IN CONSUMER PRICE	LOST CONSUMER SPENDING POWER
Apparel	+12.5%	\$13.9 billion	+20.6%	\$24 billion
Toys	+36.3%	\$8.8 billion	+55.8%	\$14.2 billion
Furniture	+ 6.4%	\$8.5 billion	+9.5%	\$13.1 billion
Household Appliances	+19.4%	\$6.4 billion	+31%	\$10.8 billion
Footwear	+18.1%	\$6.4 billion	+28.8%	\$10.7 billion
Travel Goods	+13%	\$2.2 billion	+21.5%	\$3.9 billion

The National Retail Federation has projected two scenarios: a 10% or 20% tariff imposed on every country, and either a 70% or 120% tariff imposed on Chinese goods. The estimated effects of both are listed here.

the point of entry. If a retailer wants to import a Chinese-made Blu-ray player, for instance, that retailer will buy the player for a certain cost—say, \$100.

At U.S. customs, the tariff is imposed:

If the retailer wants to import that player,

it must pay (in this case) 60 percent of the cost, or \$60. (Foreign shippers, such as a Chinese company, do not pay the tariffs.) The retailer is going to resell the Blu-ray player for a markup, anyway—let’s assume 30 percent. If there was no tariff, the consumer would pay \$100 plus 30 percent, or \$130, for the right to run down to Best Buy or Target and pick up the player.

With the tariff, the retailer has to make a choice: absorb the cost of the tariff and sell the player at or near the original price of \$130, or pass along the tariff’s cost to the consumer. Given that a retailer has an obligation to make money, the common belief is that the retailer would opt for the latter choice and make the consumer pay. Now our hypothetical Blu-ray player costs \$100 plus the tariff’s 60 percent (\$160), plus the 30 percent retailer markup: \$208. That’s a difference of \$78 from the original, pre-tariff price to the higher, post-tariff price.



Retailers aren’t likely to absorb the cost that any tariffs bring.

“In brief, we find that the additional costs associated with these proposed tariffs would be too large for U.S. retailers to absorb and, when passed on to consumers, would result in prices higher than many consumers would be willing or able to pay,” the NRF said.

“Some consumers would stop purchasing the items and demand would fall.”

Whether you characterize the tariff as an effective tax, as CAP does, or simply inflationary, the simple answer is that the Trump tariffs will likely raise prices.

WHAT WILL TRUMP’S TARIFFS DO TO THE PRICE OF TECH PRODUCTS?

That’s the simple math. The problem is that electronics manufacturing is anything but a simple problem.

Laptops, smartphones, and other complex electronic devices contain varying numbers of components, many of them

sourced from China—but also from Taiwan, Korea, Japan, Vietnam, and elsewhere in Asia. Some peripherals—especially peripherals like USB-C hubs, for example—ship directly to Amazon and are produced by a variety of small Chinese startups. Intel manufactures its chips in countries like Israel, Ireland, and others, but packages them in still other countries, such as Malaysia. Tariffs are still assessed, whether on the individual components or the finished goods.

Other companies, such as peripherals maker Plugable, have moved their operations out of China. Plugable moved because of intellectual property concerns, but a variety of reasons have prompted manufacturers to distance themselves from China, IDC analyst Phil Solis wrote in an email. (IDC is owned by IDG, which owns PCWorld.)

“It is important to note that because of the tariffs introduced in President-elect Trump’s first term and kept in place by the Biden administration, the supply chain disruption from the global COVID-19 pandemic, countries looking to increase manufacturing jobs, and the potential for an escalation of the trade war, companies have already been shifting

manufacturing to other countries such as Vietnam, Malaysia, India, and Brazil,” Solis wrote.

“The semiconductor ecosystem has seen chip fabs being built in countries around the world with government investments to help,” Solis added. “If tariffs were to focus only on China, the effects would be lessened overall by the fact that many companies have already shifted manufacturing to other countries from China or are planning to do so because of President-elect Trump’s statements about tariffs.”

The CTA found that the current tariff on lithium-ion batteries—currently the highest

SUMMARY OF ESTIMATED IMPACTS OF PROPOSED TARIFFS ON CONSUMERS

	INCREASE IN CONSUMER PRICE	LOST CONSUMER SPENDING POWER	AVERAGE RETAIL COST INCREASE*
Laptops and Tablets	+45%	\$32.5 billion	+\$357, laptops; +\$201, tablets
Smartphones	+25.8%	\$25.6 billion	+\$213
Connected Devices	+10.2%	\$7.9 billion	+\$5 to +\$37
Video Game Consoles	+39.9%	\$6.5 billion	+\$246
Computer Accessories	+10.9%	\$5.2 billion	+25, printers
Monitors	+31.2%	\$5 billion	+\$109
Desktop Computers	+6.2%	\$3 billion	+\$74
Televisions	+9%	\$1.5 billion	+\$48
Lithium-Ion Batteries	+12.1%	\$1.5 billion	Up to +\$11
Speakers and Headphones	+10.9%	\$1.1 billion	\$29, speakers; +\$35, headphones

* Assuming full pass-through of tariff costs to retail buyers.

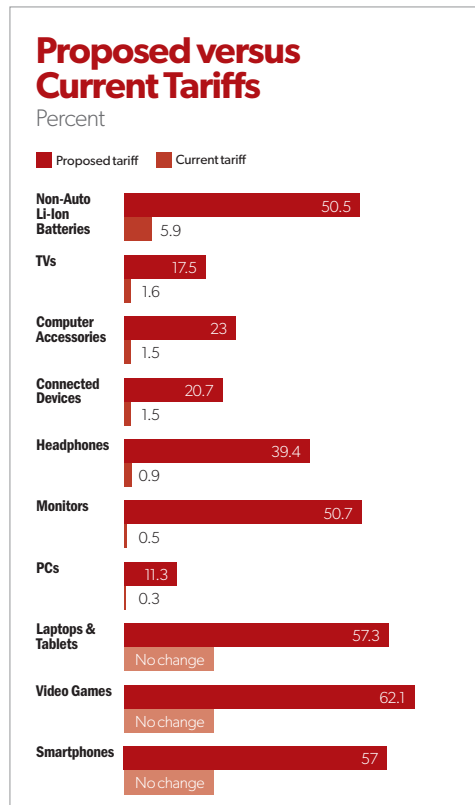
The Consumer Technology Association’s estimates on how much the proposed Trump tariffs will cost the average U.S. family.

the CTA tracked, at 5.9 percent—would go up to 50.5 percent under the new plan. Laptops and tablets would go from zero to 57.3 percent. Video games could be the hardest hit, with tariffs that would increase from zero to 62 percent.

That will raise prices across the board, the CTA estimated. The average laptop price will increase by \$357. Oddly, the CTA was much more optimistic in terms of desktops, as prices might only increase by \$74. Here, though, the tariffs would have their desired effect, as Chinese imports would essentially vanish. The price of computer monitors, many of which are imported from China, would increase by 31 percent or an average of \$109.

Smartphone prices would increase by \$213 (if a price of \$816 is used as a baseline), the CTA found. Smartwatch prices would jump \$37. Television prices might only go up \$48—but the cheapest TVs, such as those made by Chinese brands like TCL, might face relatively steep price increases. But it's the price of video-game consoles that tech enthusiasts should worry about, with tariff costs potentially adding \$246 to the total price.

The NRF didn't focus on consumer tech products per se. Its examination of household appliances comes closest, with its estimates of prices for items such as refrigerators, toasters, and ovens. Still, consumers are likely to pay between \$126 to



\$202 more for a refrigerator that costs \$650, the NRF found.

CAN TARIFFS BE AVOIDED?

Yes, they can, if only because Trump is a negotiator. As Bloomberg noted ([fave.co/4fia3KF](https://www.bloomberg.com/news/articles/2025-01-08/apple-ceo-tim-cook-essentially-talked-apple-out-of-the-first-trump-tariffs)), Apple CEO Tim Cook essentially talked Apple out of the first Trump tariffs simply by flying to Trump's New Jersey golf club and making his case. But that strategy has only seemed to work when

individual company executives meet with Trump one-on-one.

For now, tech companies haven't had to answer the tough questions about how they plan to weather any Trump tariffs. Election Day (Nov. 5) fell shortly after major chipmakers like AMD, Intel, and Qualcomm reported their earnings, which are accompanied by a routine grilling of executives by Wall Street analysts. Nvidia reported earnings on Nov. 20, followed by Dell on Nov. 26.

Meanwhile, contract manufacturer and iPhone builder Foxconn said on Nov. 14 that it's diversifying its supply chain, and its chair said "it's uncertain" what policies Trump will implement (fave.co/4f1RBWp). Foxconn was the crown jewel of a 2017 plan to bring foreign manufacturing to the U.S. under Trump. It went bust (fave.co/4ihhe8v).


Unfortunately, there's no guarantee that corporations will keep prices down, even if they're *not* subject to tariffs—one of the underlying issues of the Biden presidency.

Snopes.com (fave.co/3OFSclS) pointed out a 2020 economic paper that found that the price of clothes dryers rose by about 12 percent in 2012 and 2016, when the U.S. placed anti-dumping duties, or tariffs, on China and South Korea. The problem? *Washing machines* were the subject of the tariffs, not dryers. But dryer prices went up anyway. Preventing that is up to U.S.

government agencies like the Federal Trade Commission...which may or may not face cuts coming from the new Department of Government Efficiency.

There are other corollary costs consumers could face: proposed tariffs on cars imported from Mexico, and the phasing out of the federal tax credit for electric vehicles. Mario Morales, another IDC analyst, said he's more concerned about the potential effects of the CHIPS Act, which hasn't really paid out any substantial amounts of funding—and which Trump has promised to rework. What about immigration? That's left even more uncertainty in the supply chain.

There's even the very real possibility of a tariff war or trade war, where other countries place tariffs on American goods. U.S. exports would then fall, hurting American companies. It might not be China that imposes them but Trump. In 2023, Trump suggested levying exactly the same tariff that other countries place on the U.S., as a retaliatory measure (fave.co/4g1CEzh).

Basically, we don't know for sure what will happen. That's left some in the industry scratching their heads, wondering whether tariffs will turn out to be another Trump bluff, or the last opportunity to grab a bargain before prices jump hundreds of dollars next year. Is normalcy still a possibility? Analysts hope so. "Hopefully cooler heads prevail over time," IDC's Morales said. 

I am
more
than
who
I am
on
paper.



Jeff, STAR

It's time to let your skills shine.
Find resources for breaking through barriers like
degree screens and stereotypes. It's time to tear the
paper ceiling limiting STARs: workers *Skilled Through
Alternative Routes* rather than a bachelor's degree.

TEAR THE PAPER CEILING.ORG

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SKILLED THROUGH
ALTERNATIVE ROUTES™

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MAKE SURE CUTIE PIE IS IN THE RIGHT SEAT.

[NHTSA.gov/TheRightSeat](https://www.nhtsa.gov/TheRightSeat)



NHTSA



Intel's Arc B580 is the GPU we've begged for since the pandemic

Powered by the new Xe2 Battlemage architecture and a new XeSS 2 frame generation feature, Intel's \$249 Arc B580 is bringing 1440p gaming to the masses. **BY BRAD CHACOS**

Intel heard your screams of anguish, PC gamers. Budget graphics cards that are actually worth your money have all but disappeared this pandemic-, crypto-, and AI-crazed decade, with modern "budget" GPUs going for \$300 or more, while simultaneously being nerfed by substandard memory configurations that limit your gaming to 1080p resolution unless you make some serious visual sacrifices.

No more.

Today, Intel announced the \$249 Arc B580 graphics card (launching December 13) and \$219 Arc B570 (January 16), built using the company's next-gen Battlemage GPU architecture. The Arc B580 not only comes with enough firepower to best Nvidia's



VIDEO: INTEL'S TOM PETERSEN TALKS B580, B570, XESS2 AND MORE

Watch now at fave.co/3Bgmfxj



Intel's range of budget graphics cards.

GeForce RTX 4060 in raw frame rates, it has a 12GB memory system target-built for 1440p gaming—something the 8GB RTX 4060 sorely lacks despite costing more.

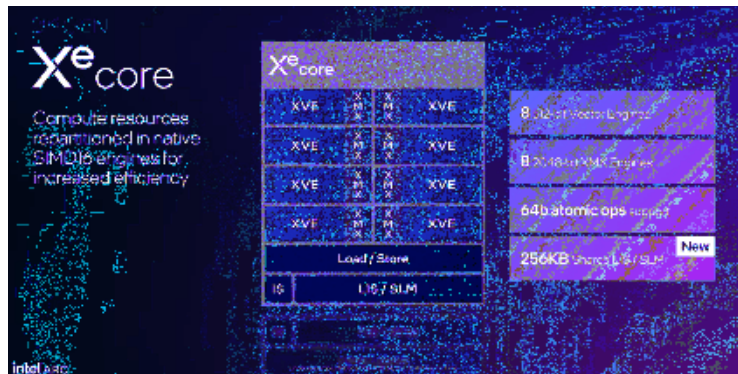
As if that wasn't an appealing enough combination (did I mention this thing is \$249?), Intel is upping the ante with XeSS 2, a newer version of its AI super-resolution technology that adds Nvidia DLSS 3-like frame generation for even *more* performance, as well as Xe Low Latency (XeLL), a feature that can greatly reduce latency in supported games.

Add it all up and Intel's Arc B580

seems poised to really, truly shake things up for PC gamers on a budget—something we haven't seen in years and years. If you're still rocking an OG GTX 1060, take a serious look at this upgrade. Let's dig in.

MEET BATTLEMAGE AND THE ARC B580

Intel's debut Alchemist Arc GPUs ([fave.co/3g2HHul](https://www.fave.co/3g2HHul)) launched in late 2022, rife with all the bugs and issues you'd expect from the first generation of a product as complex as modern graphics cards. Intel diligently ironed those out over the subsequent months,



delivering driver updates that supercharged performance (fave.co/3CYzR0N) and squashed bugs at a torrid pace.

In a briefing with press, Intel Fellow Tom Petersen said a major force during Battlemage's development was improving software efficiency, to be better able to unleash the full power of Intel's hardware. But remember, it ran on first-gen hardware, too. Battlemage improves efficiency on that front, using tricks like transforming the vector engines from two slices into a single structure, supporting native SIMD16 instructions, and beefing up the capabilities of the Xe core's ray-tracing and XMX AI instructions to make everything run smoother and better than before.

New Vector Engine

- SIMD16 native AI Us**
5x speed for AI workload
- Xe Matrix extensions**
1.5x speed for AI workload
- Extended Math and FP64**
1.5x speed for AI workload
- 3-way co-issue**
1.5x speed for AI workload

Xe2 Vector Engine

XMX

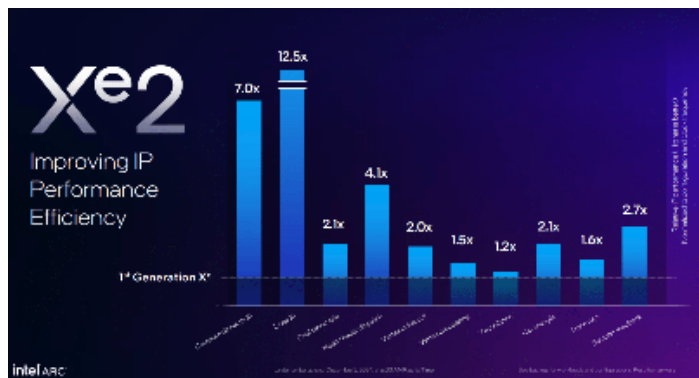
intel arc

Introducing BMG-G21

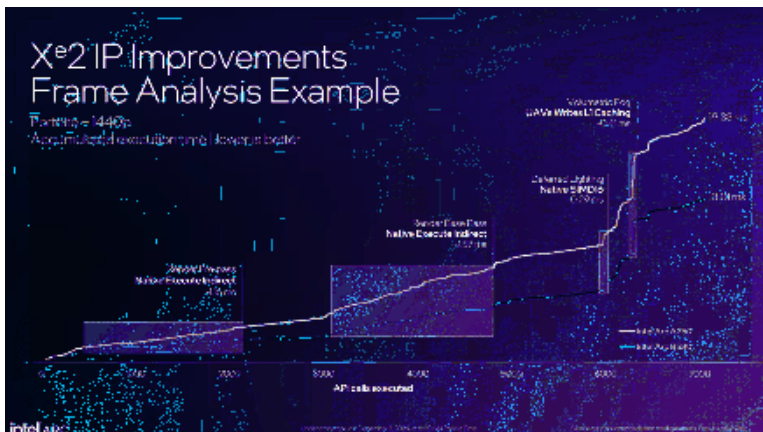
BMG-G21

- 5 Shader Units
- 20 Xe Cores
- 160 Vector Engines
- 20 Xe Matrix Engines
- 20 Xe AI Engines
- 10 Xe Matrix Engines
- 18 MB L3 Cache
- 192 Xe Cores
- 2 Xe Matrix Engines

intel arc



Intel says it has improved software efficiency.



Battlemage’s hardware efficiency improvements are illustrated here, showing how a Fortnite frame runs on the new Arc B580 versus last-gen’s (more expensive) A750—the time to render a frame dropped from 19ms to a silky-smooth 13ms.

I’ve included a bunch of technical slides above, so nerds can pick through the details. But here’s the upshot: The Arc B580 delivers 70 percent more performance per Xe core than last gen’s Arc A750, and 50 percent more performance per watt, per Intel.

Cue Keanu Reeves: *Whoa*. That’s absolutely *bonkers*. You almost never see performance leaps that substantial from a single-generation advance anymore!

That’s at an architectural level; the

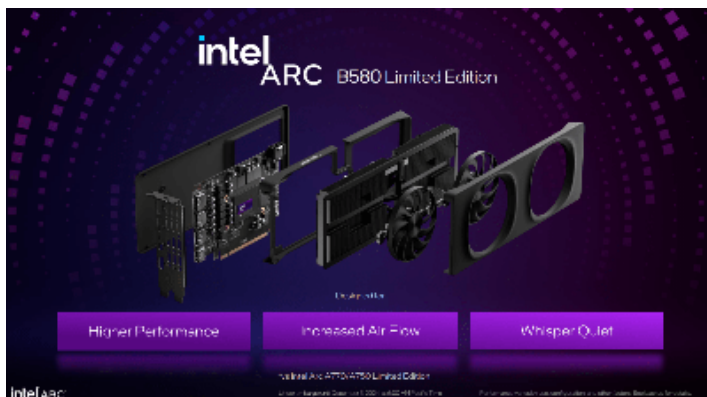
slide above shows the specific hardware configurations found in the Intel B580 and B570. A couple of things stand out here, first and foremost the memory configuration.

