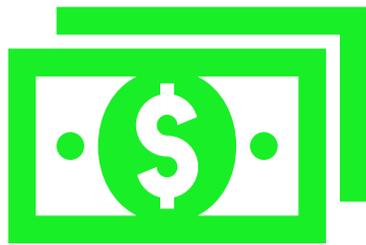


**PC
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**OUR FAVORITE
TAX APP**



**FIX YOUR NET
CONNECTION**



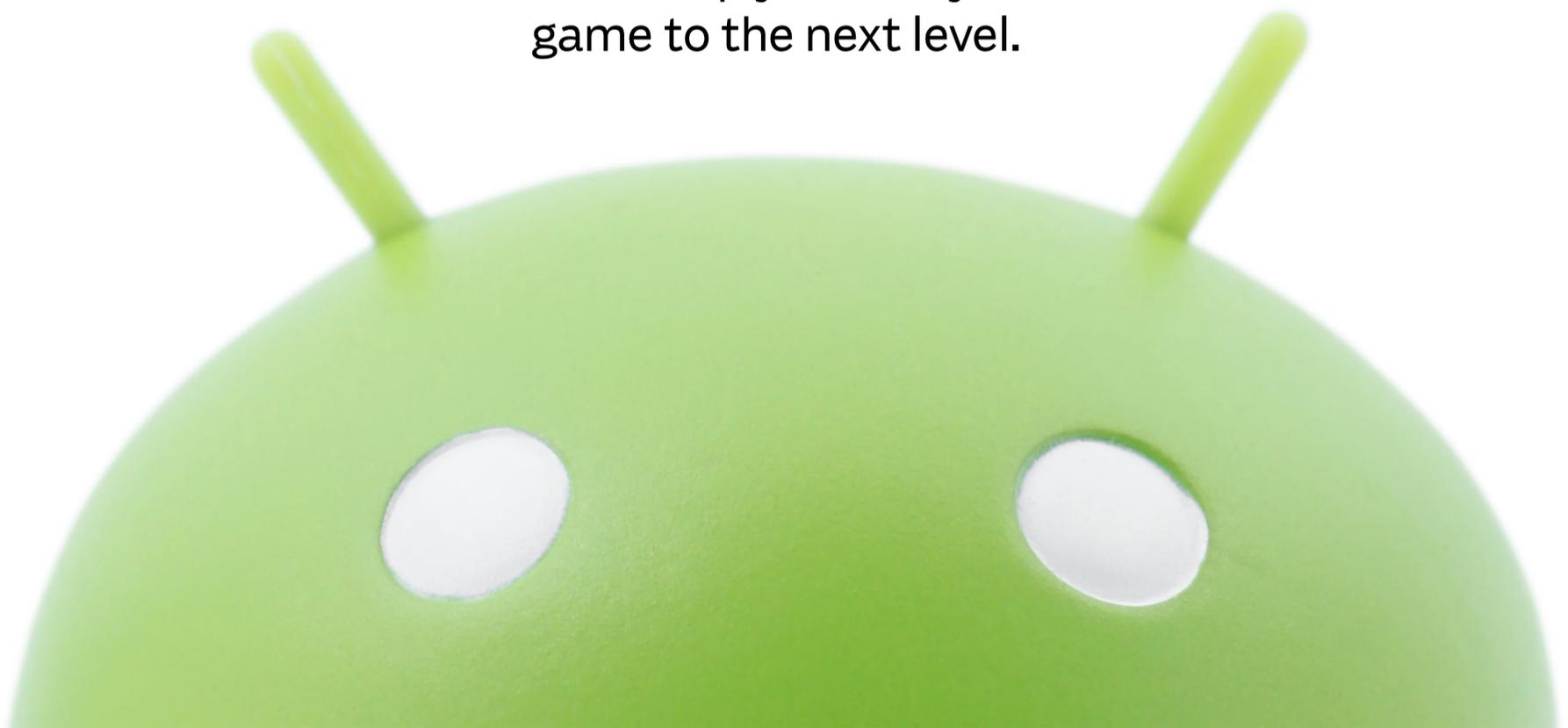
KILLER ANDROID TIPS



COVER STORY

KILLER ANDROID TIPS

Our collection of secrets, tricks, and shortcuts will help you take your mobile game to the next level.



FEATURES

**TURBOCHARGE
YOUR TAXES**

You have to give Uncle Sam his due, but the process doesn't have to be a pain. Our favorite tax software makes it a snap.



REVIEWS

CONSUMER ELECTRONICS

Perfect Bake Pro & Perfect Drink Pro

HARDWARE

Acer Aspire Switch 11 V (SW5-173-632W)

Dell Inspiron 11 3000 Series 2-in-1 Special Edition

Lenovo IdeaPad 100S-11

Shuttle XPC Nano

HP Envy Curved 34-A051 Signature Edition All-in-One

TP-Link AC1750 Wi-Fi Range Extender (RE450)

SOFTWARE & APPS

Dashlane

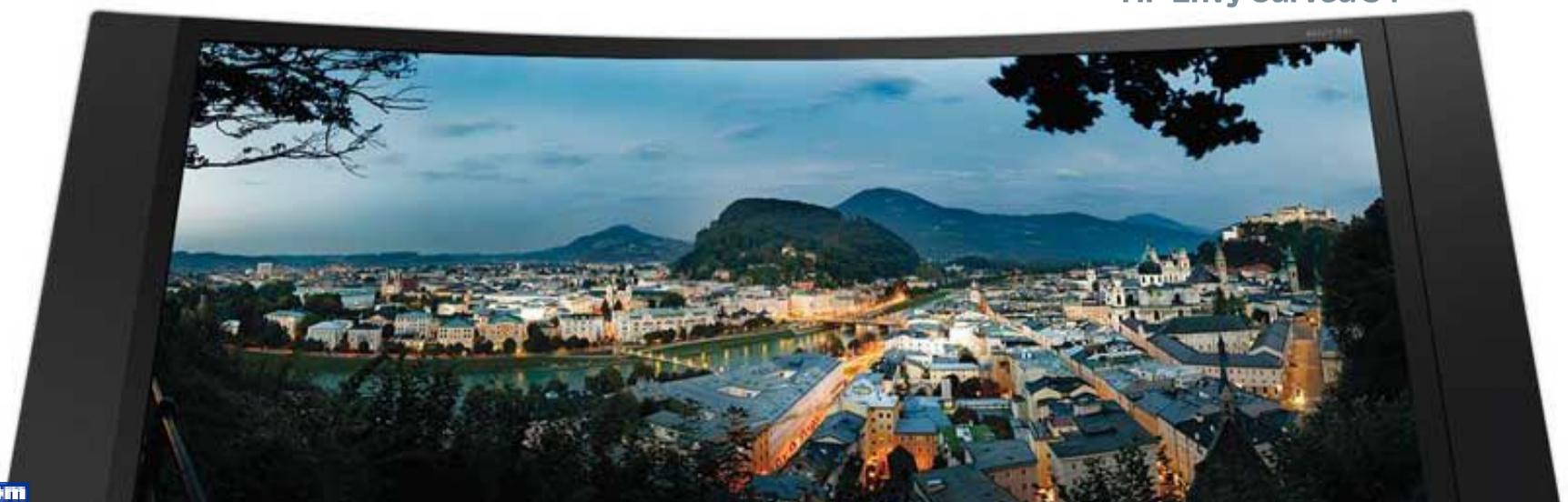
Our Favorite Apps for March



Perfect Bake Pro



Shuttle XPC Nano



HP Envy Curved 34

WHAT'S NEW NOW



YOUR FAVORITE LAPTOPS AND DESKTOPS

What systems won our annual Readers' Choice awards? Not the ones you may expect.

AN END TO SCALING: INTEL WILL SACRIFICE SPEED TO REDUCE POWER

To keep up with changes in computing, Intel is about to buck decades of conventional wisdom.

CONNECTING REMOTE AREAS TO THE INTERNET—BY SATELLITE

Ultra-fast Internet could soon be anywhere—and it's coming from the sky.

THE GLOVE THAT CAN FIGHT PARKINSON'S DISEASE

Innovative technology is bringing real relief to those suffering from a debilitating medical condition.

TOP GEAR



OPINIONS

DAN COSTA

First Word

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MATTHEW MURRAY

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SASCHA SEGAN

What the US Mobile Fiasco Says About Google Fi

TIM BAJARIN

How Midrange VR Could Save The PC Market

DOUG NEWCOMB

Why Your Car Needs "Nanny Tech" Riding Shotgun

“

It has been predicted for two decades that computers would become appliances.

”

JOHN C. DVORAK

Last Word

DIGITAL LIFE



GET ORGANIZED

Wrangle Your Digital Photos

TIPS

Primo Tips for Amazon Prime Video

HOW TO

Troubleshoot Your Internet Connection

GAMING

Witness Protection Program



Privacy Is Never About Just One Phone

As this issue goes to press, Apple is under a court order to unlock an iPhone 5c for the FBI. The phone belonged to the now-deceased Syed Farook, who was one of the shooters in the San Bernardino killings from December of last year. According to law enforcement, unlocking this phone could save lives by revealing the communications and contacts of a known murderer. Apple has five days to respond to the order, but the company's CEO, Tim Cook, has made it clear that he does not want to comply.

Is unlocking this one phone really that big of a deal? Absolutely. This is a big new problem, and it requires a new debate.

Farook's phone is running iOS 9. This latest version of Apple's mobile operating system requires a passcode to unlock; without it, all of the information the phone remains encrypted. In the past, law enforcement could get around even strong encryption systems by using brute force. With iOS 9, however, the phone will automatically erase all information it contains if the wrong password is entered too many times. The government's only hope of cracking this one is to have Apple write custom code to bypass this feature, which one assumes the company could be capable of doing.

That's the technical background. The legal foundation for the request comes from the All Writs Act, a version of which was originally passed in 1789. It allows courts to issue warrants and subpoenas to enforce the law. Obviously, there is

nothing in the Act that specifically applies to forcing a company to modify a software code to make it less secure.

On Tuesday, February 16, Tim Cook posted a message to Apple customers calling for a public debate on the issue. Part of his post reads, “The implications of the government’s demands are chilling. If the government can use the All Writs Act to make it easier to unlock your iPhone, it would have the power to reach into anyone’s device to capture their data. The government could extend this breach of privacy and demand that Apple builds surveillance software to intercept your messages, access your health records or financial data, track your location, or even access your phone’s microphone or camera without your knowledge.”

This is not hyperbole. The precedent at stake here isn’t just about mobile phones. It will also apply to your desktop computer, email account, Tinder profile, Snapchats, text messages, and any other form of digital communication. If a company builds a communication channel, it will have to build a backdoor for it. Insecure by design. Insecure by government fiat.

In the 24 hours since the court order, Apple has garnered a lot of support. Of course, the ACLU, Electronic Frontier Foundation, and Amnesty International came out on Apple’s side, but its support in the tech industry is just as complete.

“Technology companies should not be required to build in backdoors to the technologies that keep their users’ information secure,” wrote Microsoft CEO Satya Nadella.

“We build secure products to keep your information safe and we give law enforcement access to data based on valid legal orders,” wrote Google CEO, Sundar Pichai, “But that’s wholly



I couldn't find a single tech industry leader who supports the FBI's claim.



different than requiring companies to enable hacking of customer devices & data.”

“When we receive lawful requests from these authorities we comply,” was the statement from Facebook. “However, we will continue to fight aggressively against requirements for companies to weaken the security of their systems. These demands would create a chilling precedent and obstruct companies’ efforts to secure their products.”

“I have always admired Tim Cook for his stance on privacy and Apple’s efforts to protect user data, and couldn’t agree more with everything said in their customer letter today,” wrote Jan Koum, one of the cofounders of WhatsApp.

In fact, I couldn’t find a single tech industry leader who supports the FBI’s claim, although I’m sure some exist.

After all, the FBI makes a fair point. The encryption on Farook’s phone is unquestionably making it harder for law enforcement officials to investigate this case. But there is no way to provide them with the access they need without also giving them access to your iPhone, my iPad, and every other iOS device on the planet.

It gets worse. Once the backdoor is opened, there’s no way to control who gets to walk through it. Thanks to Edward Snowden, we also have ample evidence that the United States government maximizes every opportunity to intercept communications in the name of national security. A lot of Americans don’t have a problem with that, especially after events like 9/11, the November attacks in Paris, and yes, the San Bernardino shootings. But once these backdoors are opened, they are not easily closed again. This particular case may involve just the FBI, but the NSA could

“

Once these backdoors are opened, they are not easily closed again.

”

also use the technology. It could also be taken advantage of by the bad guys as well as the good guys: corporations, foreign governments and intelligence agencies, hackers, ISIS—and anyone else with a modicum of technical knowledge. And they won't need a warrant from an American judge to do it.

I truly want the FBI to have access to Farook's iPhone. I also wish there were a way to accomplish that without creating a backdoor that, by definition, makes all of our digital communications vulnerable to hackers, thieves, and overreaching governments of all kinds.

Unfortunately, I can't have both. And neither can you.



dan_costa@pcmag.com



Not Getting a Dell

Five years ago, I bought what was a top-of-the-range computer, the Dell Vostro 3700. It was quite expensive at that time, and I expected it to serve me well for a good few years. I now find that it is not compatible with Windows 10, due to a Dell hybrid graphics card!

When I approached Dell, they said it was down to Nvidia to produce suitable drivers, and they didn't know when that might occur. I then contacted Nvidia, who said they had produced all the drivers needed (32- and 64-bit) for Windows 10 to work, but that Dell had customized the graphics card, so any update would be down to Dell. I then spoke again with Dell, who denied this, but suggested I contact Microsoft, who might be able to offer a solution. They said that this is what they had recommended to other Vostro users in the past. So, I then spoke with Microsoft, who said they had no solution... It was down to Dell!

Essentially, my Vostro is now obsolete, after only five years, and is not capable of being kept up to date. For a company the size of Dell, I believe this is deplorable. Obviously, when I replace my Vostro, the last company I will go to now is Dell.

—Cliff Wragg

OUR ANSWER:

Sorry to hear that, Cliff. Keeping drivers up to date across new versions of any operating system is a challenge, and it's one made even more troublesome when the computer uses unusual hardware. You've definitely done your due diligence here, and it's a shame that those companies can't give you the help you need.

Ultimately, it sounds like you're a victim of a hardware trend that didn't have quite the longevity everyone involved probably thought it would. The good news is that if, as Microsoft insists, Windows 10 is the final "new" version

of the operating system, the driver model probably won't undergo enormous revisions again (at least for a while), sparing other people from suffering from this problem.

As for what you can do now, if you upgraded from Windows 7 to Windows 10 less than a month ago, you can still roll it back. Go to the Settings menu, then click on "Update & security," and then click on the "Get started" button under "Go back to Windows 7." This process should address your immediate problem, and at least keep the system working until you're ready to buy a new one.

—*Matthew Murray, Managing Editor of Digital Editions*

FONT OF FRUSTRATION

I read your review of Photoshop Elements 14 [in the February 2016 issue] with great interest, hoping that Adobe may have at last fixed the problem with the tiny menu font size that has long been an issue with Elements users. [The images in] your own review article provide an excellent example of the Elements menu font size compared with other menu font sizes. I can only deduce that your review article is seriously biased. I am extremely disappointed that a magazine with your standing would fail to be objective.

—*Shirley Pipitone*

OUR ANSWER:

It's all too easy to overlook matters of accessibility such as this one when reviewing software, and we appreciate your alerting us to this issue. We will take it into advisement when reviewing future products.

The two biggest operating systems can work around this somewhat. In Windows, open Windows Magnifier, and you can use the tool's controls to increase the size of everything on your screen. In OS X, go to System Preferences > Accessibility > Zoom to access similar functionality.