Nvidia and AMD’s current \$300 gaming options come

with just 8GB of VRAM, tied to a paltry 128-bit bus that all but forces you to play at 1080p resolution. The Arc B580 comes with an ample 12GB of fast GDDR6 memory over a

Intel ARC B580	Intel ARC A750	
20	18	Xe-cores
5	5	Render Units
20	18	Ray Tracing Units
160	144	DRP AI Cores
2670 MHz	2500 MHz	Graphics Clock
12 GB	10 GB	Memory
192 bit	160 bit	Memory Interface
450 GB/s	380 GB/s	Memory Bandwidth
283	208	Max. Hot Spot Power
190 W	150 W	Total Board Power
1.8 Pin		Power Connector
PCIe 4.0 x8		PCIe Interface
AV1, HEVC, AVC, VP9, XAVC-H		10 Video Streams
DirectX Ray Tracing 2.1 (up to L1.6 RT 1.1)		DirectX Ray Tracing
Xe HPG 2.1		DirectX Ray Tracing

Here you can see the specific hardware configurations found in the Intel B580 and B570.



Intel's homebrew Limited Edition reference GPUs will return for the B580 in a newer, smaller design with blow-through cooling.

wider 192-bit bus—so yes, *this* GPU is truly built for 1440p gaming, unlike its rivals. The Arc B570 cuts things down a bit to hit its \$219 price tag but the same broad strokes apply.

Also worth noting: Intel's new GPUs feature a standard 8-pin power connector (though third-party models may add a second one to support Battlemage's ample overclocking chops)—no fumbling with fugly 12VHPWR connectors here.

Intel's homebrew Limited Edition reference GPUs will return for the B580 in a newer, smaller design with blow-through cooling. You'll also be able to pick up third-party custom cards from the partners shown above, and the B570's launch in January

will be exclusive to custom boards, with no Limited Edition reference planned.

As part of the launch, Intel is also introducing a redesigned gaming app with advanced overclocking capabilities, including the ability to tweak voltage and frequency offsets.

INTEL ARC B580 PERFORMANCE DETAILS

Now let's dig into actual performance, using Intel's supplied numbers.

Intel says the \$249 Arc B580 plays games an average of 25 percent faster than last generation's *higher-tier* \$279 Arc A770



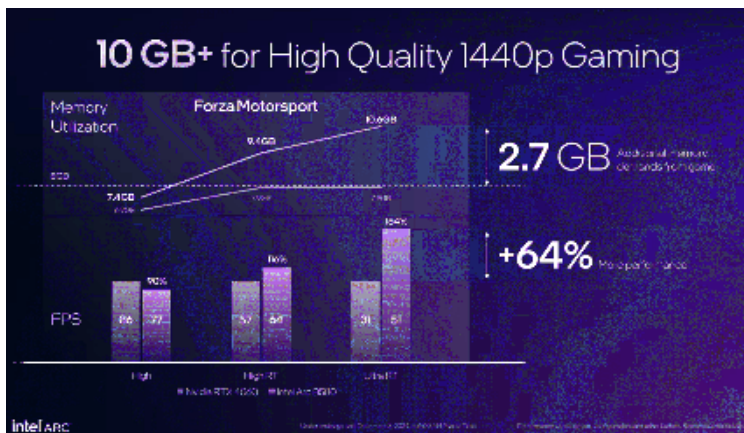
Intel is also introducing a redesigned gaming app with advanced overclocking capabilities.



Intel’s claimed performance for its Arc B580.

across a test suite of 40 games. Compared to the competition, Intel says the Arc B580 runs an average of 10 percent faster than Nvidia’s RTX 4060—though crucially, those numbers were taken at 1440p resolution rather than the 1080p resolution the overpriced RTX 4060 works best at.

Intel also made a point of stressing how the RTX 4060’s limited 8GB of RAM over a 128-bit bus can directly impact performance today. The screenshot shown opposite shows *Forza Motorsport* running at 1440p resolution. At standard High settings, the RTX 4060 actually holds a performance advantage. As you scale up the stressors, turning on ray tracing and moving to Ultra settings, the advantage instantly flips, with the B580 taking a clear and substantial lead, while the RTX 4060



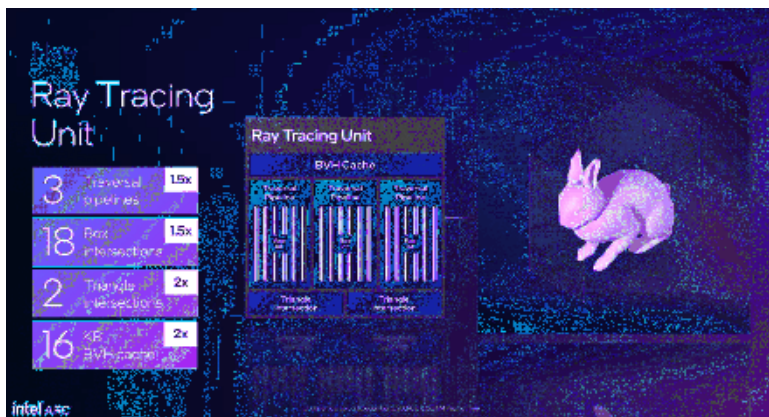
Here are the results of *Forza Motorsport* running at 1440p resolution.

hits the limits of what’s possible with its memory setup.

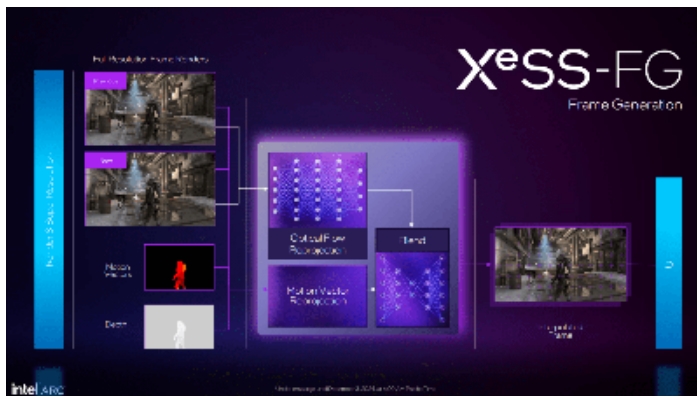
Speaking of which, Intel says most of the key technologies underlying ray tracing have been improved by 1.5 to 2 times in Battlemage compared to the first-gen Arc Alchemist offerings. Considering that Intel’s debut Arc cards already went toe-to-toe with Nvidia’s vaunted RTX 40-series ray tracing, there could be a fierce battle brewing in realistic real-time lighting next year—which isn’t something I’d thought I’d say in

the \$250 segment before even flipping the calendar to 2025. If you’re still rocking a GTX 1060 or 1650 from back in the day, the Arc B580 would be a massive upgrade in both speed and advanced features like ray tracing.

Raw hardware firepower alone is only part of the graphics equation these days, however. Nvidia’s RTX technology forced the power of AI upscaling and frame generation into consideration this decade—and Intel’s new software features are designed to supercharge frame rates and lower latency even further.



Intel says most of the key technologies underlying ray tracing have been improved.



XeSS technology is Intel's AI upscaling rival to Nvidia's DLSS technology.

MEET XESS 2 AND XE LOW LATENCY

Intel's XeSS technology debuted alongside the first-generation Arc cards, serving as an AI upscaling rival to Nvidia's core DLSS technology. (These render frames at a lower resolution internally, then use AI to supersample the final result, leading to higher performance with little to no loss in visual quality.) But then Nvidia launched DLSS 3, a technology that injects AI-generated interpolated frames between every GPU-rendered frame, utterly turbocharging performance in many games and scenarios.

XeSS 2 is Intel's response to that. While

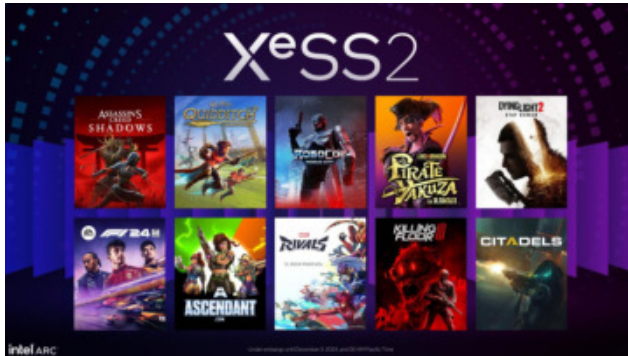
DLSS 3 requires the use of a hardware Optical Flow Accelerator only present in RTX 40-series GPUs, Intel's XeSS 2 uses AI and Arc's XMMA engines to do the work instead—meaning it'll also work on previous-gen Arc cards, and the Xe-based integrated graphics found in Intel's Lunar Lake

laptops (fave.co/402SDh2).

And as we see with DLSS 3, the performance improvements can be *outstanding*. Intel says that in its in-house F1 24 tests with the B580, activating XeSS 2 with supersampling and frame generation can improve performance by a whopping 2.8× to



Intel's in-house F1 24 tests with the B580 show activating XeSS 2 with supersampling and frame generation can improve performance by a whopping 2.8× to 3.9 ×.



Support for XeSS 2 is coming to the games shown above, with more to arrive in the coming months.

3.9x, depending on the Quality setting used. While the game runs at 48fps at the chosen settings without XeSS 2 enabled, turning on XeSS 2's Ultra quality lifts that all the way up to 186fps—a literal game changer.

Support for XeSS 2 is coming to the games shown above, with more to arrive in the coming months. First-gen XeSS hit 150 games to date, so the hope is that XeSS 2 (which uses different APIs for developers to hook into) ramps quickly as well.

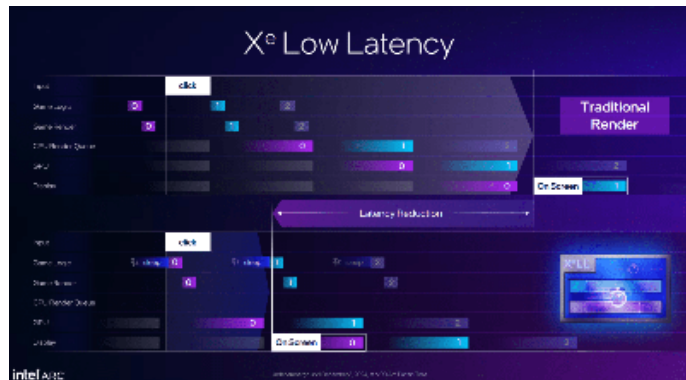
Injecting AI frames between traditional frames has a side effect, though—it increases latency, or the reaction between your mouse click and the action occurring onscreen,

because the interpolated AI frames can't respond to your commands. Enter Intel's Xe Low Latency feature.

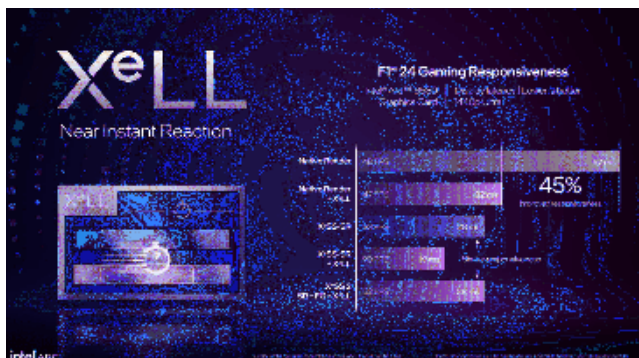
XeLL essentially cuts out a bunch of the intermediary rendering and logic queues that happen behind the scenes in a frame, letting your GPU render a frame much, much faster than typical. (Nvidia's awesome Reflex technology works similarly.) Activating it

drastically lowers latency. You can tangibly feel the improvement in games that *don't* have frame generation active, but enabling it alongside XeSS 2 claws back the latency created by frame generation.

You can witness the improvements possible in the slide below, which shows the performance of an *F1 24* frame with a



Intel's Xe Low Latency feature lets your GPU render a frame much, much faster than is typical.



Here you can see the performance of an F1 24 frame with a variety of XeSS features (supersampling, frame gen, XeLL) active.

variety of XeSS features (supersampling, frame gen, XeLL) active. It really illustrates the need for a latency-reduction feature alongside frame generation.


Latency reduction is so critical to frame gen “feeling right” that Intel requires developers to include XeLL as part of the wider XeSS 2 package, following in Nvidia’s footsteps. As with DLSS 3 and Reflex, you may see the options presented separately in some games, while others will silently enable them together—it’s up to the developer.

BATTLAMAGE BRINGS THE HEAT—MAYBE

Always take vendor numbers with a big punch of salt. We’ve seen vendor benchmark controversies over the years, *including* this year. Corporate marketing exists to sell stuff to you first and foremost. Hashtag: Wait for benchmarks, et cetera, et cetera.

All that said, while Battlemage doesn’t push for the bleeding edge of performance, I’m wildly excited by what I see on paper here. Budget GPUs have been an absolute quagmire ever since the pandemic, with none of the current Nvidia or AMD offerings being very compelling. Honestly, they feel like rip-offs.

Intel’s Arc B580 and B570 feel like genuine *value* offerings, finally giving gamers without deep pockets an enticing 1440p option that’s actually affordable—something we haven’t seen this decade despite 1440p gaming becoming the new norm. Delivering better than 4060 performance and 12GB of VRAM for \$250 is downright killer if Intel fulfills all its promises, “[This Magazine Free on SoftArchive.is](#)” especially paired with what looks to be a substantial increase to Arc’s already good ray-tracing performance. And with XeSS 2 and XeLL, Intel is keeping pace with Nvidia’s advanced features—assuming developers embrace it as wholeheartedly as they have first-gen XeSS.

Add it all up, and I’m excited for a truly mainstream GPU for the first time in a *long* time. The proof is in the pudding (again, wait for independent benchmarks!), but Intel  seems to be brewing up something spicy .indeed with Battlemage and the Arc A580

Elgato Facecam Mk. 2: Superb, but it still can't hear you

Elgato's next-generation Facecam offers premium features at a somewhat premium price.

BY MARK HACHMAN



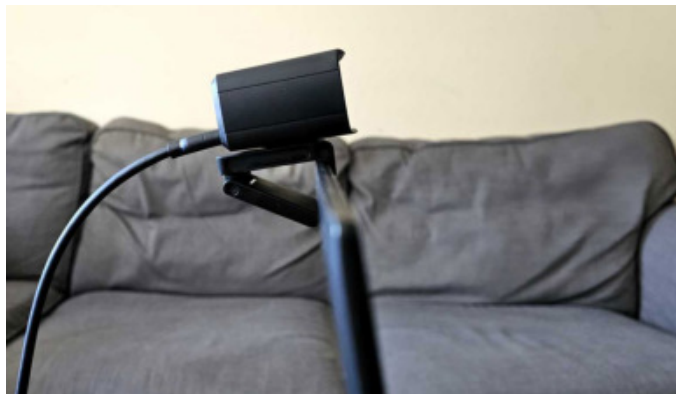
If Elgato's Facecam Mk. 2 sounds like a sequel, that's exactly what it is. Unfortunately, the lack of a key feature—a microphone—still hasn't been resolved, leaving this 1080p webcam still a little overpriced. Otherwise, it's quite good.

Our review of Elgato's original Facecam (fave.co/3wXLvIk) noted several features were left out, including a privacy shutter and HDR. To its credit, Elgato listened, and those

features have now been built in. The Facecam is one of the few webcams that captures at a TV-like 60Hz, though at fixed focus. It also maintains its Sony CMOS sensor, a strong point in favor of the original Facecam.

If 1080p resolution is too limiting, Elgato also sells a 4K60 Pro version for \$299 (fave.co/3ZGAeWL)—though that webcam lacks a mic too. (Elgato's argument is that these mics were originally built for streamers, and

streamers will have already purchased an upgraded, standalone mic anyway.) If the Facecam's MSRP of \$149.99 is too much, Elgato also has a cheaper 1080p model, the Facecam Neo. Our review of the Facecam Neo ([fave.co/3Bi4xtu](https://www.fave.co/3Bi4xtu)) found it somewhat limiting, however.



Elgato's Facecam Mk. 2 wasn't heavy enough to overburden my laptop.

BUILD QUALITY

The Elgato Facecam Mk. 2 is average size, about 3 inches wide and 2.5 inches deep. It's about 1.25 inches high when the mount is excluded. A removeable USB-C cable plugs into the back of the webcam, connecting to a USB-A port on your PC. I took a yardstick and confirmed the cable's 79-inch (about 6.5 feet) length. Elgato recommends that you plug the cable into a USB 3.0 (5Gbps) port on your PC, instead of a hub; this shouldn't be an issue on a new PC, but double-check if you use an older one.

The Facecam clamps onto your monitor using a tooth that juts over the top of your display or laptop; a pair of jaws allows the webcam to rest against the back of your display. You can then manually adjust the webcam down or up to center yourself. There's nothing especially unique about the design, although I prefer webcam jaws to be

made out of something soft or sticky, to prevent the webcam from jiggling around—the Facecam Mk. 2's plastic is a bit smoother than I'd like.

I don't ever detach a webcam to mount it separately, but there's a standard 0.25-inch threaded hole in the base of the webcam for a separate mount, along with a thumbscrew to detach and secure it.

A small LED lights up when the camera is in use. Otherwise, you can crook a finger or thumbnail to drag the privacy shutter from one side. Since the webcam lacks a microphone, you don't have to worry about being heard.

PERFORMANCE

Elgato recommends that you download the Elgato camera app (Camera Hub) before you start using the webcam, and the app was one of the highlights of our earlier Facecam review ([fave.co/3wXLvIk](https://www.fave.co/3wXLvIk)).

Why? Many webcam apps contend for control of the video output, including preview. If you're in Zoom or Teams, for example, and decide that you don't like the way you look, you often must shut down that app to allow the webcam's preview function to work. Elgato's Camera Hub software doesn't operate like that—you should be able to make real-time adjustments to brightness, contrast, or zoom in the Camera Hub app, and see those show up in real time in the other application.

It's worth noting that the Camera Hub software has advanced fairly significantly over the past few years. As it does now, it offers both manual and automatic controls for the picture, exposure, white balance, and more. But the camera now has an adjustable

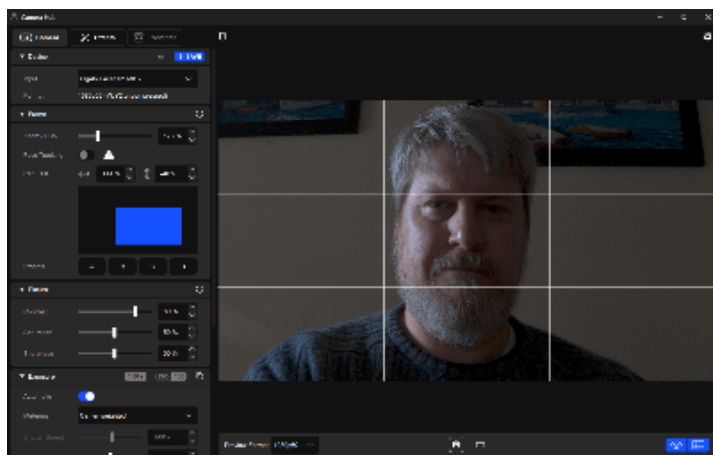
field of view and zoom function, which zooms in from 85 degrees on in, and can cut out most of the background.

For that matter, the webcam now includes face-tracking features, blurring, and background replacement. It does so (at least on my laptop, which included a discrete GPU) using an Nvidia video SDK. Installing that SDK tripped my laptop's Local Security Authority protection, a security feature within Windows 11's core isolation, and blocked the installation. Microsoft's support documentation says that Windows is supposed to analyze when this happens, but I had to manually override it to get it to install.

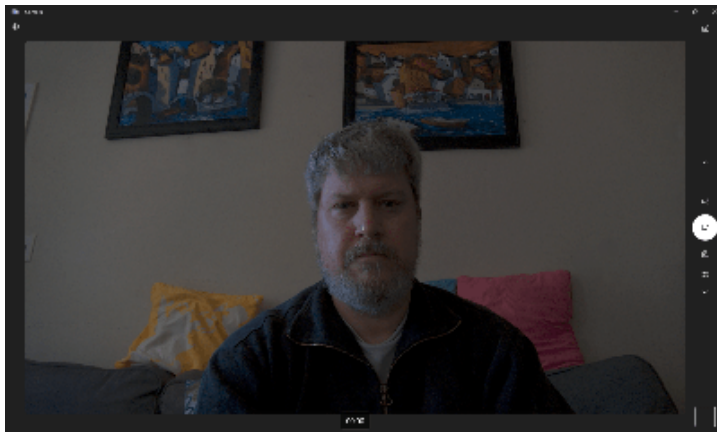
I was quite impressed with the photos that the Elgato Facecam Mk. 2 took. I actually took this photo first, in afternoon side light. For

some reason, it looked much brighter on my laptop's display as it took this shot than in the screenshot that I captured—bright, well exposed, with great color accuracy. At default settings, the field of view is at its widest at 82 degrees.

Flipping on the HDR didn't really do anything in dimmer lighting situations, but it's quite useful to even



A shot using Elgato's Facecam Mk. 2 with the Camera Hub software. It's essentially the same as the image below, but zoomed in with the camera controls visible.



Flipping on the HDR didn't do anything in dimmer lighting situations.

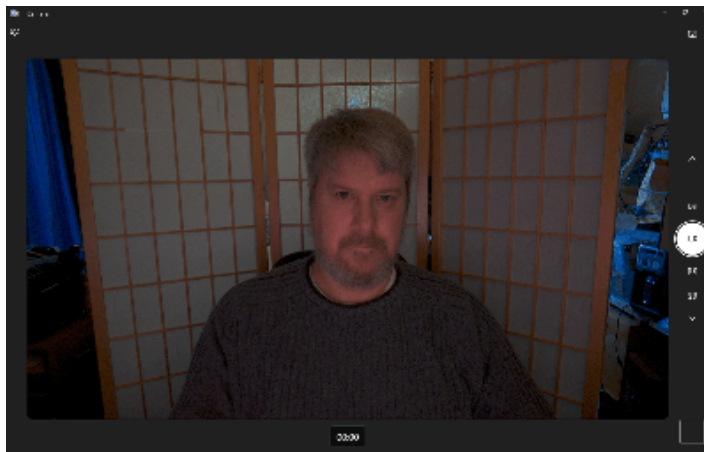
out the shadows and lit areas under these conditions. For 1080p, it was quite good.

About the only thing I didn't like was that the webcam doesn't really seem to make any adjustments when changing the exposure.

My indoor office shots (a bit down the page) use a screen because there's a window directly behind me, which affects the exposure. A good camera will adjust for my face, blowing out the window's light. I didn't quite see that, and adjusting the controls for spot or average metering didn't really make a

difference. You can't specify a spot (such as my face) and use that as the correct point to adjust the lighting. What you *can* do with this camera is manually configure the ISO and shutter speed, which allows you to brighten up the image without the need for external lighting. This is a fairly unique feature.

Note that the Camera Hub software has color temperature controls, which allow you to make some adjustments for skin tone. My example shots leave it in the auto mode, however.



My indoor office shots use a screen because there's a window directly behind me, which affects the exposure.

Downstairs in my dimly lit cave of an office, most of the light is artificial.

Perhaps it was just the brightness of my monitor, but the images looked a bit more vibrant on my screen as I was taking screenshots. I can't deny that the images are a bit dimmer than some of those from my other test webcams, which I used for comparison, so you'd be best served by taking photos and video in brighter light.

Since the Elgato Facecam Mk. 2 lacks a microphone, I was unable to test it.

BOTTOM LINE


The lack of an integrated microphone is a big omission—not for streamers, but for the average user. On the other hand, your laptop probably includes an integrated microphone—desktops don't, however. If you reside in the former camp, you may be able to get away with buying this webcam, which is otherwise very good.

I honestly think the screenshots, for whatever reason, undersell the quality of the camera's shots. Elgato's Camera Hub utility is straightforward and practical as well and adds value.

I still feel like Elgato is charging too much for this webcam, especially as it's missing a



The Facecam Mk. 2 impresses with what it delivers.

key piece. But I was also quite impressed with what it did deliver. If you have access to a standalone or integrated mic, Elgato's Facecam Mk. 2 is absolutely worth a look. 

Elgato Facecam Mk. 2



PROS

- 1080p at 60Hz, which adds to a TV-like feeling.
- Excellent utility software doesn't compete with other apps.
- Solid image quality, if maybe a bit dim.
- Excellent zoom function.

CONS

- No integrated mic.
- HDR didn't noticeably improve the camera quality.
- AI features require Nvidia SDK.

BOTTOM LINE

Elgato's Facecam Mk. 2 addresses a number of shortcomings of the original, excellent 1080p, 60Hz webcam. The lack of an integrated mic is its only major issue.

From \$149



Lenovo Chromebook Duet: Budget brilliance

This update to one of the most popular Chromebooks on the market keeps its good points while enhancing its style and typing experience. **BY MICHAEL CRIDER**



Google representatives tell me that the Lenovo Chromebook Duet series is the best-selling Chromebook ever, and I believe them. With a low price, a Surface-style form factor, and a bit of an iPad look when all the extras are stripped off, it's

an appealing package, especially if you're more comfortable with a touchscreen than with a mouse.

The new revision to the model is an improvement in almost every way. While it still doesn't handle heavy desktop-style tasks or Android apps very adroitly, it's an excellent



The Chromebook Duet's stand design allows the Duet to stand up in either horizontal or vertical mode.

budget device if you want a little more flexibility than a standard laptop offers.

PHYSICAL DESIGN

The newest Gen 9 model looks extremely similar to the first two models but has more refinement. It's still a tablet first, at least in a purely physical sense, with a little more of a focus on conventional web browsing thanks to ChromeOS. And while I appreciate the included stylus, its value proposition isn't quite as good as it used to be, especially if you want the 8GB memory upgrade. And trust me, you want that upgrade.

The Duet is an 11-inch tablet, and bare of all its accoutrements, you might confuse it for a standard iPad at first glance. But a little handling time

quickly puts that notion to rest. It's horizontally aligned, with a wider 16:10 LCD screen and a webcam poking out from the side with a handy physical shutter. You'll also notice two different USB-C ports, one on the left side if you're using it in laptop mode, and one on the top. An extra port for accessories and charging, but what's with that weirdo placement?

It makes sense when you notice the updated magnetic kickstand. This design dispenses

with the fabric, allows a hole for the magnetically charging stylus, and crucially has a bit of a kink to it. The slanted angle allows the Duet to stand up in either horizontal or vertical mode, and either way those USB-C ports are not obstructed.



The device has two USB-C ports, one on the left side if you're using it in laptop mode, and one on the top.

It's a thoughtful touch, though I have to point out that accommodating two different modes here means there's only one angle for the tablet to stand up in either one. I'd prefer the flexibility of multiple angles in horizontal mode since that's the way I used it by far.

CHROMEBOOK FIRST, TABLET SECOND

ChromeOS has made big improvements in its touch interface, but this is still a Chromebook and not a tablet, at least according to the branding. So most of my time with the Duet was spent using it laptop-style with the kickstand and combined keyboard, touchpad, and screen cover attached. And I was surprised at how comfortable this was. One of the few low points of the original design was that the

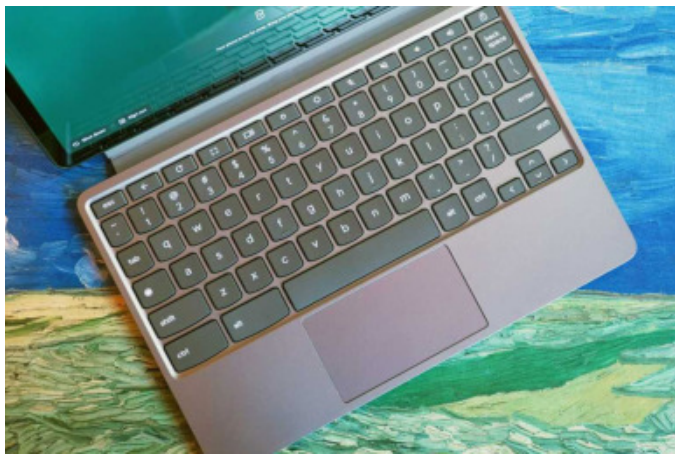
keyboard was a bit cramped and didn't have a lot of give to the keys.

Lenovo seems to have addressed this with a new design. It still sits flat as a pancake, but the keys have increased travel distance and the layout keeps all the alphanumeric keys at full size despite the squished layout. That makes typing for extended periods surprisingly natural. It's not as good as a high-quality keyboard with a full-size layout, and it's a far cry from Lenovo's best-in-class ThinkPad keyboards. But considering the restrictions of both the form factor and the price, it's pretty darn good.

Ditto for the touchpad, which is plastic instead of glass, but is more than serviceable for scooting your cursor across a tablet screen. The screen is also fine, if not outstanding. The 1920×1200 resolution is a lot wider than a

standard tablet and a little taller than most laptops, which is a good compromise. It's an IPS-LCD panel with good color accuracy and plenty of brightness. Again, nothing here is going to blow you away versus a more expensive device, but it's all acceptably in the pretty-good zone for a gadget that starts at \$360.

Here are the specs, though keep in mind that



Considering the restrictions of both the form factor and the price, the keyboard is pretty darn good.

since this tablet is running Arm-based hardware, it's not an apples-to-oranges comparison to most x86-based Chromebooks.

Model number:

83HH0000US

CPU: MediaTek

Kompanio 838

Memory: 4/8GB

Graphics: ARM

Mali-G57 MC3

Display: 10.95-inch

IPS-LCD, 1920×1200, 60Hz

Storage: 64/128GB SSD

Webcam: 5MP (8MP rear camera)

Connectivity: 2 USB-C, proprietary keyboard, 3.5mm audio jack

Battery capacity: 68Wh

Dimensions: 255.3×166.84×7.69mm (with keyboard and stand, approx. 17mm)

Weight: 1.21 pounds, 2.09 pounds with keyboard and stand

MSRP: \$359.99/\$399.99

MOBILE GUTS, MOBILE LIMITATIONS

For that price, you get a MediaTek processor (Arm, but that's okay—ChromeOS, don't judge) with four primary cores and four efficiency cores, a spartan 64GB of storage, and just 4GB of RAM. The upgraded model, which Google sent

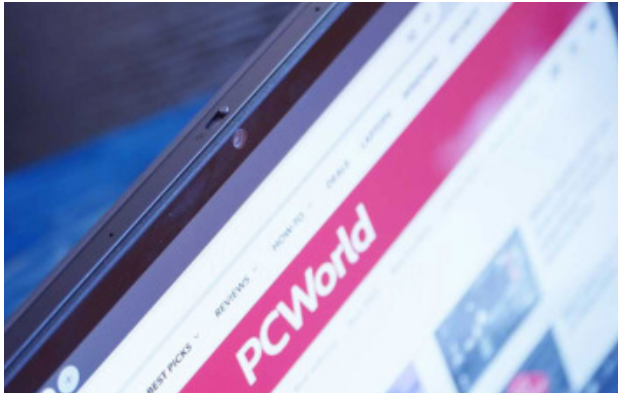


The Lenovo's battery life shines above that of most Chromebooks competing with conventional laptops.

me as the review unit, boosts those last two to 8GB and 128GB, respectively. For that upgrade, you're charged the princely sum of \$399.99. That's more than you'd pay for a base-model iPad, but well below that same iPad with a keyboard and stylus.

The mobile hardware also gives this gadget mobile-style battery life, including a solid workday of runtime and standby that I was never able to exhaust even when the tablet spent days in my bag. In this area, it shines above most Chromebooks that compete with conventional laptops. It's a trade-off for raw, number-crunching power, sure, but considering the audience this device is shooting for and the requirements it brings, it seems like a good one to me.

Other hardware includes a 5MP front-facing camera and a single 8MP rear-facing



Other hardware includes a 5MP front-facing camera and a single 8MP rear-facing shooter.

shooter, which I imagine was thrown in with the Arm-based chipset, and which I can't imagine many people using too often. The webcam isn't great, especially since the default laptop angle has it pointing right up my nose. It's sharp but washes out easily and doesn't handle low levels of light well. The rear camera is a little better, but again, I doubt you'll be using that one regularly.

The tablet has a proprietary magnetic connection for the keyboard and a headphone jack, the latter of which was notably absent in the original design. The magnets connecting the keyboard and affixing it to the screen when closed are nice and sturdy, far less likely to move

around—they cling to a coffee shop's metal exterior table when I went on a walk. I don't think that was intentional, but it's reassuring nonetheless. I could wish for a MicroSD card slot to augment the low storage, but beggars can't be choosers. And yes, a \$400 Chromebook that doubles as a tablet qualifies as a beggar in this context.

The Duet is surprisingly capable as a laptop, or as close to a laptop as something using the Surface form factor gets. The "good enough" display and keyboard combo lets you use it for hours without too much trouble, and any issues you might have with a smaller-than-usual display can be alleviated with a quick pinch gesture in Chrome or one of the apps that are



The magnets connecting the keyboard and affixing it to the screen when closed are nice and sturdy.

pretending they aren't just Chrome with another icon.

But you'll have to be mindful of how many you're using. When you load up Chrome with more than six or seven tabs, especially with something particularly heavy like Gmail (or the WordPress interface I'm

typing in right now), it tends to chug a bit. It's not surprising—even with a RAM upgrade, this hardware wasn't designed to be used by a tab addict. But this is somewhat mitigated by the fact that the small size of the tablet means using a dozen tabs or apps at once isn't practical anyway.

The Duet is pointedly *not* a Chromebook Plus model, so you don't get access to the full gamut of Google's AI features. It gets a lot less power than, say, the equally recent Samsung Galaxy Chromebook Plus (fave.co/4gm0NWv). Testing via PCWorld's gamut of Chromebook benchmarks, it's less than half as powerful...which seems okay, since it's approximately half the price and aiming for a very different use case.

CrXPRT 2: 107

Speedometer 2.0: 75.6

Basemark Web 3.0: 502.99



Lenovo Chromebook Duet, left, with iPad Air and Galaxy Z Fold 6.

Kraken: 1164.15

Jetstream: 108.516

I'm not exactly crying into my beer over that one. But on the flip side, the form factor does encourage you to use ChromeOS in the other direction: as a kinda-sorta Android tablet.

AS A TABLET

And frankly, it's not a great one. Compared to, say, one of Samsung's Galaxy laptops, it feels slow and clumsy, even if it's technically far more capable with its full-power browser. Android apps from the Play Store chug, even simple things like Google's own Keep Notes program, and that goes double if you try to run them side-by-side with Chrome browser windows or other Android apps. Games do okay, as long as you temper your expectations. The recently released *Balatro* was nice and snappy, but the far more

visually complex *Hearthstone* tended to stutter and skip, even on its lowest setting for visual fidelity.

And while the screen is fine for video—albeit at a somewhat unambitious HD resolution—the stereo speakers are a let-down. They're plenty loud for a tablet or even a small laptop, but tinny and lacking in bass. Imagine a budget phone at about double the volume. It's fine if you're just listening to someone talk, but enjoying music or a movie's audio demands a good set of headphones. Oh, and by the way, this model has a headphone jack, something pointedly missing from the older designs.

So if you're looking for an Android tablet first and a Chromebook second, the Galaxy Tab or Pixel Tablet will serve you better, even if you have to spend a little extra on a keyboard and kickstand (should you want one). The Chromebook Duet works great as a handheld web browser, as Google's done a lot of work to make ChromeOS's touchscreen interface far more approachable. But if you prefer mobile apps as your means of interaction, it's not the way to go. That's especially true if you consider Samsung's surprisingly flexible DeX system, which approaches this convergence form factor from the other direction.

BOTTOM LINE

This might sound like a lot of low points and a lot of compromises. But considering this is a crossover device and a budget device,

they're basically all both understandable and forgivable. The changes that Lenovo has made are all improvements over the original and already very popular design, with the arguable exception of the double-mode kickstand. If Google and Lenovo have sold more of this design than any other Chromebook, I expect them to sell a lot more.

Go for the upgraded RAM—you'll want it, and the extra storage for Android apps is handy even if they don't run great. Beyond that, make sure you keep your tabs under control and don't demand too many extra fills or too much camera prowess. Everything else about the Duet is excellent, especially the value—and it doesn't hurt that it's already gone on sale a couple of times. 🔥

Lenovo Chromebook Duet



PROS

- Great value.
- Flexible form factor.
- Surprisingly good keyboard.
- Amazing battery life.

CONS

- Needs more RAM.
- Android apps don't run well.
- Vertical kickstand reduces horizontal options.

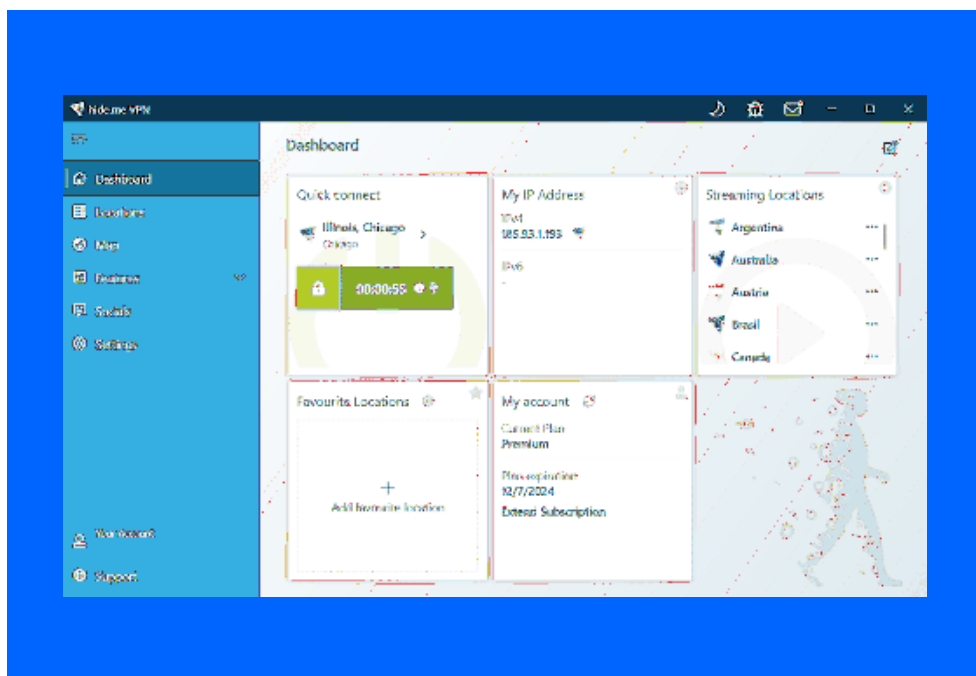
BOTTOM LINE

The 2024 edition of the Chromebook Duet doubles down on its hybrid form factor and budget price. Lenovo has refined this design very well, and it remains a great choice if you want a cheap, reliable Chromebook that fits in small spaces and can do some light tablet duty. Just keep an eye on your tabs.