I also want to assure you, and all our readers, that we *are* objective in our review process. Our editors and analysts evaluate the products based on their broad experience and the competition, and then return them afterward. For more than 30 years, our goal has been to bring you the fairest technology reviews possible—and we're not going to stop now.

—*MM*

Ask us a question!

Have a question about a story in *PC Magazine*, one of the products we cover, or how to better use a tech product you own? Email us at letters@pcmag.com and we'll respond to your question here. Questions may be edited slightly for content and clarity.



What's New Now

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TOP GEAR

Your Favorite Laptops and Desktops

BY BEN Z. GOTTESMAN



When choosing your next computer, whether it's for personal use or work, you're likely going to look at a few familiar brands: Apple, Asus, Dell, HP, and Lenovo. After all, these five companies accounted for more than 84 percent of the PCs sold in the United States in the fourth quarter of 2015, according to research firm Gartner. Given such a concentrated market, sometimes it's easy to forget all the other companies making PCs. Don't. You may be missing out on a better option.

Among the other 15.9 percent of companies making sales are familiar names like Acer, Microsoft, and Toshiba, as well as the somewhat less common Alienware (which is owned by Dell), CyberPowerPC, and MSI. As we launch our

2016 Readers' Choice Awards with the laptop and desktop categories, you'll see that, according to our readers, market share doesn't automatically correlate to customer satisfaction.

The Readers' Choice awards rate *PC Magazine* readers' overall satisfaction with the products they use, as well as with ease of setup, reliability, technical support, and repairs. Finally, respondents are asked to rate how likely they would be to recommend the brand of PC that they use, as this has been shown to be an excellent measure of satisfaction. Each company must have at least 50 responses to be included in our analysis. These results provide a valuable complement to PC Labs' in-depth product reviews, revealing which companies' products stand the test of time and how well the companies back their products with the support that you need.

LAPTOPS

In last year's survey, Apple and Microsoft dominated the laptop category and the two companies each received Readers' Choice awards. Survey respondents rated Apple a 9.2 in overall satisfaction (on a scale from 0 for extremely dissatisfied to 10 for extremely satisfied); Microsoft was close behind at 9.0. No other company received better than an 8.3. This year, Apple repeats again as a Readers' Choice award winner in the overall laptop category, marking the ninth straight year that it has won the award.

Remarkably little changed in our respondents' evaluation of their Apple laptops. Scores for overall satisfaction, reliability, and likelihood to recommend are all the same as they were in 2015 (9.2, 9.3, and 9.2 respectively). Satisfaction with technical support improved slightly from 8.2 to 8.3, and satisfaction with repairs decreased from 8.5 to 8.3. These are excellent results; very few companies ever have technical support and repair ratings in these measures of 8.0 or higher.

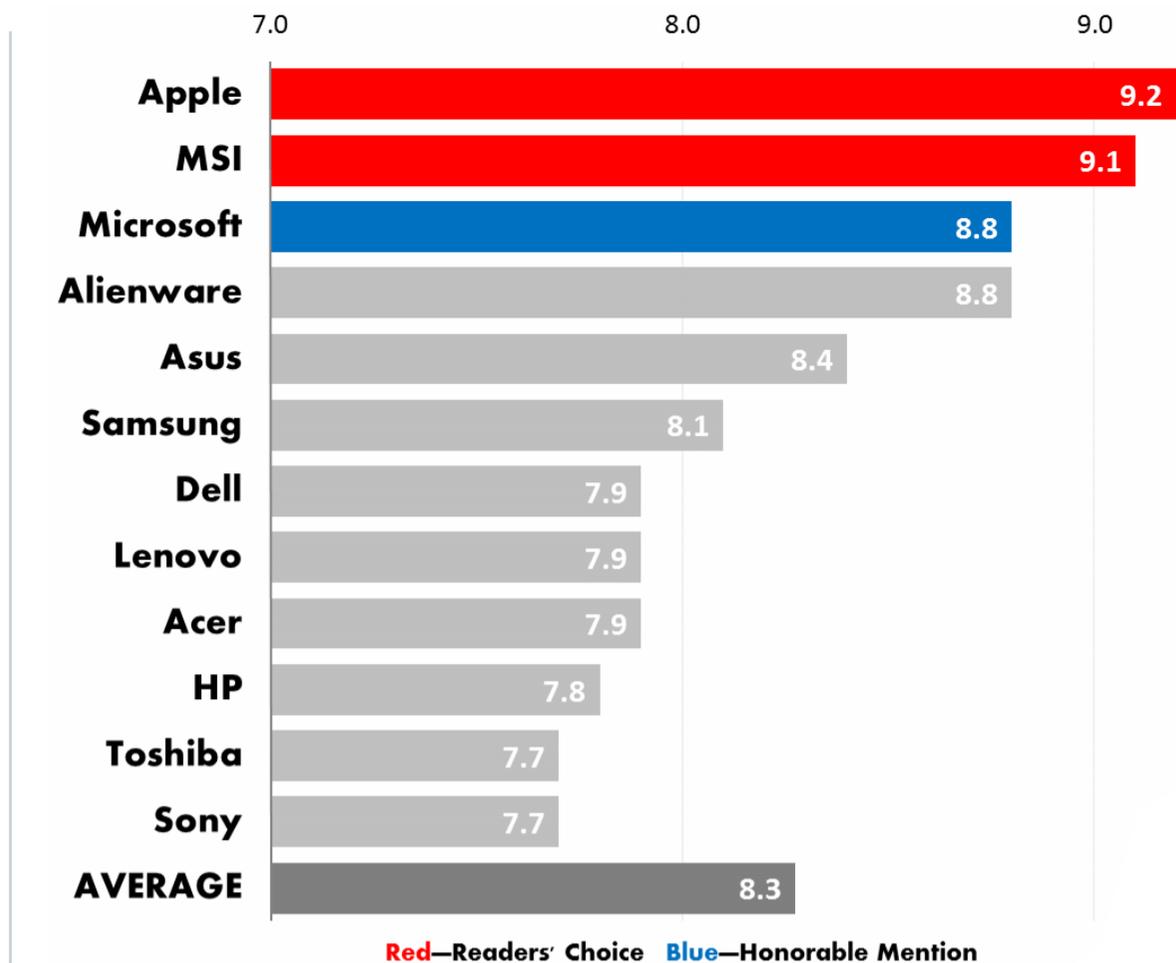


These results provide a valuable complement to PC Labs' in-depth product reviews.



LAPTOPS OVERALL

Although Apple is still at the top of the laptop heap, not far behind is MSI, which replaces Microsoft as our readers' second-place choice.



Red—Readers' Choice Blue—Honorable Mention

Apple again shares the Readers' Choice award—but this year it's not with Microsoft. The second award goes to MSI, a brand headquartered in Taiwan that may not be known to non-gamers. But readers using MSI laptops gave the company some very Apple-like ratings: Overall satisfaction was 9.1 and satisfaction with reliability was 9.0. The likelihood to recommend MSI was 8.7. If you're in the market for a gaming laptop, you should definitely give MSI a look, but don't ignore Alienware, which focuses on the same market. Alienware didn't rate quite as highly as MSI in any satisfaction measure, but it wasn't far behind.

Microsoft's satisfaction ratings slipped slightly from last year, but on average its users are still quite satisfied with their Surface hybrid devices. But the company earns an honorable mention with an overall satisfaction rating of 8.8 (down from 9.0). Likelihood to recommend also dropped from 9.1 to 8.9. Part of the reason for the drop may be related to reliability. Last year, only 4 percent of Microsoft's devices needed repairs; this year, the percentage more than doubled to 9 percent. That's still better than the overall average of 11 percent, but satisfaction with reliability dropped from 9.2 to 8.9. On the other hand, satisfaction with technical support was rated 8.0, far better than any other Windows laptop brand: Dell and Lenovo were next closest with ratings of 6.8. Toshiba rated an abysmal 5.1 for technical support and Asus' 5.9 was nothing to brag about.