From \$359

Hide.me VPN: A feature-packed and customizable service with solid privacy credentials

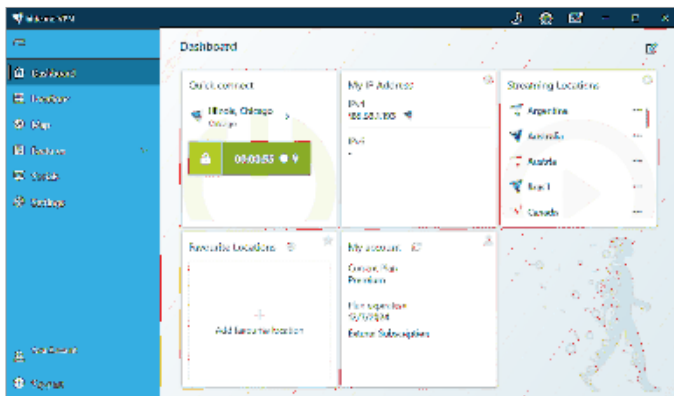
A VPN for those who take their hide-and-seek seriously. **BY SAM SINGLETON**



Hide.me (fave.co/3ZQxE05) from Malaysia-based eVenture continues to hang with today's most popular services, even if it doesn't have the same name recognition.

Since my last review of its service, Hide.me has passed a new independent security

audit and updated its interface to be more user-friendly. It has also added a few features such as a new protocol and server sorting options. So with these new advances in mind, let's take another look and see where it stands in the current VPN market.



Hide.me's homescreen is completely customizable.

Hide.me VPN in brief:

P2P allowed: Yes

Simultaneous device connections: 10

Business location: Malaysia

Number of servers: 2,000-plus

Number of country locations: 91

Cost: \$11.95 per month, \$53.88 for 1 year, or \$61.83 for 27 months

FEATURES AND SERVICES

Since my last review of Hide.me, it hasn't significantly changed up its interface. That's to be expected, however, as it went through a serious facelift a few years ago.

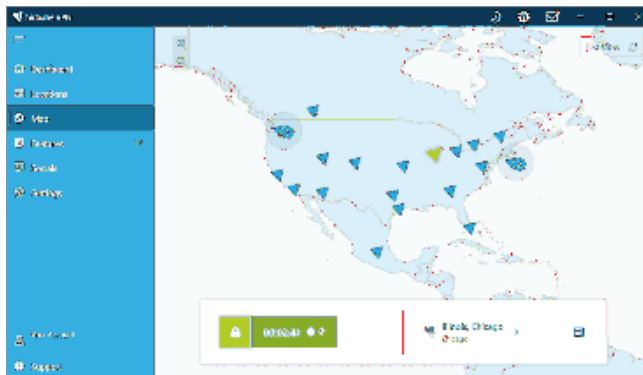
When you open up the application, you're confronted with a dashboard

that shows some relevant information, such as a Quick connect button that will connect to the last used server, information on your IP address, account information, a list of streaming optimized servers, and a list of your Favorite Locations.

Furthermore, all of these widgets are movable and

interchangeable as well, meaning that you can customize the look to only display the info you need.

On the left sidebar you have additional tabs for Locations, Map, Features, Socials, and Settings, as well as Your Account, and Support. The Locations tab displays a searchable list of all available Hide.me



For those who prefer to navigate their VPN connections with a map, Hide.me has you covered there as well.

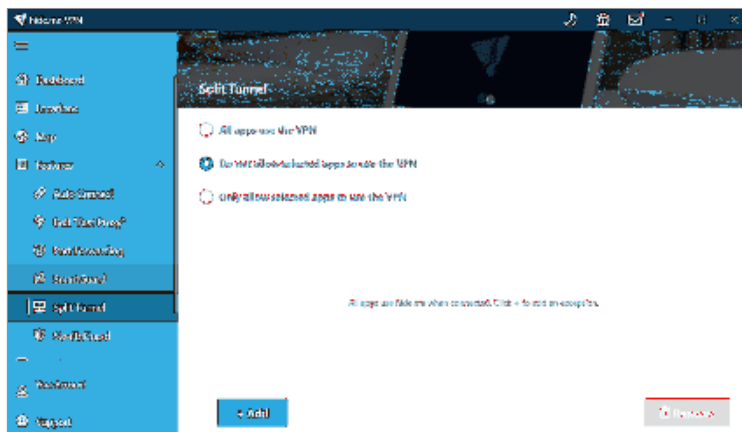
server locations, with especially fast IOG servers tagged with an icon next to the server name. Along the top you can filter through all servers, those optimized for streaming, or multihop servers as well. The latest

addition is an option to let you filter by physical distance from your home IP address location.

For those who are spatially inclined, the Map tab displays the physical location of all of these servers on a world map instead.

The Features tab is where Hide.me really shines—there’s a lot here. There are the usual options to launch on system startup, connect automatically, and so on. It also introduced a feature called Bolt Fast Proxy, which optimizes internet speed performance over an OpenVPN TCP connection. Theoretically, this can lead to speed increases, particularly in Windows.

There is also an option to set up split tunneling and its own complementary proprietary firewall feature called Stealth Guard. This can be used to limit either your entire internet or just certain apps unless a



Hide.me comes with a ton of great customizable feature options.

Hide.me VPN connection is present—thus eliminating IP address leaks should your connection ever falter.

Here you’ll also find a port-forwarding feature as well as an ad and tracker blocker called SmartGuard. Port forwarding allows incoming data on your connection to get around your local firewall, potentially speeding up your connection. It can also expose you to extra security risks, so be careful when using it.

There is also a separate kill switch feature available under the settings menu. Like I said, this service has a lot of features. Add to that the vast array of protocols available and the option to use custom DNS, and it quickly becomes apparent that Hide.me is a power user’s dream.

With all of that said, due to the sheer amount of available features and the maze

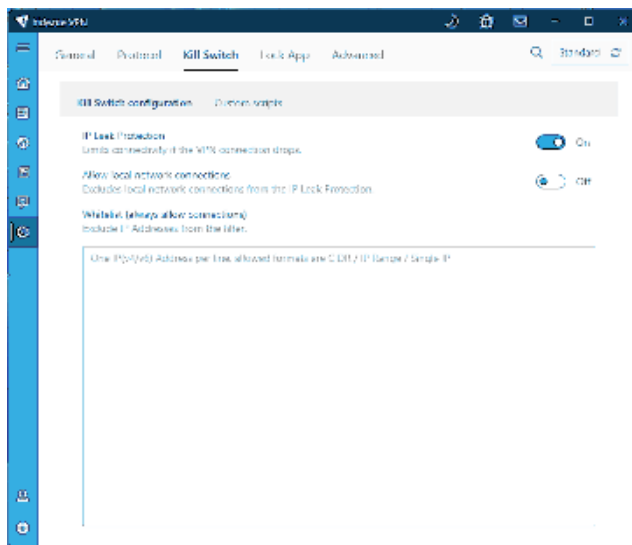
of menus you need to work through to tweak all of them, this service probably isn't for beginners—or for the faint of heart.

In the beginning, I personally found navigating the app a bit disorienting. Some things are listed under Features that should be settings, and some are under Settings that should be under Features. That's a minor gripe, though, and figuring out the menu system is only a matter of spending some time in the application itself.

Hide.me is available for Windows, Mac, Linux, Android, and iOS, as well as some consoles and smart TVs. There are also browser add-ons for Chrome and Firefox that come with support for the SOCKS proxy.

PRICE

Hide.me offers a total of three different plan options for its premium service; a monthly plan, a 1-year plan, and a 2-year plan. The monthly plan costs \$11.95 per month, which is a bit steep. Sure, the VPN gives you a lot of configurable options, but similarly priced services such as NordVPN (fave.co/3wX9BwC) or Surfshark (fave.co/3Z1OmGj) offer all of the same things plus additional security features.



A kill switch is available under the settings menu.

The 1-year plan is a better deal at \$53.88, or \$4.49 per month, but it still remains a bit pricier than competitors. The 2-year plan is where Hide.me really becomes affordable. For a total of \$61.83, or \$2.29 per month, you'll get access to the premium service for 24 months plus an additional three free months. That ends up being cheaper than most other VPNs for the same time period.

Finally, it's worth noting that Hide.me has a handy free version that provides all of the great security features of its premium counterpart for absolutely no cost. The only downside is that you're limited to 10GB per month and it only provides access to eight of its servers. Due to these limitations, I

don't recommend using the free version to stream, but it is a great way to browse securely or just to try out the service to see how you like it.

When signing up for Hide.me, you do have to provide personal billing information and it accepts payments via credit card, PayPal, Google Pay, and various cryptocurrencies.

PERFORMANCE

In order to test Hide.me's speeds, I rated connection speeds across its servers in six different countries all around the world for multiple days and then compared them to my baseline internet speeds. Across all locations tested, the speeds averaged just over 45 percent of the base download speed and 68 percent of the base upload speed. That's okay, but it's short of our list of the fastest VPNs (fave.co/3OWgSrf). It is an improvement over the last time I tested its speeds, though.

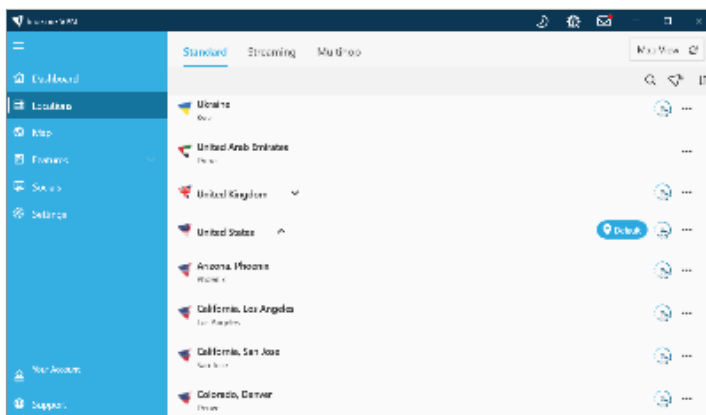
Within these aggregates were some truly incredible speeds. I just found they weren't consistent. It was quite common for each location to show some great relative speeds one day and then fall

off completely the following day. I also found that the drop in speed was quite significant the further the Hide.me server was from my physical location. This is, of course, not uncommon, as distance tends to affect latency, but it was so drastic in some instances that it caught me a bit by surprise.

Hide.me does indicate which servers have faster 10Gbps connection speeds next to the locations on the server list. However, I frankly didn't notice a major difference in my testing while using these servers.

Also, testing with different protocols didn't show one to be much faster than the others. However, I did find that WireGuard had a slight edge over the others, as is to be expected.

Please note, however, that online speeds can vary wildly in pure Mbps tests from day to day and even hour to hour. It's best to take



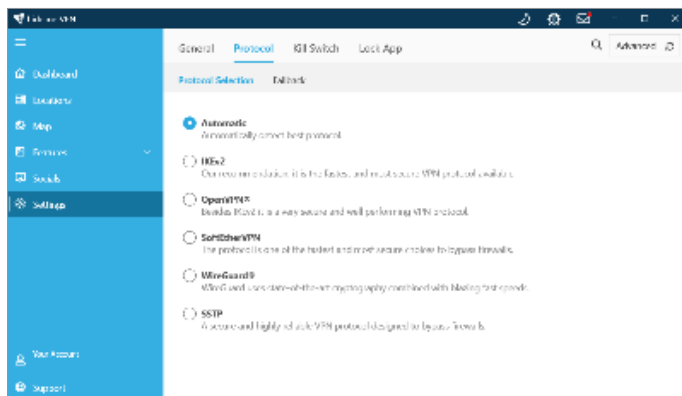
Hide.me's server list displays which connections are high-speed 10Gbps so you can choose the fastest locations.

any and all speed tests with a grain of salt. Your experience with Hide.me may differ from those in the tests for this review.

Despite all of this, however, I never really ran into a problem due to connection speeds. Therefore, I'm confident that Hide.me has enough speed to take care of just about anything you need to do over a VPN connection.

In regards to streaming, Hide.me performed admirably. Under the server list, there is a tab for streaming-optimized servers. Every optimized streaming server I connected to was able to access streaming sites such as Netflix and Amazon Prime without any problems. I was even able to access streaming sites with some nonoptimized servers. Given these results, Hide.me should serve you well for streaming and getting around region blocks.

Unfortunately, the same cannot be said for the Hide.me free version. Of all the eight servers offered with the free VPN, I found that every single one was blocked by Netflix. Given that the free plan only gives you 10GB of data per month—or about three hours of HD video—I can't recommend Hide.me's free version for those looking to stream.



Hide.me offers a good selection of protocols, but I usually recommend WireGuard.

Something like Proton VPN would be a better free VPN choice for streaming.

SECURITY AND PRIVACY

The VPN comes with industry-standard AES 256-bit encryption. It also offers a whole range of protocols including IKEv2, OpenVPN, SoftEtherVPN, WireGuard, and SSTP—that's more than most other services. Furthermore, it even offers advanced configuration options for many of these protocols to add to the customization. And in my testing, I found that there were no IP address leaks when using Hide.me across any of its servers and protocols.

Hide.me is owned by eVenture, an IT security company that is based out of Malaysia. Privacy-conscious users will be glad to know that Malaysia has no data retention laws and is not a member country

of any surveillance alliances such as Five, Nine, or 14 Eyes.

Hide.me has a very thorough privacy policy (fave.co/49u3pPV) on its website. It states that it does not track your activity when you're connected to the VPN. It doesn't keep connection logs or store IP addresses.

The company does, however, keep troubleshooting logs that include a randomly generated username and an internally assigned IP address for each user. The troubleshooting logs are erased every few hours, according to the privacy policy. Additionally, it logs monthly data traffic amounts for quality assurance purposes.


The company did originally pass an independent security audit of its no-log policy by Defense Code in 2015. In my last review, I criticized the service for not undergoing a new audit since that time. Hide.me was obviously paying attention, though, as it completed not one but two new audits in the last year. The first was a Mobile Application Security Assessment in December of 2023, and then another full no-log audit of its service by Securitum in June of this year.

The fact that it was one of the first VPN services to undergo an independent audit back in the day gave it old-school privacy cred. Now, with the latest audit, the company continues to prove that it takes user privacy seriously.

Hide.me also publishes annual Transparency reports (fave.co/3B3vscs)

detailing data requests the company has received in a given year.

BOTTOM LINE

Hide.me is a really intriguing VPN service. On the one hand, it offers a fantastic tool set for power users to tweak and configure to their heart's content. On the other, it can't quite nail down some basic things you want from a VPN, such as consistent speeds across servers and a user-friendly interface. It has a great privacy track record, though, and the service was able to unblock all streaming sites that I tested. Overall, it's a well-rounded service that ticks almost every box you could want from a top VPN. I can easily recommend it for experienced power users, but beginners might want to try the free version before committing to the premium service. 

Hide.me VPN



PROS

- Strong privacy practices.
- Affordable long-term plans.
- Lots of power user options for customization.

CONS

- Speeds were inconsistent in our tests.
- Not the easiest VPN for beginners.
- Free version has strict data limits.

BOTTOM LINE

Hide.me comes with a wide variety of features that can be tweaked, making it a great option for those looking to customize their VPN experience. It's also compatible with streaming services and recently passed a new independent audit.

From \$12 per month



Gigabyte G34WQCP: An excellent budget ultrawide monitor

This \$350 ultrawide earns high marks in SDR brightness, contrast, and color performance.

BY MATTHEW S. SMITH

Almost a year has passed since PCWorld reviewed the Gigabyte GS34WQC ([fave.co/3ZEvcjD](https://www.pcworld.com/3ZEvcjD)), a budget ultrawide monitor that earned our Editors' Choice award. Now, Gigabyte is updating that model with the new Gigabyte G34WQCP. It's similar to its predecessor but increases the maximum refresh rate from 144Hz to 180Hz.

SPECS AND FEATURES

The Gigabyte G34WQCP's basic specifications are similar to other budget ultrawide monitors. It's a 34-inch, 21:9 aspect ratio display with a resolution of 3440×1440. The monitor also uses a Vertical Alignment (VA) panel, which is the more common choice in this category, though some competitors use an In-Plane Switching (IPS) panel. The monitor supports Adaptive

Sync through AMD FreeSync and also supports HDR.

Display size: 34-inch 21:9 widescreen

Native resolution: 3440×1440

Panel type: VA

Refresh rate: Up to 180Hz

Adaptive sync: AMD FreeSync Premium

HDR: Yes, VESA DisplayHDR 400

Certified

Ports: 2× HDMI 2.0, 2× DisplayPort 1.4, 1× 3.5mm headphone

VESA mount: 100×100mm

Speakers: 2× 2-watt speakers

Price: \$349.99 MSRP

However, the G34WQCP makes two notable changes compared to the previous Gigabyte G34WQC. As mentioned, the refresh rate has been increased from a maximum of 144Hz to 180Hz. In addition, the monitor now has two DisplayPort 1.4 ports, while the previous model had just one.

DESIGN

The Gigabyte G34WQCP's design is basic. From the front, the display panel is framed by thin black bezels on three sides, with a small chin at the bottom featuring a centered Gigabyte logo. Gigabyte uses matte black plastic for the stand, while the rear of the display panel combines that with some semi-gloss accents.

While the G34WQCP isn't much to look at, it's well built. The

monitor's plastic panels didn't warp when I handled the monitor, and I didn't hear creaks or groans while I set it up. That's not a high bar to clear, but budget monitors don't always hurdle it.

The monitor's display panel is curved with a radius of 1500R (a lower number means a more aggressive curve). This is a moderate, readily noticeable curve, but not so aggressive that it becomes distracting outside of games. With that said, people who work with digital art, photography, and video may not like the curve, as it slightly warps the appearance of images and videos on the display (lines that are straight may not appear so, for example).