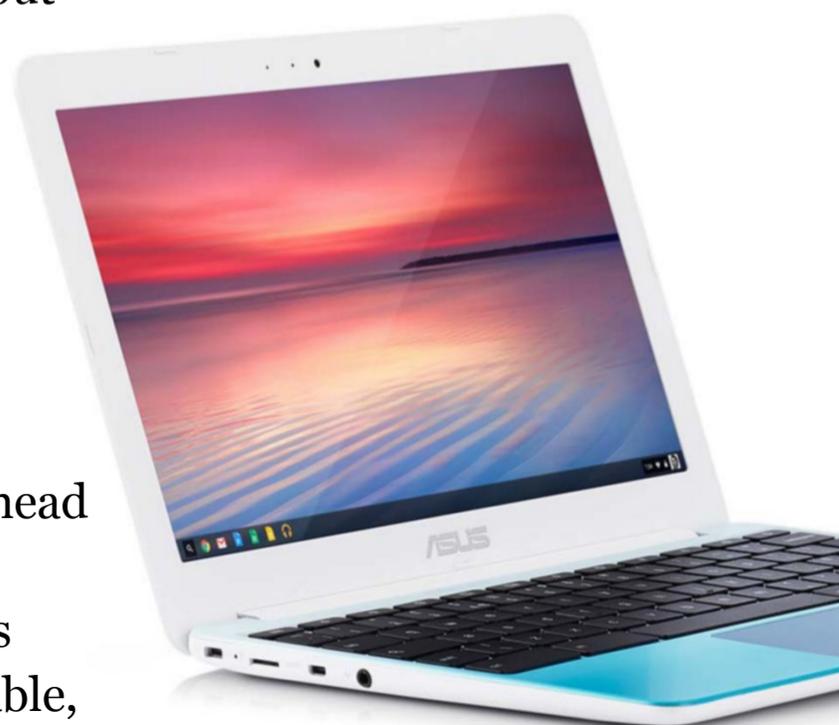
Among laptops less than a year old, Apple and Microsoft receive a Readers' Choice award. Within this group of newer laptops, Apple received overall satisfaction and likelihood to recommend ratings of 9.1. Microsoft earned ratings of 8.9 and 9.0, respectively. Apple also got the highest score for ease of setup

with a 9.2. Microsoft was close behind with a 9.0, but take note of Asus, which earned an ease-of-use rating of 9.1, in between our two award winners.

Among laptops for home use alone, Apple and MSI are the winners and Microsoft again gets an honorable mention. Satisfaction ratings for these companies were very similar to their overall satisfaction ratings, although likelihood to recommend ratings were slightly higher. This isn't surprising: Most people have more involvement in purchases they make for personal use than in those made for business use and are therefore more likely to stand behind their choice.

Tablet and hybrid PC usage is growing. Hybrids, also known as convertibles or two-in-ones, are PCs with built-in keyboards that can switch between regular laptop mode and tablet mode. Nearly every laptop company has a few such offerings, but Microsoft has focused all of its design efforts on this form factor and it shows. None of the other companies rated better than 8.1 for overall satisfaction with laptop/tablet hybrids, a far cry from Microsoft's rating of 8.8. Microsoft wins a Readers' Choice award in the category. (Note again, this category does not include iOS- and Android-based tablets such as the Apple iPad and Samsung Galaxy Tab.)

Chromebooks continue to grow in popularity, but they still remain a small niche in the overall laptop market. Respondents reported on several brands, including Acer, Asus, Google, HP, Samsung, and Toshiba, but none received the minimum 50 responses. As a group, however, respondents seem very happy with their chromebooks, with overall satisfaction averaging 8.7. That trails Apple's 9.2, of course, but is far ahead of the 8.0 for all Windows laptops. When you're purchasing your next laptop, consider your needs carefully. You may find a Chromebook to be a viable, attractive, and inexpensive option.



DESKTOPS

Apple doesn't offer a lot of different desktops, and within the models there aren't many configurations. Despite limited choice, the approach works, as evidenced by Apple's long stretch of Readers' Choice awards. But some users (especially gamers) want to design a computer to their exact specs and budget. There's a small group of PC companies that will let you do just that. When these companies do it right, and construct fast, reliable computers that they back with terrific service, they build a very satisfied user base. CyberPowerPC is such a company, and this year it shares the Readers' Choice award with Apple.

Most of Apple's satisfaction ratings improved slightly this year from their already excellent 2015 levels: Overall satisfaction went from 9.1 to 9.2, satisfaction with reliability was up from 9.3 to 9.4, and likelihood to recommend went from 9.2 to 9.3. In fact, Apple was the only maker of desktop PCs that received any ratings of 9.0 or better in the overall desktops category. The only rating to decrease from last year was satisfaction with technical support, which went from 8.8 to 8.7, but that still puts Apple in a league of its own; the next closest company is Lenovo, which rated a mediocre 7.1 for technical support.

CyberPowerPC won a Readers' Choice award in 2012 but failed to receive enough responses to qualify again until this year. Now that it's back, it's once again setting a standard among Windows-based desktop PC brands, receiving the highest ratings for overall satisfaction (8.8), satisfaction with reliability (8.9), and likelihood to recommend (8.4, tied with Asus). Among CyberPowerPC desktops sold for home use, the

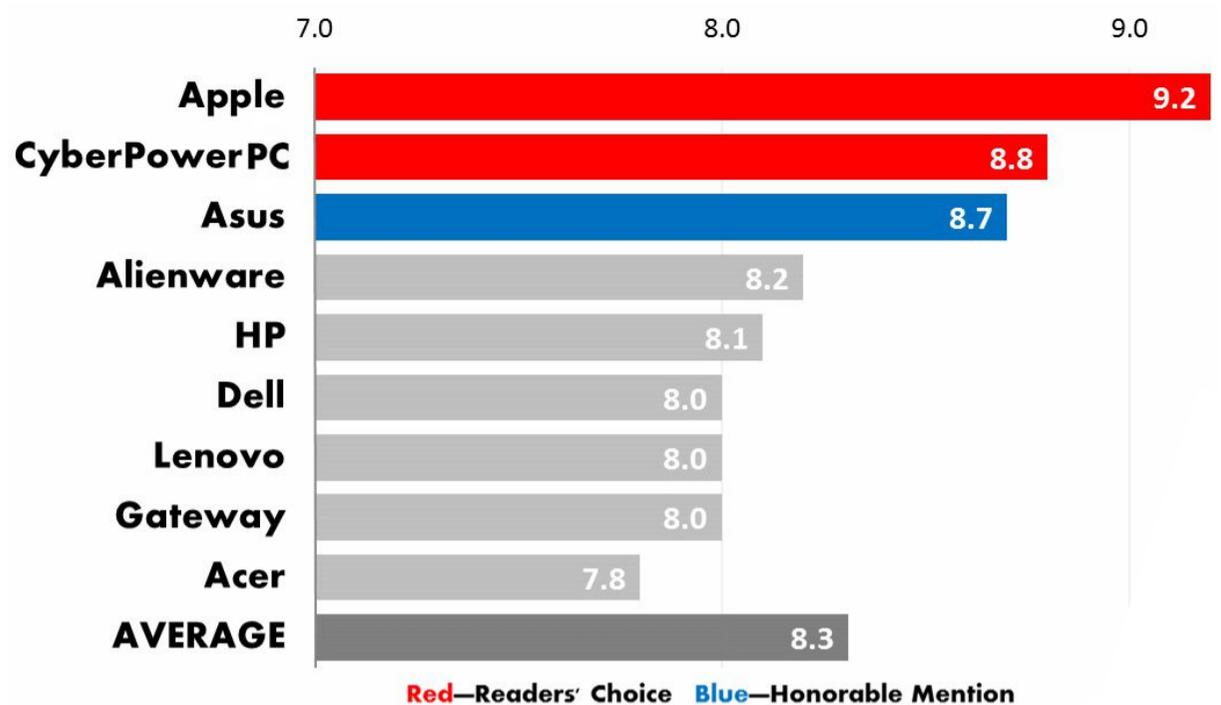


When these companies do it right, and construct fast, reliable computers that they back with terrific service, they build a very satisfied user base.