Despite its affordable price, the G34WQCP includes an ergonomic stand with a good range of height and tilt adjustment, though it doesn't swivel. I found the stand easy to adjust, as it



The G34WQCP includes an ergonomic stand with a good range of height and tilt adjustment.

required little force to move, yet stayed firmly in place once positioned. Setting up the stand is finicky, though, as the stand doesn't clip into place but instead uses screws. It's a minor annoyance, but it makes setup slightly more complicated. The display also supports a 100×100mm VESA mount for use with third-party monitor stands and arms.

CONNECTIVITY AND MENUS

The Gigabyte G34WQCP provides two HDMI 2.0 ports and two DisplayPort 1.4 ports, for a total of four video inputs—one more than is typical for a budget ultrawide monitor. That's one more port than the older Gigabyte GS34WQC, which had one DisplayPort input.

However, the new G34WQCP doesn't support its maximum refresh rate over HDMI;

only the DisplayPort connections can achieve the full 3440×1440 resolution at 180Hz. That's not a major problem, as the HDMI 2.0 ports are likely to be used with game consoles that can't achieve 180Hz. Still, it's worth knowing if you plan to connect a PC over HDMI.

USB connectivity is also absent. There is no USB-C input and no USB downstream ports for connecting wired peripherals. This is typical for a budget ultrawide monitor, but it's a minor disappointment, as it makes the monitor less useful if your gaming den doubles as your home office.

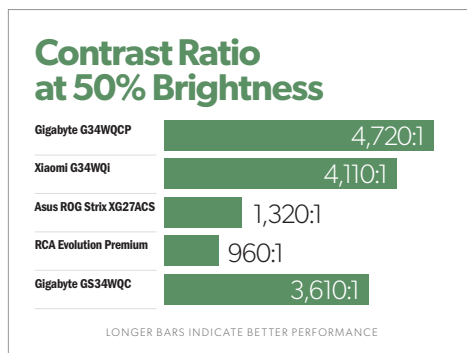
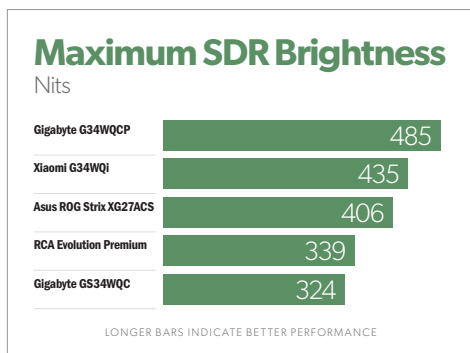
The monitor's on-screen menus are controlled with a joystick located on the rear right side of the display panel. The joystick is responsive, and Gigabyte's menus are easy to navigate, thanks to well-labeled options. The range of options is extensive and includes adjustments for color

temperature and gamma.

The monitor also comes with a pair of 2-watt speakers that provide basic audio. They aren't loud and they lack low-end depth, so they're not good for games, movies, or music. Most people will prefer to use external headphones or speakers. Still, the built-in speakers are an acceptable option for watching a YouTube video or listening to a podcast.



The monitor's on-screen menus offer a wide range of options, including adjustments for color temperature and gamma.



SDR IMAGE QUALITY

SDR image quality is, of course, very important for the Gigabyte G34WQCP. While the monitor does support HDR, most PC games still only support SDR, and most Windows applications are also limited to SDR. Fortunately for Gigabyte, the G34WQCP is a strong performer in SDR content.

Starting with brightness, the Gigabyte G34WQCP delivered an impressive maximum SDR brightness of 485 nits. This is much higher than necessary for most situations, but it's a perk if you plan to use the monitor in a brightly lit room or near sunlit windows.

It's also worth noting that curved display panels have a tendency to focus light sources behind the viewer, which can make the display less comfortable to view. The G34WQCP's high brightness helps balance out that problem.

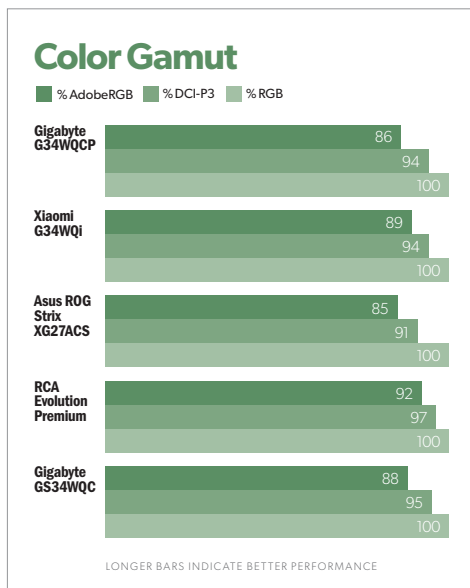
Contrast is a real highlight, as the monitor achieved an impressive contrast ratio of

4720:1. That's an excellent result for a display that lacks a Mini-LED dynamic backlight or an OLED panel.

The G34WQCP's image is immersive and provides convincing shadow detail in dark areas under most viewing conditions. The G34WQCP's edge-lit backlight means it will still display slightly elevated black levels in the darkest scenes, but contrast otherwise looks fantastic.

Gigabyte has an edge over other monitors in this price bracket. IPS monitors like the RCA Premium Gaming Monitor (fave.co/3OJE3Eo) and Asus ROG Strix XG27QCS (fave.co/3VtibRf) have a far lower contrast ratio, which can make their images appear slightly flat and washed out. Other VA panel monitors, like the Xiaomi G34WQi, come close to the G34WQCP, but Gigabyte's result is the best we've seen from a VA panel this year.

The G34WQCP's color gamut is solid but doesn't provide any advantage over the competition. It achieves 95 percent of DCI-P3

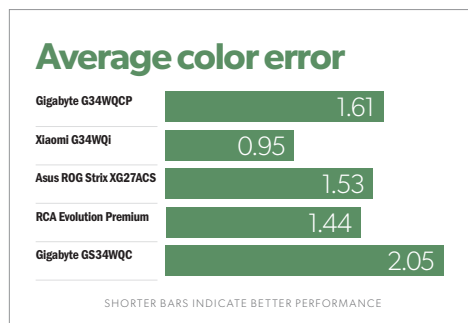


and 86 percent of Adobe RGB—figures that translate to a bright, vibrant image that looks saturated and lively.

However, as the graph shows, the monitor's performance is in line with those of similarly priced monitors.

The same can be said for color accuracy. The G34WQCP's accuracy is good enough that any errors are generally unnoticeable in typical use. However, even budget monitors now tend to ship with strong color accuracy out of the box, so this is no longer a defining characteristic.

The monitor produced a gamma curve of 2.3, slightly off our target of 2.2, which means content appears a bit darker than it should. Color temperature came in at 7000K,



noticeably higher than the 6500K target, giving the image a cooler tone. The monitor does offer gamma and color temperature settings, so it's possible to adjust these results, but the out-of-box image could use some improvement in these areas.

With a resolution of 3440×1440 spread across a 34-inch ultrawide panel, the monitor has a pixel density of about 109 pixels per inch, which is identical to a 27-inch widescreen monitor with a resolution of 2560×1440. This level of sharpness is enough to look crisp in games, movies, and photography. It usually appears sharp on the Windows desktop and in apps, but small fonts can start to reveal slight pixelation around the edges of characters. However, shoppers don't have much choice when it comes to sharpness—aside from a few high-end 5K displays, nearly all 34-inch ultrawides deliver 3440×1440 resolution.

Overall, the Gigabyte G34WQCP delivers a bright, high-contrast image with strong

color performance and acceptable sharpness. The monitor's only notable flaws are its color temperature and gamma results, which are slightly off-target, but these can be adjusted in the settings. The G34WQCP's image quality is impressive for the price; to see a significant improvement, you'd need to consider an OLED panel or a high-end Mini-LED monitor, both of which typically cost closer to \$1,000.

HDR IMAGE QUALITY

While the Gigabyte G34WQCP proved itself in SDR, the monitor's HDR performance was unremarkable.

I measured a maximum sustained brightness of 372 nits. That level of HDR brightness is typical for a budget monitor but, unfortunately, nowhere near what's required to do HDR justice. Most HDR content targets a luminance of at least 1,000 nits, so HDR viewed on the G34WQCP will look dimmer than intended and lack detail in bright areas of a scene.

The monitor also lacks some practical features, like an HDR brightness override. That means the brightness of HDR is entirely

controlled by the content displayed. That's fine if you're viewing in a dark room, but it can become an issue in brighter rooms.

In brief, the G34WQCP isn't a good HDR monitor. Shoppers who want better HDR on a tight budget should consider cut-rate Mini-LED displays, like the Innocn 27M2V (fave.co/4aiTHAa) or Xiaomi G Pro 27i (fave.co/3VsRQTV). These have their own drawbacks but, when it comes to HDR, they're far more capable.

MOTION PERFORMANCE

Refresh rate is among the Gigabyte G34WQCP's highlights, as the refresh rate has increased from a maximum of 144Hz to 180Hz. That looks like a big improvement on paper, but in reality, I'm not sure I can notice the difference. I think a refresh rate bump to



The Gigabyte G34WQCP's refresh rate has increased from a maximum of 144Hz to 180Hz.

about 240Hz is required before most people will find it noticeable.

With that said, though, motion clarity is good given the monitor's size and price. The monitor displays small objects with good detail and motion feels extremely slick at high refresh rates. This level of motion clarity is table stakes for a modern gaming monitor, but it's still leagues better than an old-fashioned 60Hz IPS or VA panel monitor.

The G34WQCP, like other VA panel monitors, tends to suffer "dark smear," which results in more noticeable blur behind darker objects than bright objects. The problem is definitely visible, and it's the reason why competitive gamers often prefer IPS and TN panels. With that said, though, the problem didn't distract from my enjoyment of the monitor.


Adaptive Sync is available with official support for AMD FreeSync Premium, but G-Sync also functioned when I connected a Nvidia-powered laptop to the G34WQCP. This is typical, as FreeSync and G-Sync have a lot in common. Frame pacing was smooth and I didn't notice any flickering or display drop-outs, though the same can be said of nearly all monitors I review.

BOTTOM LINE

The Gigabyte G34WQCP picks up where last year's GS34WQC left off. While the two monitors are similar, the new G34WQCP delivers better image quality thanks to its

higher brightness and slightly improved contrast. The G34WQCP also kicks up the refresh rate to 180Hz and adds a second DisplayPort.

These additions slightly increase the price from \$329.99 to \$349.99, and that throws a wrinkle into this review. The prior GS34WQC is available for as little as \$279.99, and while the new G34WQCP is better, the older model is an alluring alternative if you're on a tight budget. The Gigabyte also faces stiff competition from the recently released Xiaomi G34WQi (fave.co/3VtibRf), which performs similarly to the G34WQCP but is less expensive at \$269.99.

That makes the G34WQCP more difficult to recommend than its predecessor. With that said, though, it remains a good budget ultrawide with top-notch SDR image quality for the price. 

Gigabyte G34WQCP



PROS

- Plenty of video inputs.
- Good SDR brightness.
- Excellent contrast ratio.
- Solid color gamut and accuracy.

CONS

- Stand requires use of screws.
- No USB connectivity.
- Modest HDR brightness.

BOTTOM LINE

The Gigabyte G34WQCP is an excellent budget ultrawide monitor that earns high marks in SDR brightness, contrast, and color performance.

\$349



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life changed**

when I took
a chance and
got my high
school diploma
at age 22.

Ariel

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centers near you at
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DOLLAR GENERAL
LITERACY
FOUNDATION

THE BEST HARDWARE SOFTWARE 2024

THE BEST OF THE
BY THE PCWC
BY BRAD

BEST PC SOFTWARE AND HARDWARE OF 2024-25

BEST, AS CHOSEN
BY OUR WORLD EDITORS.

CHACOS

The titans of the PC industry slugged things out in 2024, jockeying for dominance in the new AI era blossoming before our eyes.

It was most evident in laptops: Qualcomm's Snapdragon X Elite chips kicked off Microsoft's Copilot+ PC era with long life and surprisingly competitive performance, only to be rivaled by Intel's Macbook-killing Lunar Lake chips months later. AMD, meanwhile, focused on bringing high-octane speed to Copilot+ PCs, zipping for *oomph* while the others zagged to endurance. With competition flourishing, PCWorld expects to review over 120 laptops by the end of the year, by far a new high water mark!

But laptops weren't the only category laser-focused on innovation and performance.

This year, cutting-edge monitors became the norm, Thunderbolt docks and SSDs embraced newer, faster standards, Intel and AMD launched overhauled desktop CPUs, gaming handhelds got truly competitive, and the software that runs on all that hardware kept getting better and better, too.

You love to see it. With such a gluttony of choice, it became harder than ever for PC hardware and software to impress us. Few products earned our rare Editors' Choice award. And only the very best of the best grace this list.

Without further ado, this is the Best PC Hardware and Software of 2024, as chosen by PCWorld's editors. Congratulations to the winners—with a field this crowded, they've definitely earned it.

BEST LAPTOP: DELL INSPIRON 14 PLUS

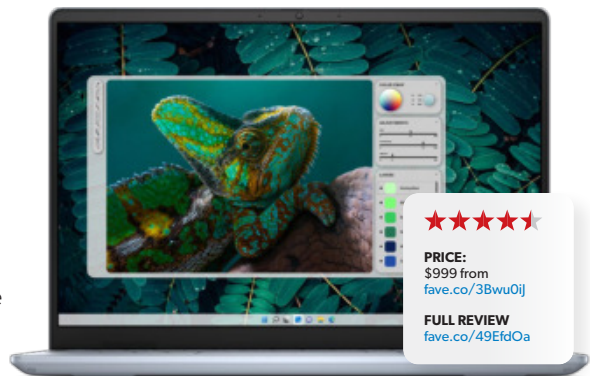


The Dell Inspiron 14 Plus is one of the most well-rounded laptops we've ever tested

here at PCWorld. You're getting strong performance, phenomenal battery life (17 hours on a single charge!), and a vibrant 14-inch 1400p display to boot. It hits nearly every mark and is clearly the best laptop for most people. The aesthetics are a little bland, sure, but the hardware capabilities and marathon battery

life more than make up for it – and a laptop that fits in with the crowd isn't a bad thing.

—Ash Biancuzzo



BEST DESKTOP CPU: RYZEN 7 9800X3D

It's been a dour year for CPUs—AMD's initial Ryzen 9000 lineup (fave.co/4efXMpv) offered minimal performance uplift and suffered from (since fixed, fave.co/40zlutp) Windows-related performance woes, while Intel's radical new Core Ultra chips (fave.co/4hACpC7) wound up being slower than their predecessors in gaming. But things ended with a bang courtesy of AMD's jaw-dropping Ryzen 7 9800X3D (fave.co/3OM9NIY).

Thanks to a second-generation V-Cache that eliminated the caveats required by earlier X3D models—the 9800X3D isn't a drawback for productivity now!—AMD's new gaming champion brought the heat against Intel. The Ryzen 7 9800X3D obliterates Intel's flagship Core Ultra 9 285K by 25 to 30



percent on average, with the whopping hitting an almost unbelievable 45 percent in *Cyberpunk 2077*.

Madness! I can't remember the last time I witnessed a hardware beat down this relentlessly violent. If you want the single best gaming chip you can buy, the Ryzen 9 9800X3D is it—by a whole hell of a lot. —Brad Chacos

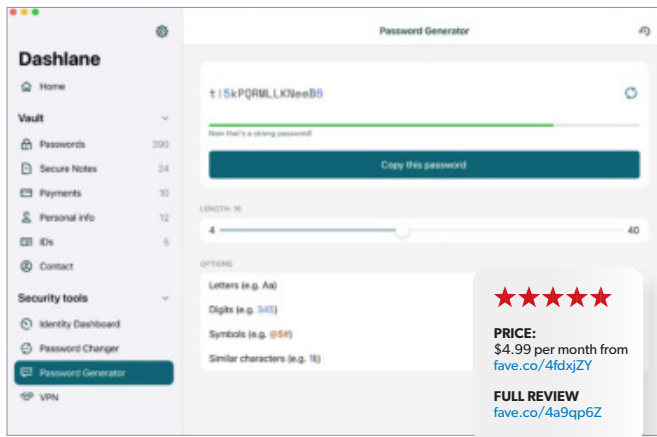
BEST PASSWORD MANAGER: DASHLANE



As data breaches increase in number and severity, password managers have become ever more important. A good one makes staying on top of your online security easy—quickly creating strong passwords, alerting when

one's been compromised, and updating compromised or weak credentials.

Of the options out there, Dashlane's consistency and continual feature updates have helped keep it as a long-standing favorite among our staff. Its paid Premium plan includes passkey support, passwordless login, dark web monitoring, VPN access, and even



real-time phishing protection. The latter two features are a proactive stance against other dangers to your password health—a welcome touch if your online habits would benefit from extra privacy and online protection, but you haven't yet looked into a dedicated VPN or antivirus subscription.—*Alaina YeeTat*

BEST MONITOR: DELL ULTRASHARP U2724DE



We knew this monitor was special when our veteran monitor reviewer, Matt Smith,

described it as “arguably the most versatile monitor ever sold.” Say more!

The Dell Ultrasharp U2724DE has what it takes to meet a user's every display need, whether it's as the command center of a busy workday, the canvas for content creation, or the means of losing yourself in a movie or game. The IPS Black panel gives the 27-inch screen incredible contrast,

while a 120Hz refresh rate makes for great motion clarity. Add to that the oodles of ports, an attractive and functional design, and a reasonable price, and Dell's stunner is definitely this year's best monitor!

—*Katherine Stevenson*



BEST DESKTOP GPU: NVIDIA GEFORCE RTX 4070 SUPER

It was a slow year for graphics cards, but the GPUs we *did* get were welcome ones. Nvidia's RTX 40-series Super refresh, announced at CES, righted the missteps made in the original 40-series lineup, lowering prices and beefing up specs where it made sense.

The best of the bunch was Nvidia's GeForce RTX 4070 Super (fave.co/49eZaH0), which offers a super-sized

performance boost over its vanilla namesake thanks to 20 percent more CUDA, ray tracing, and DLSS tensor cores, all at the same \$599 price point as the original. Yes please! On top of best-in-class ray-tracing performance, Nvidia's also best-in-class software features (such as DLSS 3.5 ray reconstruction (fave.co/49w67Ev), dual AV1 encoders, and Nvidia Reflex, a must-have in competitive shooters) make the RTX 4070 Super shine bright in the most competitive segment of the graphics card market.

What, that's not good enough for you?

The Nvidia RTX 4080 Super (fave.co/3D9OFd1) also earned an Editors' Choice award for its all-around excellence, buoyed by a \$200 price cut versus the original 4080.

—Brad Chacos



PRICE:
\$549 from
fave.co/4iGCKnt

FIRST LOOK
fave.co/49eZaH0

BEST CHROMEBOOK: LENOVO FLEX 5i CHROMEBOOK PLUS

From the versatile 2-in-1 design to the stunning touchscreen, the Lenovo Flex 5i Chromebook Plus has a lot to offer. The Chromebook Plus models have really raised the bar in terms of hardware capabilities and the Lenovo Flex 5i Chromebook Plus pushes the pedal to the metal even further. Not only is



From the versatile 2-in-1 design to the stunning touchscreen, the Lenovo Flex 5i Chromebook Plus

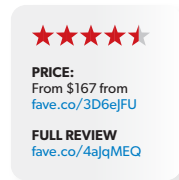


PRICE:
\$499 from
fave.co/4ipQQjB

FULL REVIEW
fave.co/4fBAxqj

day-to-day performance zippy, but the build feels strong in both tent and tablet modes. The 360-degree hinge is especially unyielding, which is exactly what we like to

see. The original \$499 MSRP price is a little high for a Chromebook, sure, but the overall fit, finish, and firepower make it worth the extra cash.—*Ashley Biancuzzo*



BEST SSD: CRUCIAL T705



The cutting edge in solid state storage is the PCIe 5.0 interface, and the SSD that sets the bar for this echelon is the Crucial T705.

If it's speed you're after, this bad boy brings it—as in 14.5GBps sequential reading

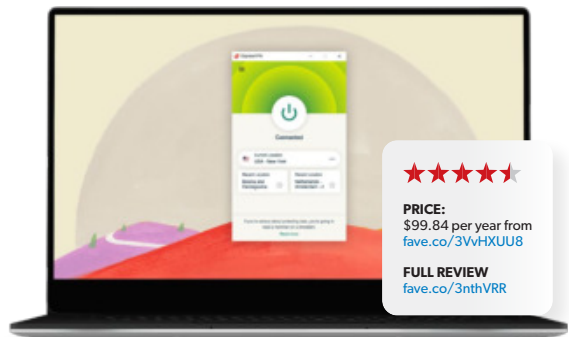
and 12.3GBps writing in our synthetic benchmarks. Real-world performance is also impressive. And the price for the Crucial T705 has come down considerably since we first reviewed it, to sub-\$200 for 1TB, making this high-performance drive a no-brainer for speed freaks.—*Katherine Stevenson*

BEST VPN: EXPRESSVPN



It's a tough ask to select the best VPN overall. There are so many factors to consider such as privacy, ease of use, server network size, unblocking capabilities, and speed. Everyone's intended usage may vary, and that needs to be taken into account. Will the VPN be used to get around location blocks for streaming, staying incognito online, torrenting, or something

else? The list goes on and on. Many VPNs excel at a few of these functions, but seldom



do you find one that manages to shine all across the board.

Enter ExpressVPN. It's one of the only services that consistently ranks highly in each category. That's why, for the third year in a row, it's my top VPN. Not only does it continue to be one of the fastest VPNs I've ever tested, but

it has a huge server network, it's dead simple, and comes with a sterling user privacy record. It also never fails to unblock streaming services and fully supports P2P. There might be services with more extra features, but none exemplifies all of the elements of a great VPN like ExpressVPN.—*Sam Singleton*

BEST GAMING MONITOR: MSI MPG 341CQPX

PCWorld EDITORS' CHOICE If your primary purpose is gaming, the MSI MPG 341CQPX is the monitor you want, hands down. The 34-inch curved display stands out among a sea of other QD-OLED competitors by boasting a higher refresh rate (up to 240Hz), strong HDR performance, and an excellent range of connectivity, including the ability to charge a laptop or phone over USB-C.

Of course, with QD-OLED, incredible contrast and color performance are a

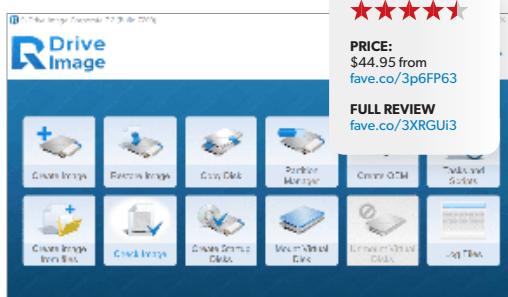
given. With a vibrant and realistic image and smooth-as-butter motion clarity, this display was made for immersive entertainment.

—*Katherine Stevenson*



BEST WINDOWS BACKUP: R-DRIVE IMAGE 7.2

PCWorld EDITORS' CHOICE When it comes to backup, the most important feature is reliability. R-Drive Image, which has been in the backup game for years, boasts an unblemished record in this regard. Now at version 7.2, it's more



full-featured and capable than ever. It offers the range of backup duties: disk and partitions, files and folders, WinPE and Linux boot media creation, the works. You can save your backups locally, to the network, or to your preferred cloud storage. You can

even replicate your backups across multiple destinations.

The interface is straightforward, and performance is speedy. There's really no need to consider other options. —*Katherine Stevenson*

BEST THUNDERBOLT DOCK: KENSINGTON SD5800T



Many laptop docking stations come and go across my desk, enough that I donate the remainder to my coworkers at the end of the year. Kensington's Thunderbolt 4 dock, the SD5800T, was one I didn't want to give up. I love docks that don't sacrifice either flexibility or stability, and the SD5800T offers it all: support for up to four displays, USB-C and USB-A, charging capabilities (7.5W to a

phone, just under 100W to a laptop). There really aren't any compromises at all. The only concern I had was its price, and that's fallen to a wholly respectable \$250 at press time. Absolutely recommended.—*Mark Hachman*



PRICE:
\$309 from
fave.co/3P8XyGF

FULL REVIEW
fave.co/3No58fo

BEST EXTERNAL DRIVE: ADATA SE920



If you want the very best external drive, look no further than the Adata SE920. It features the latest-generation USB 4 spec, making it capable of 40Gbps transfers. Within that class, it's the fastest external drive we've tested. But that's not all. The SE920



PRICE:
\$150 from
fave.co/4iwniKy

FULL REVIEW
fave.co/3ONosyH

also looks badass—a welcome perk for a device that will live on your desk or accompany you out in the field. The enclosure consists of a latched, spring-loaded outer

shell that can slide open about half an inch to activate an internal fan, which is effective at heat dissipation and runs quietly. How clever is that?—*Katherine Stevenson*

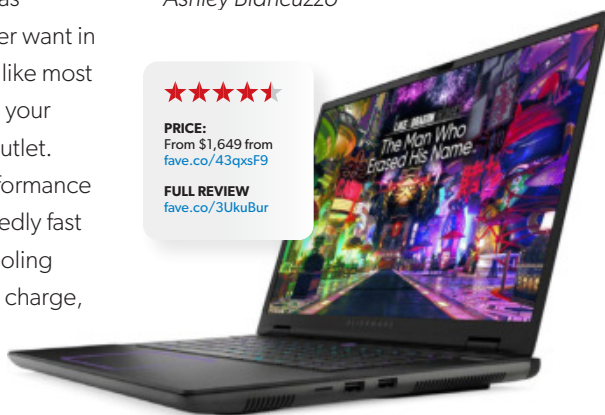
BEST GAMING LAPTOP: ALIENWARE M16 R2

PCWorld EDITORS' CHOICE The Alienware m16 R2 has everything you could ever want in a gaming laptop, and unlike most gaming laptops, it can even work as your daily driver, far away from a power outlet.

It offers exceptional gaming performance thanks to the RTX 4070 GPU, a wickedly fast display (240Hz!), and an efficient cooling system. It lasted 11 hours on a single charge, which is impressive, as most gaming laptops tend to die at the five or six hour mark. The cherry

on top? It's a great value for a gaming laptop, especially one with RTX 4070 graphics.

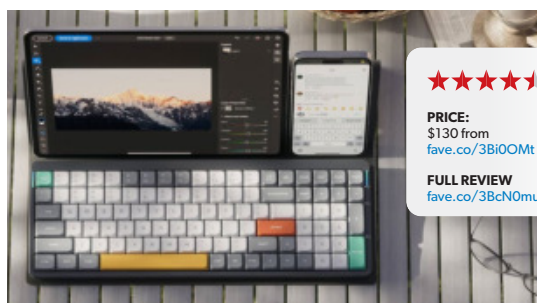
—*Ashley Biancuzzo*



BEST WIRELESS KEYBOARD: NUPHY AIR V2

PCWorld EDITORS' CHOICE If you don't need gaming chops, the wireless keyboard you want is the Nuphy Air V2, full stop. It's low-profile and stylish, but it has great components and excellent typing. And despite being low-profile, it still has hot-swap switches and a surprising variety of options from both Nuphy and Gateron. Combine it with easy VIA programming and a selection

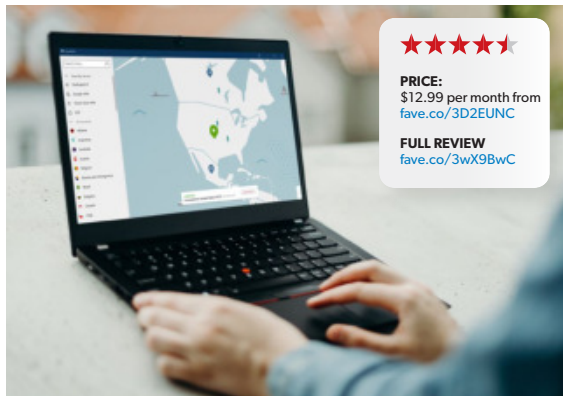
of layouts, plus a pretty good price, and it's easily outpacing the latest slim designs from Logitech and the rest.—*Michael Crider*



BEST FEATURE-PACKED VPN: **NORDVPN**

Each year NordVPN seems to find something new and exciting to add to its service. At this point, I find myself asking, what doesn't NordVPN have? Not only do you get the VPN with an outstanding server network and lightning fast speeds, but you also have access to a whole slew of top-notch privacy and security extras.

Its Threat Protection service gives you ad and tracker blocking, anti-malware download protection, and a malicious URL link checker. Then there is an active Dark Web monitoring service and built-in file transfer



feature called Meshnet. The list goes on and on. No other VPN is as rich in features as NordVPN, making it an easy top pick this year.—*Sam Singleton*

BEST PC GAMING HANDHELD: **ASUS ROG ALLY X**

Calling the Asus ROG Ally X just a refresh of the original ROG Ally is selling it too short. Yes, the ROG Ally X maintains the same 1080p 120Hz screen and AMD

Ryzen Z1 Extreme processor as before, but almost everything else has been redesigned based off community feedback, leading to a much better experience. Quieter fans, two USB-C ports (one with USB-4/ThunderBolt support), and refined ergonomics are just a few highlights, but the main one is the



upgrade in battery life. Asus summoned dark magic (and excellent engineering) to get battery life that finally rivals Valve's Steam Deck—all without a major weight increase!

Sure, the Steam Deck is the de facto mainstream handheld gaming PC option,

but if you are looking for the absolute best of the best out there, it's the ROG Ally X. Dual-boot Bazzite (fave.co/3ZKn9vt), a

custom image of Steam Deck's SteamOS), and you can get the best of both worlds! —Adam Patrick Murray

BEST LAPTOP FOR BATTERY LIFE: LENOVO THINKPAD T14S GEN 6

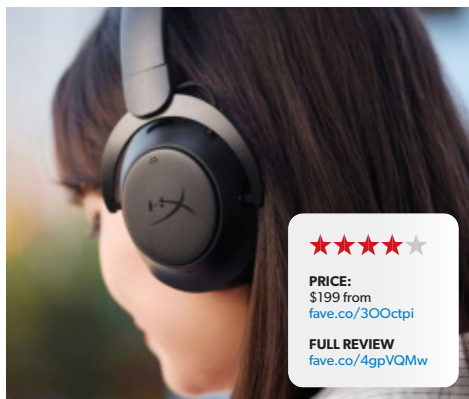
The Lenovo ThinkPad T14s Gen 6 ran for almost 24 hours on a single charge, a first here at PCWorld. Excuse me while I pick my jaw up off the floor! In addition to the phenomenal battery life, it also has a diverse array of ports and is powerful enough to handle light to moderate workloads. It measures just 0.67 inches at its thickest point, and yet Lenovo somehow squeezed in two USB4 ports, two USB-A ports, one HDMI 2.1 port, and one 3.5mm combo audi.—Ashley Biancuzzo



BEST GAMING HEADSET: HYPERX CLOUD MIX 2 WIRELESS

Most gaming headsets that claim to be versatile enough to be used as headphones fall somewhat short. With their large boom mic ports, obtrusive flip mics, or chunky earcups, they're more at home in gaming dens. But not the HyperX Cloud Mix 2.

This headset hides its mics stealthily in its earcups. It's also a champion of portability,



as it's very compact and lightweight. The sound too is crisp and clear, with enough detail in the tones to make playing and listening a treat.

Barely any clamp pressure in the headband, along with the headset's soft leatherette ear coverings, make it a comfortable fit that I can wear for hours on

end. It also has awesome compatibility, connecting to almost all my gaming devices, plus my mobile devices. Suffice it to say, the Mix 2 is the only audio device I currently need. What's also brilliant is that it has a 110-hour battery life, which means I can charge and then forget about plugging it in for days at a time.—*Dominic Bayley*

BEST GAMING MOUSE: LEMOKEY G1 WIRELESS



Unboxing the Lemokey G1 Wireless, I was immediately surprised by its excellent maneuverability. It's smoother and faster than any pro gaming mouse I've ever used. That impressed me right from the get-go—and then its devastatingly quick 8,000Hz wireless polling rate sealed the deal for me, making hitting targets a lot easier.

With its lightweight design of just 1.94 ounces and smooth 30,000 DPI sensor with a maximum speed of 750 inches per second, this mouse gives me the edge I need to win



one-on-one engagements in fast-paced games. It's also the perfect size for my medium-to-large hand. For what I'm getting here I could have paid upward of \$150, but the Lemokey G1 Wireless is also a smashing bargain at just \$69.—*Dominic Bayley*

BEST KEYBOARD: CORSAIR K65 PLUS WIRELESS



It came out all the way back in February, but the best keyboard of the year is Corsair's K65 Plus Wireless. It's hitting all the big trends,

excluding only a (wholly unnecessary) screen. It packs a 75% layout inspired by custom builds, hot-swap capability, and high-quality switches that are great for both typing and gaming. It's wireless, obviously, which many of these designs aren't. And it's about half the



price of Razer's excellent but very expensive BlackWidow V4 Pro 75%, and it doesn't try to

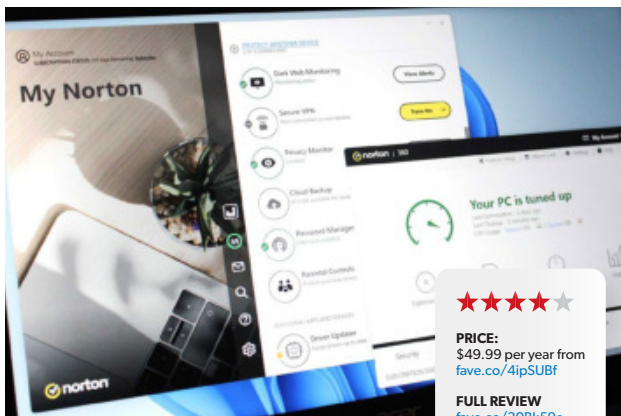
convince you that a screen belongs on a keyboard. (It doesn't.)—*Michael Crider*

BEST ANTIVIRUS: NORTON 360 DELUXE

This year proved the necessity of strong online security. Vulnerabilities are getting discovered and exploited faster, and the rise of AI tools is only fueling the onslaught. Solid antivirus software will shield you from the worst of it, whether that's viruses, malicious websites, hackers on public networks, or use of weak passwords.

And it'll do so with little effort on your part. Sure, you could stitch together different free services, but most people find a comprehensive security suite far easier—and Norton 360 Deluxe is easily the cream of the crop. It simplifies online security at a fair price, with a slew of features that cover you across the board. Beyond stopping malicious

software and websites in their tracks, Norton also provides key protections like dark web monitoring, a password manager, VPN service, parental controls, and 50GB of cloud storage for automated backups of important files. General utilities like file cleanup are even included. This level of comprehensive defense is rare among Norton's rivals—especially for how little it charges.—*Alaina Yee*



BEST WEBCAM: BENQ IDEACAM S1 PRO



The advent of personal streaming, content creation and work-at-home has meant that webcams have advanced massively from even a few years ago. BenQ's IdeaCam S1 Pro is a fantastic example of this, with functionality that goes beyond just making you look good. This "4K" webcam has a lot to offer just on that front, with sharp, lovely images and utility software that's truly a utility.

But there's more! A macro mode seems gimmicky, but it works great. There's even a "measuring" mode that would work well for



PRICE:
\$199 from
fave.co/4gtfyc

FULL REVIEW
fave.co/4bCXjwn

detail work. And there's a big bonus: a remote control "puck" that seems like something BenQ would sell separately, but includes in the box. That's real value.

— *Mark Hachman*

BEST U-C HUB: UGREEN 9-IN-1 REVODOK PRO



Ugreen's 9-in-1 Revodok Pro is a simple, straightforward, compact little dock that uses the free, downloadable DisplayLink utility as an intermediary. It's great for office work, with the flexibility to accommodate a pair of either DisplayLink or HDMI connections. It offers two USB-A ports (for mouse or keyboard, say), Ethernet, as well as a USB-C port for a smartphone or other peripheral.

USB-C hardware can be exceedingly simple, like a dongle, or with a much more robust feature offering. The Revodok Pro provides the essentials, trims the fat, and

keeps the price affordable. Ugreen's a not a household name, but the company's products have been consistently solid.

— *Mark Hachman*.



PRICE:
\$199 from
fave.co/49sxtV7

FULL REVIEW
fave.co/4g6N5au



“ Early detection allowed us to take control of the situation and make a plan together.”

If you're noticing changes, it could be **Alzheimer's**. Talk about visiting a doctor **together**.

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THESE APPS TURN YOUR **FLASH** **DRIVE** INTO A **PORTABLE PC** **SURVIVAL KIT**

START PORTABLE APPLICATIONS DIRECTLY FROM THE USB STICK. WE PRESENT THE BEST TOOLS FOR WINDOWS, HARDWARE, INTERNET, MULTIMEDIA, OFFICE, AND SECURITY.

BY THORSTEN EGGELING



Portable apps are applications and tools that can be started directly upon clicking them, with no prior installation needed.

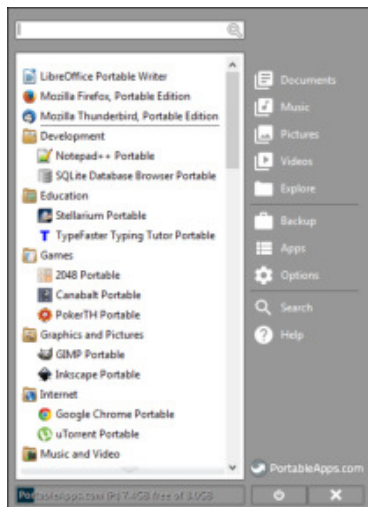
The advantage of this is that the programs are immediately ready for use and can be started from any storage drive—including a USB flash drive. These useful tools are then available for analyzing and maintaining any computer you slap the flash drive into, making them utterly invaluable for informal tech support duties.