DESKTOPS OVERALL

Among readers who like fast PCs that are fully customizable and upgradeable, CyberPowerPC was this year's winner. But Apple is still tops, with its stylish, reliable all-in-one systems.



ratings were even better: Overall satisfaction and likelihood to recommend were 9.0, and satisfaction with reliability was 9.1. The company also earns a Readers' Choice award for Home Desktop PCs.

Asus won a Readers' Choice award in the overall Desktops category last year. Because of CyberPowerPC's entry, it wasn't able to repeat that feat, but it does earn an honorable mention. In fact, Asus's ratings improved from 2015: Overall satisfaction went from 8.4 to 8.7, satisfaction with reliability increased from 8.6 to 8.7, and likelihood to recommend ticked up from 8.3 to 8.4.

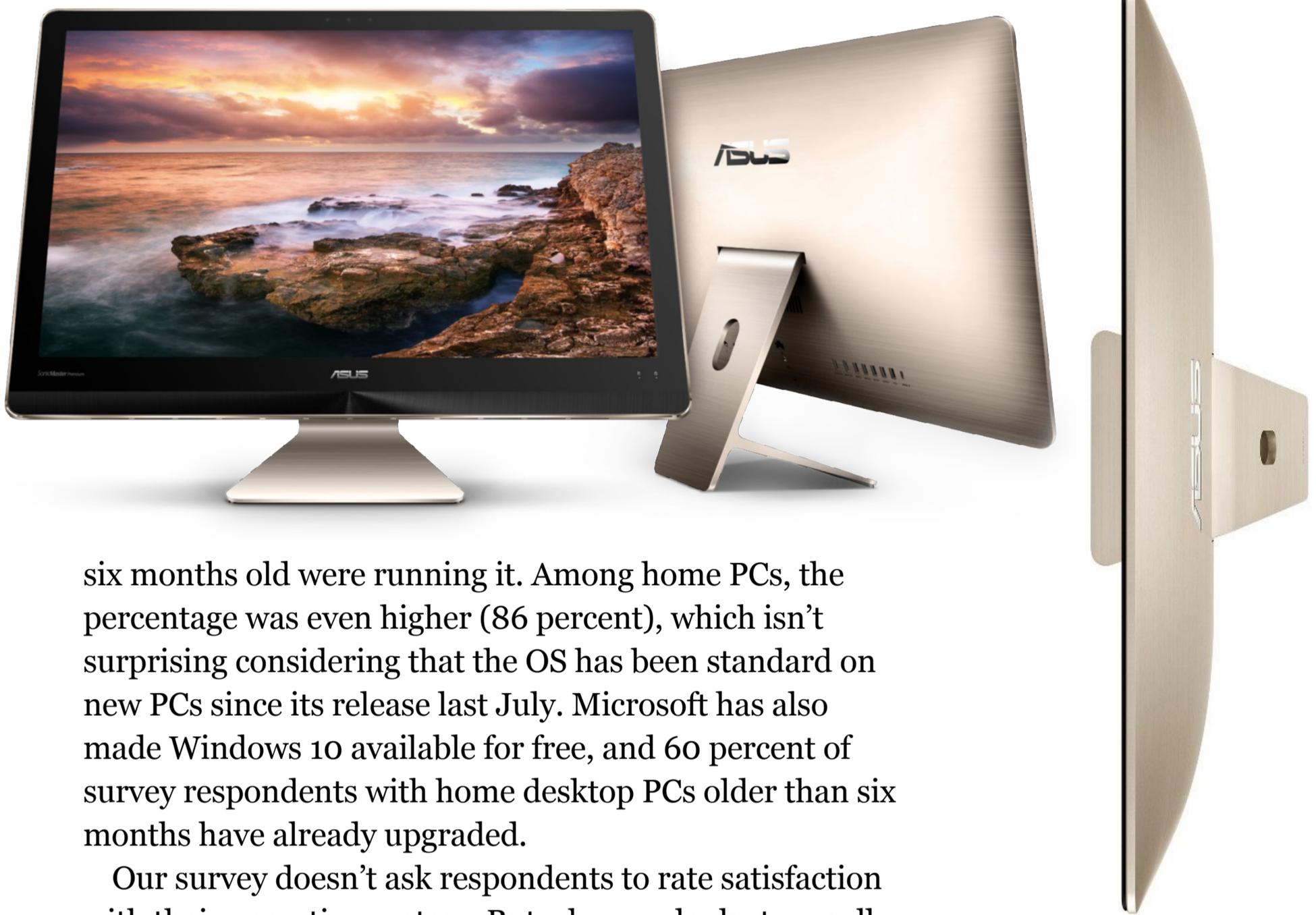
Apple also wins the Readers' Choice award in each of our subcategories. For systems less than a year old, Apple rated a 9.3 overall and a 9.5 for satisfaction with ease of setup, far ahead of the next closest companies, Asus, Dell, and HP, which all rated 8.7.

Asus didn't win overall, but it did earn our second Readers' Choice award for its desktops less than a year old: It had the highest overall satisfaction rating (8.6) and lowest percentage of units needing repairs (6 percent).

The chart of home PCs looks pretty similar to the overall PCs (a mix of home and work and all PCs rated)—it's Apple and CyberPowerPC on top. Asus also earns an honorable mention for its home desktop PCs.

As we mentioned, Apple won our new subcategory, all-in-one desktops, and did so handily. It got a 9.2 overall for this area, and that's almost a full point higher than the runner up, Dell, at 8.3. Other AIO makers just don't have what it takes compared with the love users have for iMacs.

One of the biggest changes in the PC market last year was the introduction of Windows 10. *PC Magazine* readers have been fairly quick to embrace the new operating system; seventy-three percent of respondents with desktops less than



six months old were running it. Among home PCs, the percentage was even higher (86 percent), which isn't surprising considering that the OS has been standard on new PCs since its release last July. Microsoft has also made Windows 10 available for free, and 60 percent of survey respondents with home desktop PCs older than six months have already upgraded.

Our survey doesn't ask respondents to rate satisfaction with their operating system. But when we look at overall satisfaction with desktop PCs based on it, respondents running Windows 10 were substantially more pleased. Among desktops less than six months old, overall satisfaction with Windows 10 systems was 8.7, compared with 8.2 for Windows 7. (Windows 8/8.1 did not get enough responses, a sure sign of new buyers skipping that version.) Among older desktops, Windows 10 systems also rated better: 8.4, compared with 8.0 for Windows 8/8.1 and 7.8 for Windows 7.

It's not clear if the higher satisfaction ratings on these desktop systems are due to the operating system. Perhaps respondents are more likely to upgrade the operating system on a PC with which they're already more satisfied. But either way, it shows that Windows 10 users are pretty satisfied.



An End to Scaling: Intel Will Sacrifice Speed to Reduce Power

BY JOEL HRUSKA



Faster, cheaper, smaller. For decades, those three words drove innovation in Silicon Valley and across the world. Even after clock speed increases flatlined after 2005, the semiconductor industry found ways to drive performance forward while increasing total transistor counts and improving on-die integration of various components. These days, SoCs, GPGPU, and Intel's own Xeon Phi are all designed to increase performance even though clock speeds are largely static.

Now, however, Intel has acknowledged that the future of semiconductors may rely on technologies that reduce absolute performance in exchange for improved power consumption. William M. Holt, head of Intel's Technology and



PARADIGM SHIFT

William M. Holt, an executive vice president and general manager of Intel's Technology and Manufacturing Group, sees technology as moving from performance-focused to power-focused within the next several years.

Manufacturing Group, made the announcement at the International Solid State Circuits Conference in February, when discussing some of the options Intel is evaluating. Don't expect to see any of this next year or the year after, though—all of the technologies in question would be introduced after 2021.