Let's take a look at the best portable applications for hardware analysis and system tuning, as well as a basic setup with media player, image editing, and word processing tools.

SET UP AND USE THE PORTABLEAPPS.COM PLATFORM

As a starting point for most portable applications, the PortableApp.com Platform (fave.co/3BodHo3) is used to manage the programs and as a convenient program launcher. The tool also checks whether updates are available, which can be installed with a single click.

Unzip the portable app package to any directory on the hard drive or directly to a USB stick. You can specify the root directory



PortableApps.com Platform shows a menu with categories and programs. The portable applications can also be started from a USB stick.

or a subdirectory as the destination. The PortableApps folder contains the programs; you can use the Documents folder for your own files.

Launcher: Start PortableApps.com Platform via Start.exe. The program interface opens with the application menu. When you start a program or click on the desktop, the window closes automatically.

The tool appears as a button in the taskbar and as an icon in the notification area next to the clock. The programs are sorted into categories such as Graphics and Pictures, Hardware, Security, and System, and can be started with a click of the mouse.

The search bar serves as a filter; only the menu entries that match the pattern entered are displayed.

Configuration: PortableApps.com Platform can be configured by clicking on Options. On the Organization tab, you can define the structure of the application list. For example, select “Show all alphabetically” if you want to see the list of all programs but no categories.

Under Advanced, “Keep menu open after application start” can be a useful option.

If activated, the menu remains open after you have started a program. This allows you to try out several programs without having to call up the menu again each time. Click on OK to save the settings.

Installing programs: Go to “Applications > More applications > By category.” A window opens with a list of additional programs that can be downloaded. Tick the desired entries and click on Install.

Remove programs: If you do not need a program, simply delete it from the PortableApps folder.

Add programs manually: You can also create folders with additional portable tools. PortableApps.com Platform searches for executable files in all subdirectories at startup and displays new programs in the Other category. A program can be assigned

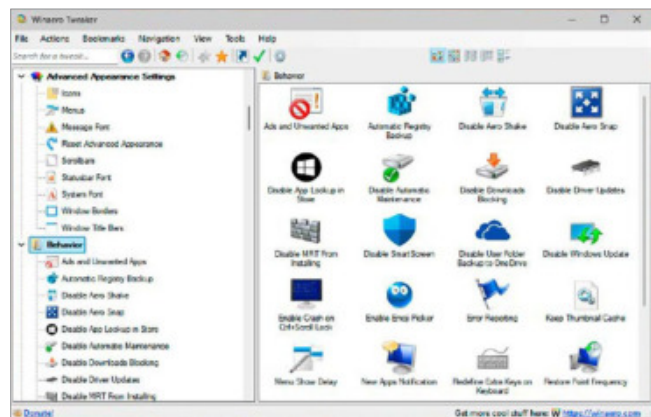
to another category via the Category context menu item.

TOOLS FOR WINDOWS TUNING AND SYSTEM MAINTENANCE

Many Windows settings are hidden in the depths of the system or cannot be changed at all by default.

Winaero Tweaker (fave.co/3ZDXG6L) provides access to numerous options and settings.

The tweaks are listed in a tree view. The tool determines the version of the operating system and only displays the settings available for it. The description texts are usually brief; if you want to know more, click on “See more details how this tweak works” (or similar). The website then shows further information.



Winaero Tweaker: The tool provides quick access to Windows options and settings, which it usually changes directly in the registry.



Tweak Power offers a host of ways you can maintain and optimize your PC.

Tweak Power (fave.co/4fWcN1a) offers an interface for a number of system tasks. Under Cleaning you can remove traces of web browser use. The Windows section provides quick access to many Windows settings—for example, in the areas of Operation (mouse, keyboard), Administration (user logon, system startup), and Visual Styler (system icons, screen saver). Tweak Power also offers functions for managing autostart programs, and can fix errors in the file system and optimize system settings.

Tweaking.com Windows Repair AIO (fave.co/4f2QWEe) can fix numerous Windows problems, such as resetting incorrectly set file permissions, re-registering system files, or repairing the Windows update.

Windows Repair recommends carrying out all repairs when you're in safe mode. To do this, click on "Restart in safe mode."

As soon as Windows is running again, restart Windows Repair. First carry out the steps recommended by the wizard. Under "System tools," create a backup of the registry before making any changes to the system. Then click on "Repairs > Main part" and "Call up repairs." Finally, select the

desired repair functions.

HARDWARE ANALYSIS AND INVENTORY

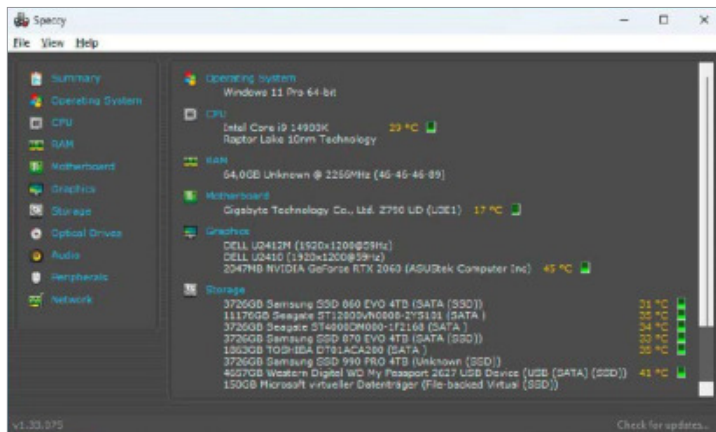
Information about what is in the PC helps, for example, when searching for drivers. However, it is also advisable to keep an eye on the condition of the drives and the temperature of the components to prevent failures.

Speccy (fave.co/3Vq26eW) quickly provides the most important data on CPU, RAM, graphics chip and motherboard. It shows the manufacturer and type designations of the components as well as the temperature of the CPU and SSDs or hard drives. The SMART values provide information on the status of the drives.

Hwinfo (fave.co/46kj7FP) displays particularly extensive details about the

hardware. The “System overview” window provides data on the CPU, motherboard, and GPU, while the main window lists all components found. Sensors provides a more detailed insight into the current values of the CPU, RAM, drives, and network adapters—for example, the clock frequency, voltage supply, temperature, power consumption, and transfer rates.

CPU-Z, GPU-Z, SSD-Z, and PCI-Z specialize in the values of the processor, graphics chip, SSD, and PCI bus. Crystal Disk



Speccy: Find out what hardware is installed in the PC and display the temperatures of the motherboard, CPU, graphics chip, hard drives and SSDs.

Info (fave.co/453qKEa) displays drives and the requested SMART data.

Crystal Disk Mark (fave.co/41mQVYm) is a performance test for hard disks and SSDs. The tool can determine the transfer rate with different file sizes. This can be used to determine whether an SSD is working as fast as it should.

The image shows the CrystalDiskMark 8.0.5 x64 [Admin] window. The interface includes a menu bar (Datei, Settings, Profile, Theme, Hilfe, Sprache(Language)), a test profile dropdown set to 'All', a file size dropdown set to '1GiB', and a workload dropdown set to 'H: 70% (2622/3725GiB)'. The results are displayed in a table with Read (MB/s) and Write (MB/s) columns.

	Read (MB/s)	Write (MB/s)
SEQ1M Q1T1	7123.86	6844.09
SEQ1M Q1T1	4639.19	5123.70
RND4K Q32T1	818.09	525.83
RND4K Q1T1	102.08	326.24

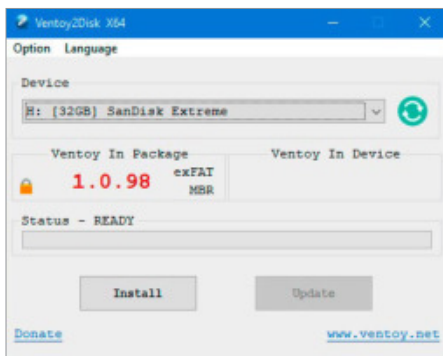
Crystal Disk Mark: The tool measures the read and write speed of hard disks and SSDs. You can find out whether a drive actually delivers the expected performance.

USING A USB STICK FOR SYSTEM INSTALLATION

Windows or Linux systems can be set up quickly from a USB stick. Installation systems are usually delivered as an ISO file, the contents of which you must first transfer to a USB stick.

This works particularly reliably for a large number of systems with Rufus (fave.co/3PKgDQq). If you start Rufus

Ventoy: Several ISO files can be booted from a USB stick prepared with this tool—for example, for Windows or Linux installation.



from a stick with the portable tool collection, you need a second USB stick as the installation target. The stick will be formatted and all files on it will be lost.

An alternative is Ventoy (fave.co/4fWdg3q). This tool also reformats the USB stick. However, you can copy the portable tool collection to the hard drive, then format the stick with Ventoy and then copy the tool collection back to the stick.

Place the ISO files of the operating systems on the stick. When you boot the PC from the stick, Ventoy displays a menu from which you can start the desired installation system.

PROGRAMS FOR NETWORK AND INTERNET

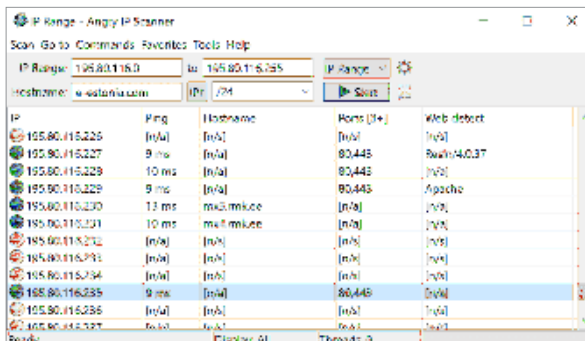
Windows only offers a few diagnostic options for the network. You can display the most important

data, such as IP address and connection speed, in the Settings via “Network and Internet.” In the terminal, **ipconfig** can help.

Angry IP Scanner (fave.co/49nAwEZ) scans an IP range and displays the network resources found. This is useful in foreign networks to track down all devices. The tool also shows whether a device is listening on

ports 80 and/or 443, which indicates a configuration interface that can be called up in the browser.

Port Expert (fave.co/4fZGmri) shows processes that are currently using the internet connection. Web browsers that establish a connection via ports 80 or 443 (HTTP and HTTPS) are to be expected. If unknown programs that use unusual ports appear in the list, this could be malware.



Angry IP Scanner: Enter the IP range of the network and click on Start. The IP numbers of all devices in the local network are then displayed in the list.

Firefox (fave.co/3OEoj5t) is useful as a portable version if you want to use the browser on other people's computers with the usual settings.

Access data can also be saved with the portable browser. Protect them in the settings under "Privacy and security" with a sufficiently complex master password.

GRAPHICS, IMAGE EDITING, AND OFFICE APPLICATIONS

A basic software package should also include image viewers and image editing as well as simple programs for document processing.

Irfan View (fave.co/49mxvES) is a powerful image viewer that supports numerous graphic formats and can therefore open almost any image file. In addition to image viewing and browser functions, Irfan View also enables the post-processing of graphic files. You can rotate, flip, crop, sharpen, or add effects to images without loss.

Paint.Net (fave.co/49rinGE) can be used to edit photos and create drawings. Functions such as image cropping, scaling, red-eye removal, color saturation, contrast, and brightness adjustment are available.

Screentogif (fave.co/3ZqkHsC) is helpful if you want to record some work steps on the PC as a tutorial. The screen recorder creates a sequence of images that can be saved as an animated GIF. The animation can be opened and played in the web browser or in Irfan View.

Abi Word (fave.co/4fcb7ja) is a clearly organized word processor and can also handle files created with Microsoft Word or Libre Office, for example. The Windows version is no longer being developed, but Abi Word is certainly sufficient for occasional use.

The text editor Notepad++ (fave.co/40ECGM1) does more than Microsoft Notepad. Files can be opened in several tabs and syntax highlighting makes it easier to edit configuration files, for example.

The PDF reader Sumatra PDF (fave.co/33TMoBt) fulfills simple requirements. It displays bookmarks and you can rotate pages if necessary.

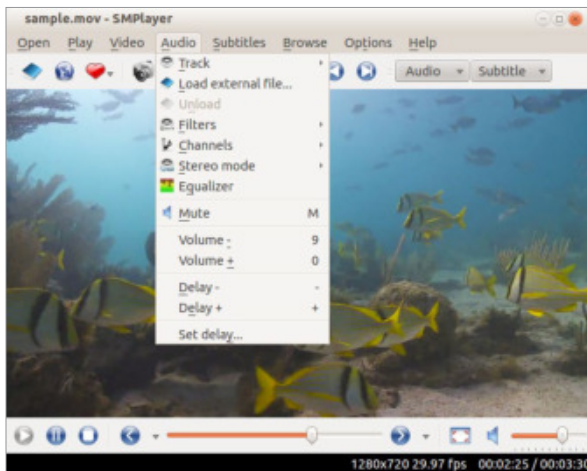
If you want to edit PDFs, you can use PDF-Xchange Editor (fave.co/4f6j3NX). You can use it to change or add text to PDFs.

PROGRAMS FOR AUDIO AND VIDEO

Not every PC has programs that can play all audio and video formats. To be prepared for presentations, for example, you should have your own media player ready.

VLC Media Player (fave.co/4imiya4) can play all common audio and video files. It comes with all the necessary codecs and is not dependent on what is installed on the PC.

Smplayer (fave.co/3OIHVp8) has roughly the same capabilities as VLC. The program is a good alternative if you want more customization options for the user interface.



SMPlayer has many of the same capabilities as the popular VLC Media Player, but with more customization options.

Audacity (fave.co/3Bd9Wlw) is an audio editor that is suitable for recording, editing, and playing back audio files in various formats. As of version 3.5, AI functions can also be used in the program.

TOOLS FOR MORE SECURITY


A virus scanner can probably be found on every PC by now. However, it can't hurt to get a second opinion if you have any suspicions of malware.

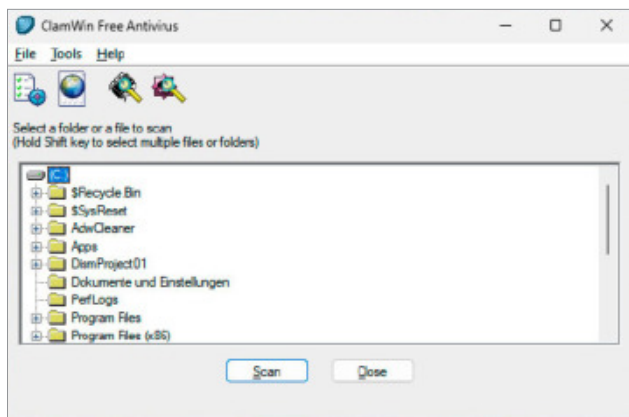
ClamWin (fave.co/3B4vmBI) is a free open-source virus scanner. When starting, you confirm the update of the signature files,

then select the drive, folder, or file and click Scan.

Stinger (fave.co/49sbTr0) was originally developed by McAfee, but is now maintained by Trellix. After starting, simply click on Scan to check the system drive. Click on "Customize my scan" if you want to select drives or folders.

Spybot—Search & Destroy (fave.co/4f2PgdN) is a long-established product for searching for unwanted software and browser tracking cookies. After clicking on "Scan system," the tool scans the drives and

displays the findings. Check the results, uncheck the boxes next to entries that you do not want to delete, and click on "Fix selected." 



Clam Win: The free virus scanner is easy to use and scans the selected drive or only certain folders or files.



**AM I OKAY
TO DRIVE?**

**BUZZED DRIVING
IS DRUNK DRIVING**





UP

WINDOWS COPILOT+ PCS AREN'T THERE YET: 8 MUST-CHANGE GRADES FOR 2025

IF AI IS THE FUTURE OF WINDOWS,
COPILOT+ PCS WILL NEED
SOME SERIOUS IMPROVEMENTS.

BY CHRIS HOFFMAN



It seems like every new laptop lately is a “Windows Copilot+ PC” (fave.co/3B3IDKs). With Intel’s Lunar Lake (fave.co/402SDh2) and AMD’s Ryzen AI 300 (fave.co/3MtBrJH) CPUs, AI-infused Copilot+ PCs have finally expanded into traditional x86 laptop territory. They aren’t limited to just Arm-powered laptops with Qualcomm Snapdragon X Elite hardware anymore.

That’s good news for everyone. Along with speedy neural processing units (NPU), fave.co/3A6clZ1, which are capable of at least 40 trillion operations per second (TOPS), fave.co/3M8R3Sp, Copilot+ PCs must have at least 16GB of RAM and 256GB of storage. If that’s the new baseline for Windows PCs, that’s awesome. It will benefit you even if you don’t care about AI.

So, your next laptop might just be a Copilot+ PC. But if you ask me, Copilot+ PCs still leave a lot to be desired. While those minimum specs are great, there’s more to a great laptop experience than hardware. If Microsoft wants people to truly care about Copilot+ PCs, some serious improvements need to happen sooner rather than later.

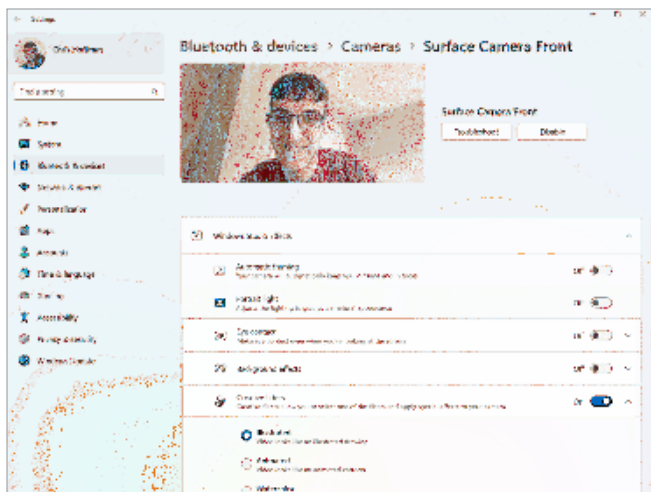
WINDOWS NEEDS TO INTEGRATE AI BETTER

Copilot+ PCs should feel more revolutionary than they currently do. At launch, we got a collection of small features (fave.co/4f3NQkw) in apps like Paint and Photos, some webcam effects, and a few other goodies. It’s just *not* a transformative AI experience the way those Copilot+ PC ads promised.