“We're going to see major transitions,” said Holt. “The new technology will be fundamentally different. The best pure technology improvements we can make will bring improvements in power consumption but will reduce speed.”

ZERO-WATT IS THE NEW 1GHZ

It's strange to hear someone from Intel, a corporation that has spent decades boosting computer performance, talk instead about how it will integrate new technologies to build lower-power circuits, but it's hard to fault the firm's reasoning. Fifteen years ago, the computer industry was focused on giving users more performance to perform more advanced tasks. Today, discussions of doing more focus on battery life, interconnected devices, the Internet of Things, and the cloud. The old paradigm was a computer that could render, retrieve, or calculate data more quickly. The new paradigm is a system that accurately retrieves your calendar, communicates with your workout sensors, or handles your scheduling.

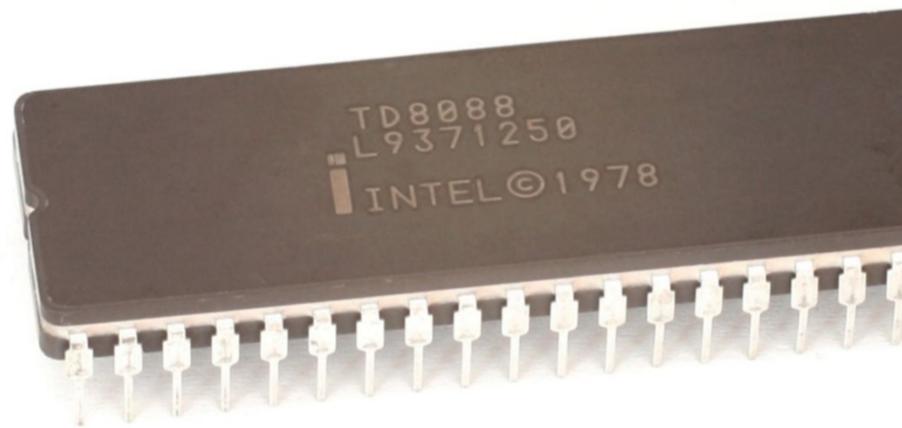
The race between Intel and AMD to 1GHz was heralded as a triumph for Moore's Law and the computer industry as a whole. Zero-watt computing is, of course, different—computing will always cost some amount of energy. But the goal is to decrease power usage as much as possible through the adoption of quantum wells, spintronics, or other types of cutting-edge designs.

Unfortunately, all of the technologies that can accomplish this are orders of magnitude slower than the ones we use today. The argument Holt and others are making is that by vastly increasing power efficiency, we can compensate for decreased clock speeds, at least in many devices. This has particular relevance for exascale computing, where the power requirements of high-density parts dominates the equation and makes it virtually impossible to assemble hardware of sufficient density to create an exascale system.

“Particularly as we look at the Internet of Things, the focus will move from speed improvements to dramatic reductions in power,” Holt said. “Power is a problem across the computing spectrum. The carbon footprint of data centers operated by Google, Amazon, Facebook, and other companies is growing at an alarming rate. And the chips needed to connect many more household, commercial, and industrial objects, from toasters to cars to the Internet, will need to draw as little power as possible to be viable.”

Intel representatives have recently stated that the company intends to compete aggressively in the Internet of Things space, but has offered little insight into what these goals for its future products mean for environments that depend on high-end CPUs. The company isn't abandoning silicon—it envisions islands of additional capability embedded in SoCs or other types of circuits—but its move to purchase Altera and its FPGA business could reflect long-term plans for the future of traditional semiconductor performance. If traditional CPU designs can't provide additional clock speeds and next-generation technologies are aimed at lower-power computing as opposed to higher performance, then either we're headed for a revolution in distributed computing (which is unlikely), or a very, very slow performance ramp.

“The chips needed to connect many more household, commercial, and industrial objects, from toasters to cars to the Internet, will need to draw as little power as possible to be viable.”



Connecting Remote Areas To the Internet—By Satellite

BY RYAN WHITWAM

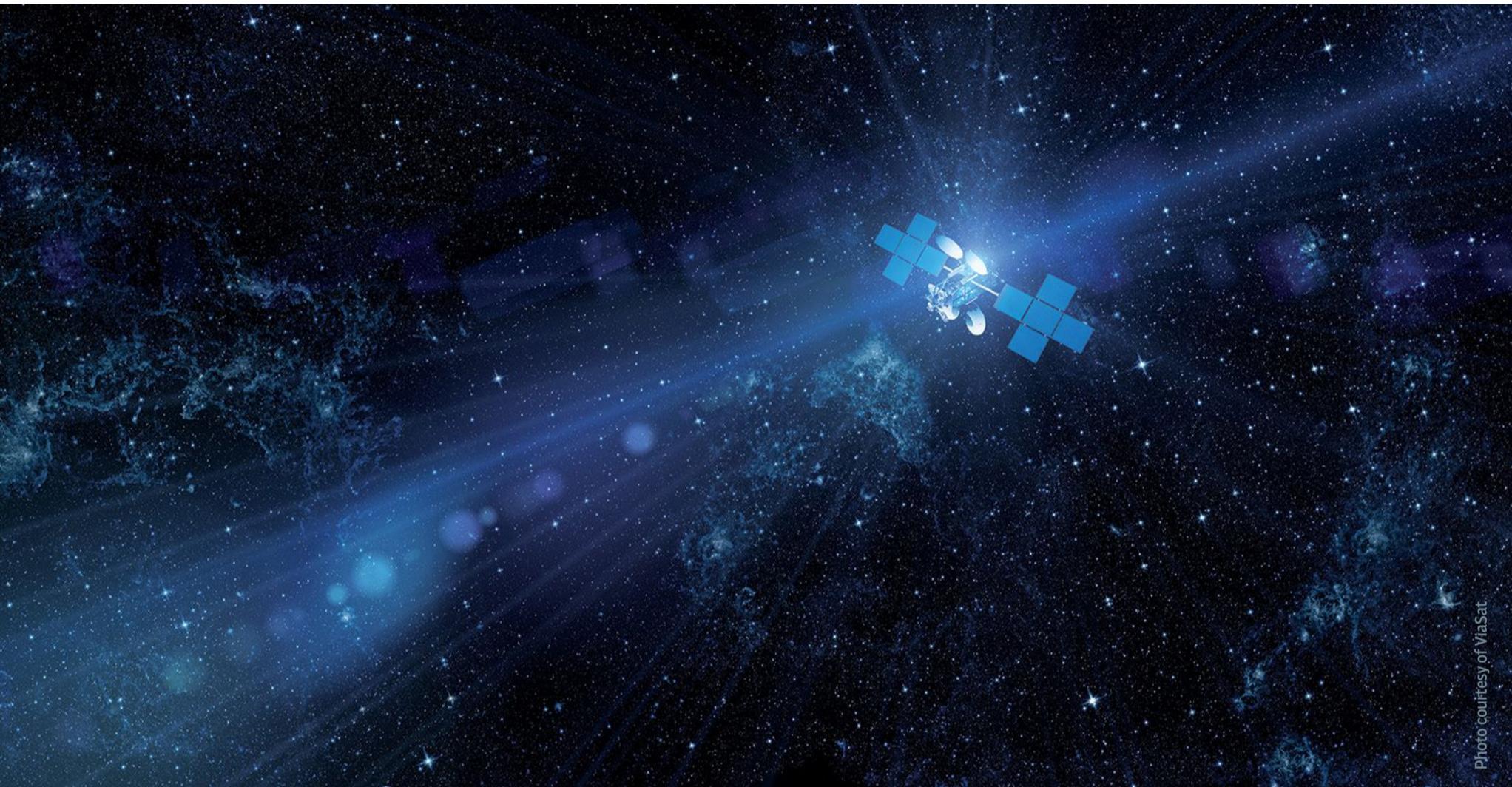


Photo courtesy of ViaSat.

Delivering Internet access to remote areas is challenging, as the traditional method of running lines from connected regions is extremely expensive. There are a few approaches to doing this wirelessly—Google’s Project Loon balloons, for example. But a company called ViaSat is teaming up with Boeing to provide super-fast Internet access to remote areas from space. The just-announced ViaSat-3 satellite will have one terabit of available bandwidth. Yes, 1Tbps.

ViaSat has made this announcement a little early, though. It has yet to announce its second-generation satellite, the ViaSat-2. That platform is supposed to head into orbit on a SpaceX Falcon 9 rocket in a few months. Although the ViaSat-2 is no slouch, it will only have one-third of the available bandwidth of the planned ViaSat-3. Once its new generation of satellites is in

orbit, ViaSat claims its platform could double the network capacity of the roughly 400 commercial communications satellites that are already circling the globe.

The 1Tbps satellites will provide fast connections, but those on the ground obviously won't be able to suck down the full amount of bandwidth. ViaSat plans to offer residential connections of about 100Mbps, which is still faster than many city dwellers can get in the United States. When you consider many of the regions ViaSat expects to serve have no broadband service at all, it's unlikely that too many will complain about "only" getting 100Mbps. Users will, however, still have to contend with the limitations of satellite Internet, including line-of-sight requirements and higher latency than is typical with terrestrial wired connections. Real-time applications, such as video chat, will probably be unworkable despite the incredible speeds.

Residential service is only one part of what ViaSat wants to do with its space-based connections. A more robust version of the service, capable of reaching speeds of up to 1Gbps, will be made available to corporate installations that are in remote areas (like oil and gas platforms). Commercial jets might also be able to use ViaSat's connections as a faster version of the Internet service they already offer.

The company says that work is already underway on two ViaSat-3 satellites, and Boeing expects them to be ready for launch by the end of 2019. That would put ViaSat a few years ahead of Elon Musk's tentative plan to get thousands of microsatellites into orbit in order to deliver high-speed Internet to the globe. Whoever makes it work is immaterial to people who lack sufficient bandwidth, but help is on the way.

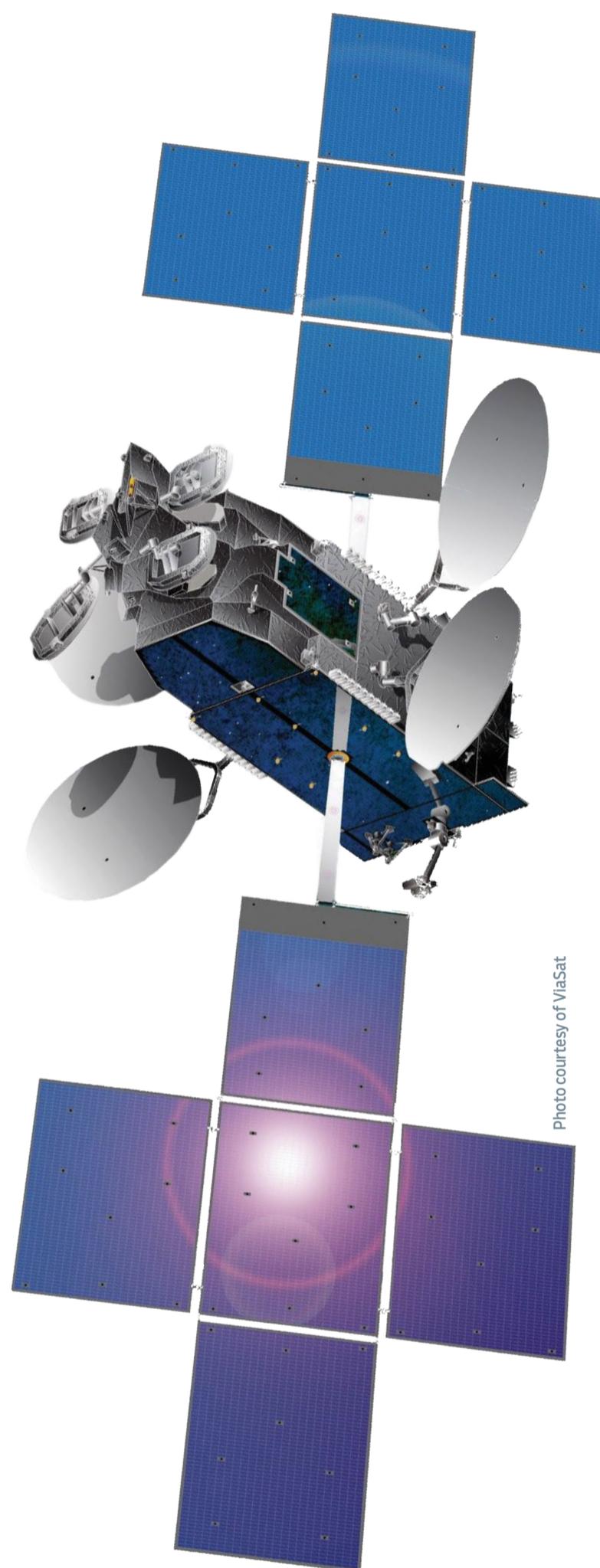
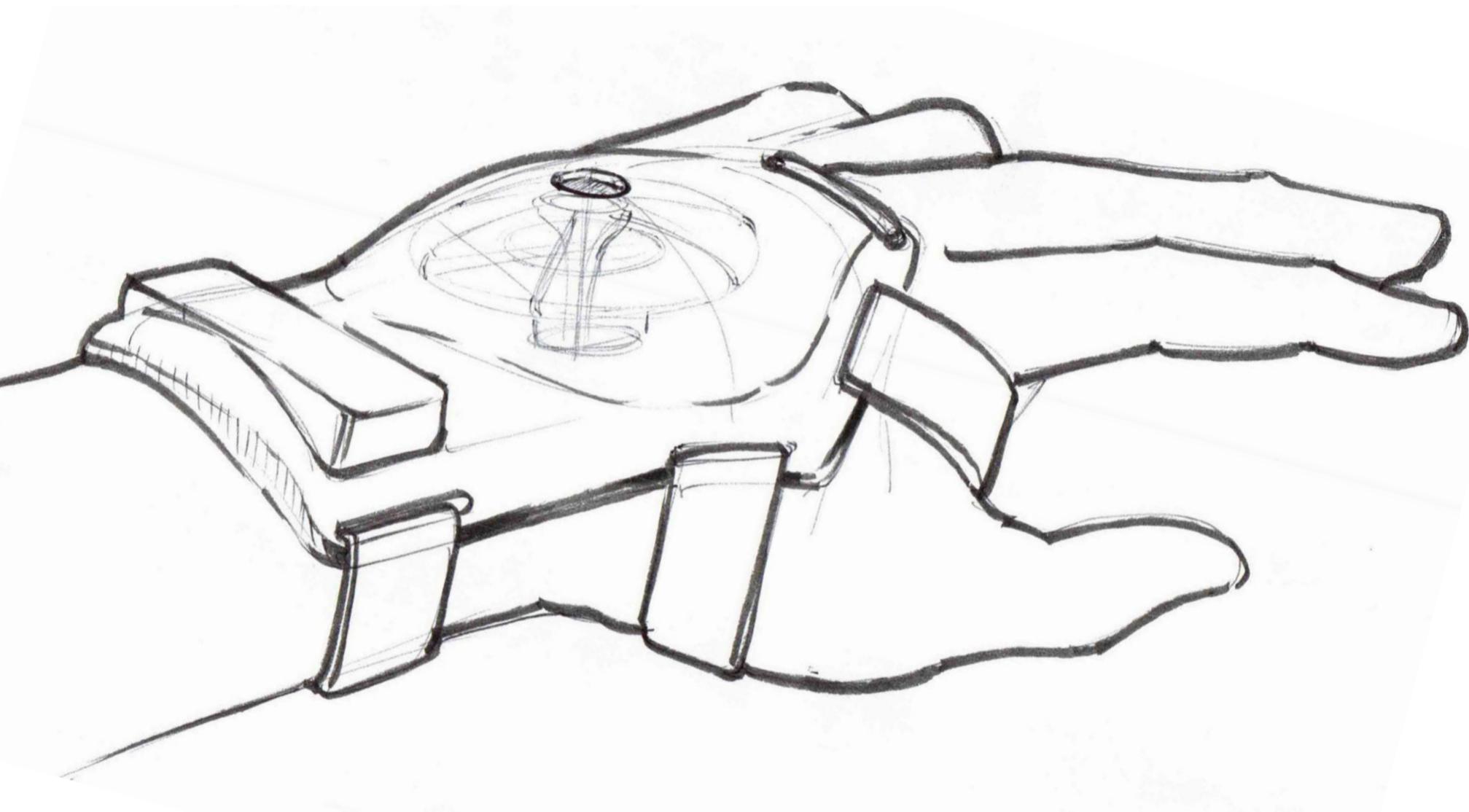