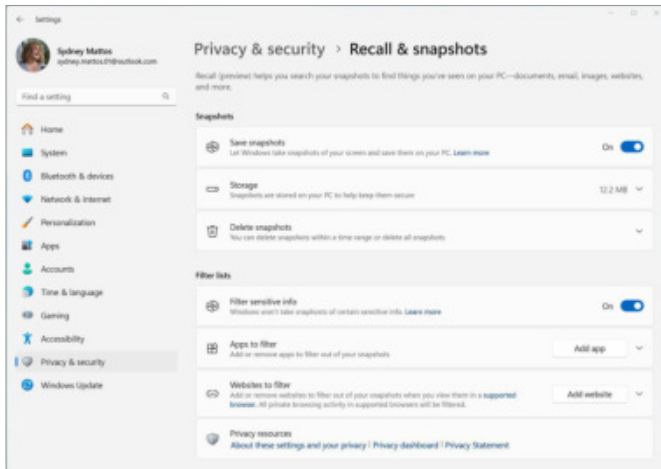
When I hear about transformative AI

integration in Windows, I imagine Windows rewriting text in any application, or summarizing anything that’s on the screen, or noticing I’m performing a repetitive task and offering to automate it for me.

What if Windows AI truly *understood* what you were doing on your PC and could help you get those things done? That would be interesting, but it isn’t happening on Copilot+ PCs.



Microsoft unveiled new features, including creative filters.



Recall's snapshots are stored entirely on your computer, and nothing is ever shared with Microsoft.

PRIVACY AND CHOICE NEED TO BE A PRIORITY

Microsoft's Windows Recall feature (fave.co/4eXeCLf) was supposed to be the impressive new thing that sold everyone on the power of AI PCs, and it was the centerpiece of Microsoft's original Copilot+ PC announcement back in May 2024. Recall takes screenshots of your PC activity every five seconds, then lets you search through it all using plain-language AI queries.

Of course, it was immediately controversial. While Microsoft insisted it was private and secure, there was severe backlash over privacy concerns — so severe, in fact, that the company backed down, pulled the feature, and promised to make changes to address criticism. As we reach the end of

2024, Recall continues to see delay after delay.

For people to trust Copilot+ PCs, privacy, control, and user choice needs to be at the forefront. Recall was actually designed in a more private way than the controversy implied — for example, those snapshots are stored entirely on your computer and nothing is ever shared with Microsoft. But concerns are still concerns, and it's clear that

Microsoft didn't take those concerns seriously when originally designing Recall.

Future Copilot+ PC features need to be designed in a way that garners user trust from day one, without repeated delays while the company scrambles to rework features after the fact. It's just a bad look.

COPILOT NEEDS TO WORK OFFLINE (SOMEHOW)

The name "Copilot+ PC" implies that you'll be able to do more with Microsoft's Copilot AI chatbot assistant on such PCs.

Unfortunately, that isn't true at all. While these PCs do have a Copilot key on the keyboard (fave.co/49QnG1u), that key also exists on many non-Copilot+ PCs, too. You don't actually get any bonus Copilot features.

Want Copilot AI features in Microsoft Word and other Office apps? You won't get that with a Copilot+ PC. Instead, you need to shell out for a Copilot Pro subscription (fave.co/4g6TlcY). That's not the clearest naming scheme!

To deliver on the promise of the name, Microsoft *should* make Copilot work offline in some form, perhaps on Copilot+ PCs to provide speedy AI answers even without an internet connection—and without sending any data to Microsoft, which would be a big boon for businesses that want to maintain control over internal data. Ideally, Copilot should still be able to access Microsoft's cloud servers for more information when necessary.

But all of this really just points to an even bigger problem: Copilot itself might need a big rethink. In my experience, the new

Copilot is more focused on friendly chatter than real productivity (fave.co/3BjYZyt). I don't want my laptop to be my friend—I want it to be a productivity tool!

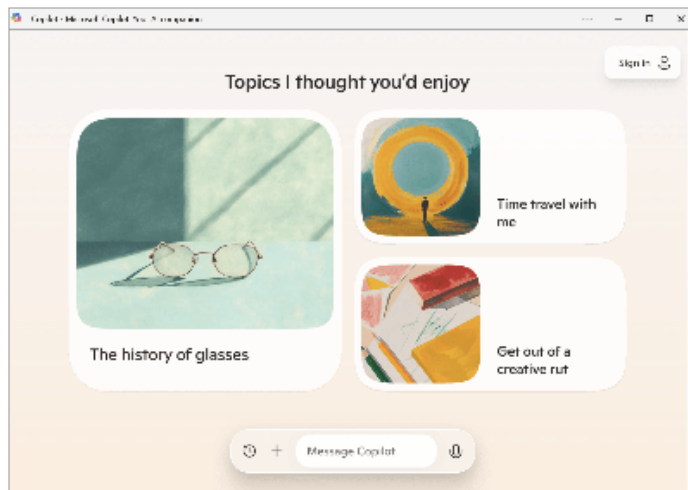
AI IMAGE FEATURES NEED TO WORK OFFLINE, TOO

The generative image features on Copilot+ PCs are a little sad. For example, Cocreator in Paint (fave.co/3Vj3lfn) can “upgrade” something you draw, and you can also generate images in Photos. But that's...it?

On a Copilot+ PC, these features use the system's NPU to perform AI image generation. But they require you sign in with a Microsoft account, and they send your generated image to Microsoft's servers for safety checks before showing them to you. In other words, you have to be connected to the

internet—they don't work offline.

What's the point of using the system's NPU to do image generation locally if it doesn't work offline, requires a Microsoft account, and sends the image to Microsoft's servers? You might as well just use cloud-based AI image solutions that do all the work on a cloud server somewhere.



The new Copilot is more focused on chatter than productivity.

IMAGE GENERATION MODELS NEED TO CATCH UP

The argument for using cloud-based AI image tools is especially strong because the image generation models on Copilot+ PCs aren't great. Yes, they technically work...but they're far behind the latest AI image generation models you can find elsewhere. Cloud-powered models like OpenAI's DALL-E 3, which is used by Copilot and Microsoft Designer, generate much higher-quality images. Copilot+ PCs need to be more competitive with the latest cloud-powered AI image models that can be used on any device, even phones. Otherwise, what's the point?

AI FEATURES SHOULD SUPPORT NPUS AND GPUS

Gaming PCs are being left out of the Copilot+ PC push. That's a shame because a powerful GPU isn't just for gaming—it's also the best way to run local AI models with the fastest possible performance. Indeed, while NPUs are getting all the hype, GPUs are still the fastest way to run many local AI applications (fave.co/3VpJQSe) that do the work on your own PC.

NPUs are useful for AI tasks because they provide better performance than a CPU and



Microsoft's Photos Image Creator isn't great.

less energy usage than a GPU. And with Copilot+ PCs being all about long battery life and power efficiency, it's clear why NPUs are in the spotlight. But what about when battery life and power efficiency aren't so important? GPUs are still the best for that, and that means gaming laptops shouldn't be overlooked for AI tasks.

When designing Copilot+ PCs and Windows AI features, Microsoft has ignored GPUs—if your computer doesn't have an NPU, it simply can't use those AI features. That's a mistake.

DESKTOP PCS AND GAMING LAPTOPS SHOULD ALSO BE COPILOT+ PCS

Copilot+ PCs are currently limited to thin-and-light laptops. Do you have a desktop? Too



Copilot+ is currently limited to thin-and-light laptops.

bad. It can't yet be a Copilot+ PC. Do you want a gaming laptop with a powerful CPU like Intel's Raptor Lake refresh (fave.co/SAw5Aj)? Also too bad. That can't be a Copilot+ PC either.

Qualcomm's Snapdragon X Elite hardware is only for laptops, and the company canceled its planned Snapdragon mini PC (fave.co/3D2hliF). Intel's Arrow Lake Core Ultra desktop chips include an NPU that's too slow for Copilot+ PC features (fave.co/3YBCYD3), and AMD's Ryzen 9000 (fave.co/4efXMpv) desktop CPUs don't have an NPU at all.

Intel, AMD, and Qualcomm need to release processors for other form factors, not just the thin-and-light laptops that are in vogue. Of course, this will likely happen in time: Qualcomm has said it plans to release its Snapdragon X processors for PC desktops (fave.co/3VIVlQU), and Intel and AMD will

surely bring faster NPUs to desktops in the future, too.

APPS NEED TO USE COPILOT RUNTIME

Microsoft's Copilot+ PC specification isn't just about getting new AI features built into Windows. It's about establishing an entirely new type of app that requires AI-related hardware and a minimum hardware level for developers to target.

When Microsoft first announced Copilot+ PCs, it also announced the Windows Copilot Runtime (fave.co/3ZJFsRG), which is a collection of AI models that are built directly into Windows. Windows applications can take advantage of these AI models...but only if you're on a qualified Copilot+ PC.

Some companies have told me about how their Windows applications can take advantage of NPUs for AI tasks, " **This Magazine Free on Soft Archive .i.s** " but I've yet to hear about a single application that uses the Windows Copilot Runtime for AI. If the industry wants to sell Copilot+ PCs for their unique features, Windows app developers will need to ship apps that take advantage of that Copilot Runtime. That's a tall order, though. Most AI applications are being built in a cross-platform way using cloud-based AI processing so they can run on any platform, whether a Windows

PC or a Chromebook or an Android phone. Microsoft will have to convince app developers to build AI features that work only on a certain subset of Windows 11 PCs—and without proper incentives, it's unlikely for any to take them up on that.

BONUS: THE PRICES NEED TO COME DOWN

One final but obvious point: Copilot+ PCs need to come down in price to achieve widespread adoption—and they *do* need to achieve widespread adoption if app developers are going to take them seriously enough to develop specialized software for them.

If Copilot+ PCs stay as high-end niche products used only by PC enthusiasts, then they're going to be easy to ignore. They won't get the software they need to be interesting, and Microsoft won't be moved to release interesting Windows features that only a few can use.

Right now, we're nearing the end of 2024, and it's still hard to get a Copilot+ PC for much less than \$1,000. You may be able to save a couple hundred bucks if you catch a Qualcomm Snapdragon X laptop on sale, otherwise you're out of luck. That's no surprise, though, as those laptops just came out (and

Intel Lunar Lake and AMD Ryzen AI 300-powered laptops just started to trickle out at the end of 2024).

We're going to need to see the price come way down in the future so that people will happily buy Copilot+ PCs instead of getting last year's laptops at half the price. A premium pricing strategy is a good way for hardware manufacturers to make money on their hardware but a bad way to build an application platform. Fortunately, we've seen some first moves on this, like Qualcomm talking about a cheaper Snapdragon X Plus chip that'll pave the way for \$700 Copilot+ laptops (fave.co/4e0ZICK).

And, of course, if prices do drop, that'll be good for everyone. Whether the AI features are useful or not, I look forward to more affordable laptops with 16GB of RAM and 256GB of storage as the minimum. 🔌



Copilot+ computers need to be a lot more affordable if the technology is going to catch on with consumers.

A photograph of a man in a blue graduation gown adjusting a purple cap on a woman in a red dress. They are both smiling and looking at each other. The background is a blue curtain.

When
you
graduate,
they
graduate.

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How to find your saved passwords in Chrome

If you're looking for your saved passwords, here's where to locate them and their related settings. **BY ALAINA YEE**

One of the easiest ways to store your passwords and passkeys is within your browser—but you may not give much thought to how to find them within Chrome, since it'll autofill your credentials whenever you need to log into a site. If you need to look

up a particular password, it takes just a few quick clicks to access them directly. Here's how to locate them—and how to access all the different settings related to them.

(Spoiler: You may need to use both methods to fully configure Google's password storage to your liking).



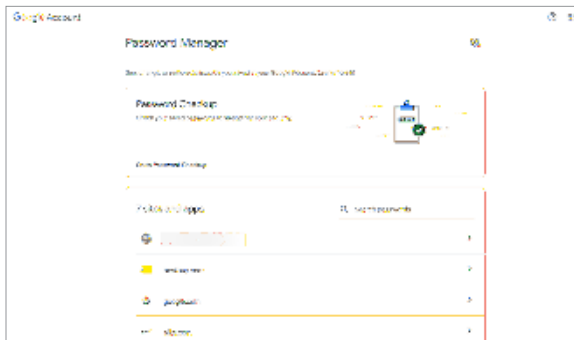
Google Password Manager includes a **checkup feature (which scans for compromised, reused, or weak passwords) and a search function.**

METHOD 1: LOOK WITHIN CHROME

You have a couple of ways to get to your passwords within Chrome. On a PC, the fastest method is entering **chrome://password-manager/passwords** into the address bar of your browser tab.

If for some reason that doesn't work, click on the three-dot menu in the upper right of the screen, then choose **Settings > Autofill & Passwords > Google Password Manager**.

On mobile devices, look for the three-dot menu at the bottom of the screen, then head



Google also has a dedicated **Password Manager website.**

to **Settings > Google Password Manager (Android) or straight to Google Password Manager (iOS).**


Tip: For extra protection on PC, head to the settings and turn on use of Windows Hello ([fave.](https://fave.co/4g3BM2H)

[co/4g3BM2H](https://fave.co/4g3BM2H)) as extra defense against unauthorized access to your passwords.

METHOD 2: VISIT THE GOOGLE PASSWORD MANAGER SITE

Chrome isn't the only place you can find passwords saved to your Google account. You can also navigate to **passwords.google.com** to access them.

This alternative method is useful if you don't use Chrome often, might be switching soon due to coming incompatibility with ad blockers, (fave.co/3Zm1atn), or don't like the browser interface.

You can also access one setting not found within Chrome—**Password Alerts**, which notify you if any saved passwords are found circulating online (and thus compromised). It's enabled by default, which most people should leave as is, but on the off chance that you need to turn it off, you'll find it here. 

How to make an old monitor look more colorful

Tips for getting your monitor's color up to speed. **BY DOMINIC BAYLEY**



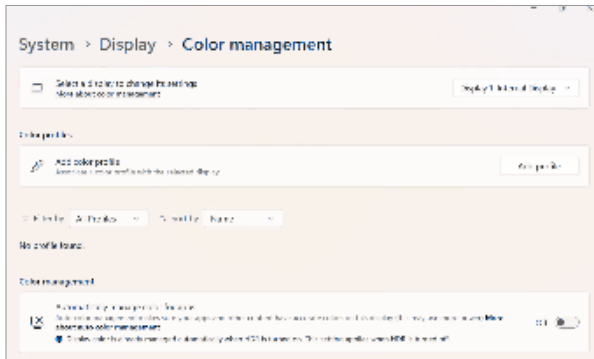
One of the things that may hold you back from using an old monitor for gaming, photography, graphics editing, or some other visual purpose is that it's not displaying the kind of vibrant color you want or will find in a new monitor.

There are different reasons that may be the case, ranging from your software settings to the hardware you are using. The good news is that most old monitors whose colors look washed out or inaccurate can be

corrected to look a lot more colorful and vibrant. Here's how to make that happen.

ENSURE YOU HAVE THE RIGHT COLOR PROFILES INSTALLED

Windows 11 should automatically detect your monitor's correct color profile and apply it, but if colors still don't look right, there's a chance the profile could still be wrong. You can update to the right color profile in Color Management in Windows 11.

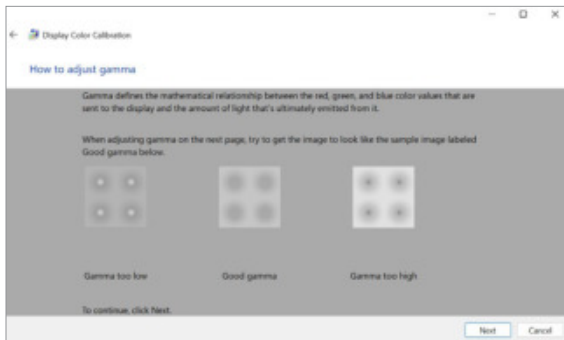


You can update to the right color profile in Color Management.

However, first you may need to download the correct color profile drivers from your monitor manufacturer's website. You can follow this guide to do both of these things.

CALIBRATE YOUR MONITOR IN WINDOWS 11

Calibrating your display using Windows 11's Display Color Calibration will make colors appear more accurate. Calibrating is kind of



Calibrating your display makes colors more accurate.

a lengthy process, so you'll want to follow a step-by-step guide (fave.co/4ink63Q) to safely see you through.

ADJUST THE COLOR SETTING ON THE MONITOR

To adjust colors on your monitor itself, locate the menu button and click it to bring up a list of options you can tweak. The

ones to look out for here are Color, Contrast, and Brightness. Adjust these settings until the colors look as strong and vibrant as possible.

CHECK YOUR CABLES

If the cables that connect your video card and your PC and monitor are cheaply made or defective, your color problems may be due to signal loss from those cables. If you suspect that you're experiencing signal

loss, swapping out the cables for better ones may fix your monitor's color issues.

SET YOUR MONITOR'S NATIVE REFRESH RATE

A monitor not set to its native refresh rate can be a little-known culprit behind a monitor displaying washed-out color. One YouTuber (fave.co/3VniAoo) only managed



Setting a monitor to its native refresh rate could fix things.

to identify the problem after trying a bunch of other fixes that didn't work.

To change the refresh rate on your monitor in Windows 11, open Settings and click on Display, then Advanced Display. Select your monitor's native refresh rate from the drop-down menu next to "Choose a refresh rate."


AN EXTRA STEP IF YOU HAVE A VIDEO CARD...

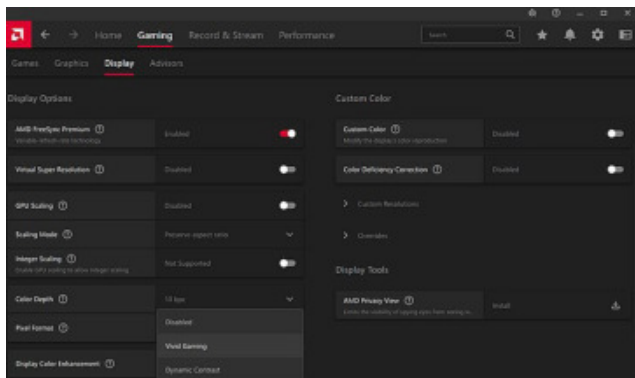
If you have an Nvidia graphics card: Follow the steps above and then apply this extra tweak. Open up Nvidia Control Panel and select Adjust Desktop Color Settings. Raise the slider for Digital Vibrance from what it was up to about 65. The colors

on your display should look richer, brighter, and cleaner.

If you have an AMD graphics card: Owners of PCs with AMD Radeon RX Series graphics cards or AMD desktop processors with Radeon graphics running Windows 10 or later can improve their monitor's color with Display Color Enhancement and Color Deficiency Correction in AMD Software: Adrenalin Edition

(fave.co/3B9qZ83). Any color changes can be made globally or applied specifically to individual games.

If you've made these changes, you should now have an old monitor that looks colorful enough for just about anything you need it for. Now the only thing left to do is decide how best to use it. 



AMD card owners can use AMD Software: Adrenalin Edition to improve an old monitor's color.

Tech Spotlight

A video showcase of the latest trends



Watch the video at youtu.be/TU_DDvS0akA

9800X3D: Low-Profile Cooler vs. 360mm AIO

→ How does an AMD Ryzen 7 9800X3D perform in a small form factor rig with a

low-profile cooler versus an open-air test bench with a 360mm AIO? In this video, Adam shows how the 9800X3D fares under extreme loads in an SFF case.