Photo courtesy of ViaSat

The Glove That Can Fight Parkinson's Disease

BY JESSICA HALL



During med school, Faii Ong met a 103-year-old patient covered in soup, and asked the nurses why they weren't helping her. "There's nothing we can do," they responded. The medications for Parkinson's disease, from which the patient suffered, don't work forever, the nurses explained, and beyond a certain point they don't help much at all.

So Ong went to work. In less than two years, he and a "crack team of engineers, designers, and medics" have gone on to win the first inaugural £10,000 F-factor prize and produce the GyroGlove: a wearable device designed to mitigate the hand tremors suffered by Parkinson's patients.

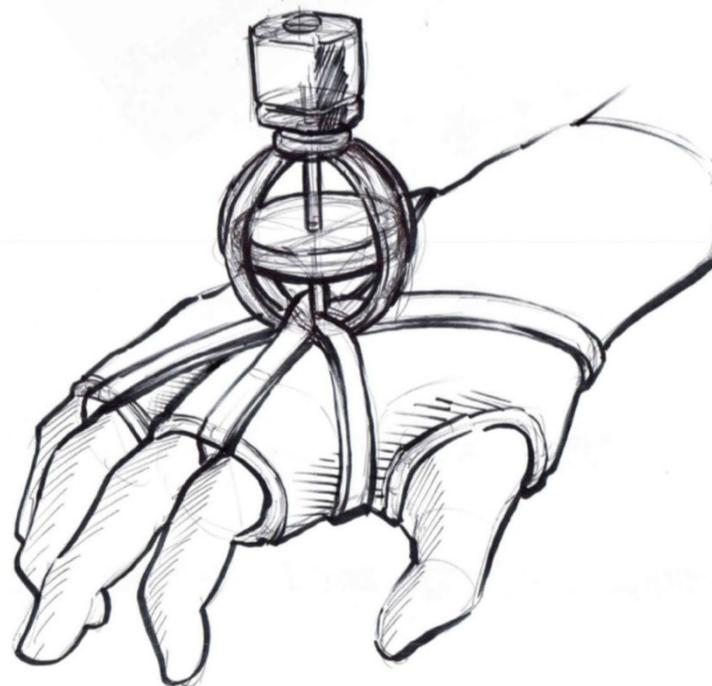
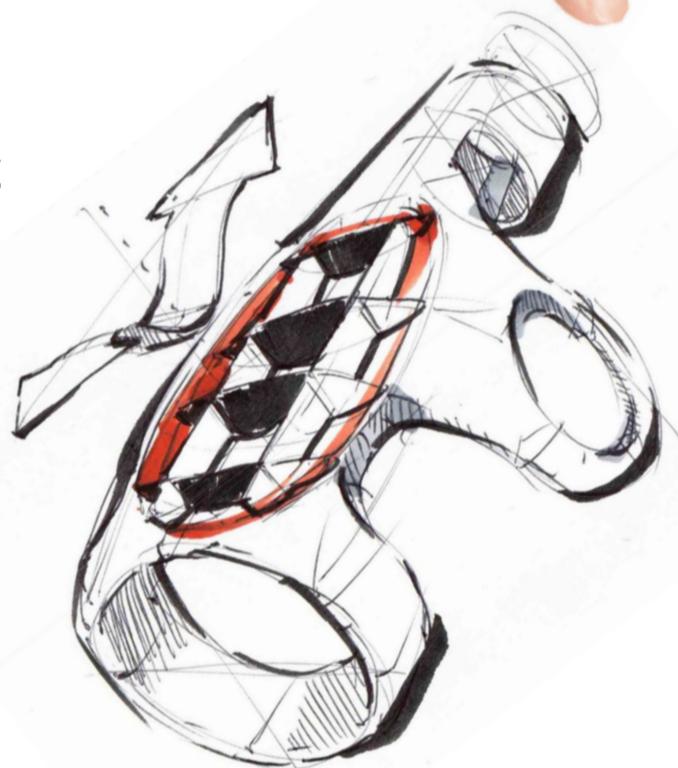
The GyroGlove is a cordless thin-and-light wearable hand stabilizer. It's powered by a battery, with a tiny integrated controller that drives a precession hinge and turntable, and a responsive gyroscope. The gyroscope isn't a

detector—it's an effector. And it has to move “silently and reliably at thousands of [revolutions per minute].” With a motion disorder like Parkinson's, the impedance of a person's normal movements is a major detractor from quality of life. That's why the device has to be so light, and why the gyroscope has to rotate so fast: It must be responsive in real time to the wearer's moving hands, without encumbering movement and thus making the solution more onerous than the problem.

The way the GyroGlove works isn't rooted in technological bells and whistles, but instead in a new application of a well-established principle: rotational kinematics. “Mechanical gyroscopes are like spinning tops; they always try to stay upright by conserving angular momentum,” Ong explains. “My idea was to use gyroscopes to instantaneously and proportionally resist a person's hand movement, thereby dampening any tremors.” Testers report that using the device is like plunging a hand into thick syrup—motion is free, but slower. Benchtop research showed that the GyroGlove was capable of reducing hand tremors by 90 percent.

The GyroGlove uses a gyroscope not unlike the control moment gyroscope used on the International Space Station, which lets it pivot in space without using fuel. It's simple, it's easy to manufacture, and it can be made very small. This low-overhead application is why the GyroGlove's power pack can be so thin and light: It doesn't require a big battery.

Although there are still some bugs to be worked out with the GyroGlove concerning weight and noise, Ong's team is now in the process of manufacturing the device. They expect it will cost about \$700 when it's released, hopefully by the end of this year.



What We Love Most This Month

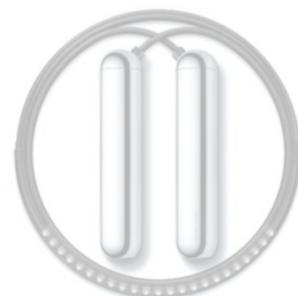
BY STEPHANIE MLOT



BEVY

Life is no longer captured by yellowing photos in aging scrapbooks. Instead, pictures are stored on your mobile devices, work laptop, and home PC, and scattered across social media. Bevy wants to rescue those precious memories and store them in one place: your home. Upload images wirelessly from iOS phones and Android tablets, add photos from Windows and Mac computers, or collect pictures from SD cards and USB drives. Bevy auto-organizes your collection and provides in-home backup via an external hard drive.

\$299-\$349 bevy.us



What We Love Most This Month

BY STEPHANIE MLOT



JAMSTIK+

I learned how to play guitar with a chunky pick wired to my computer and an electronic version of Aerosmith's "Dude (Looks Like a Lady)." But Jamstik+ takes music education to a new level, pairing with your mobile devices and teaching through interactive video lessons and games. The gadget—a portable guitar neck with electric strings—gives real-time on-screen feedback, and makes it easy to practice anywhere, at any time.

\$299.99 jamstik.com



What We Love Most This Month

BY STEPHANIE MLOT



NES30 PRO

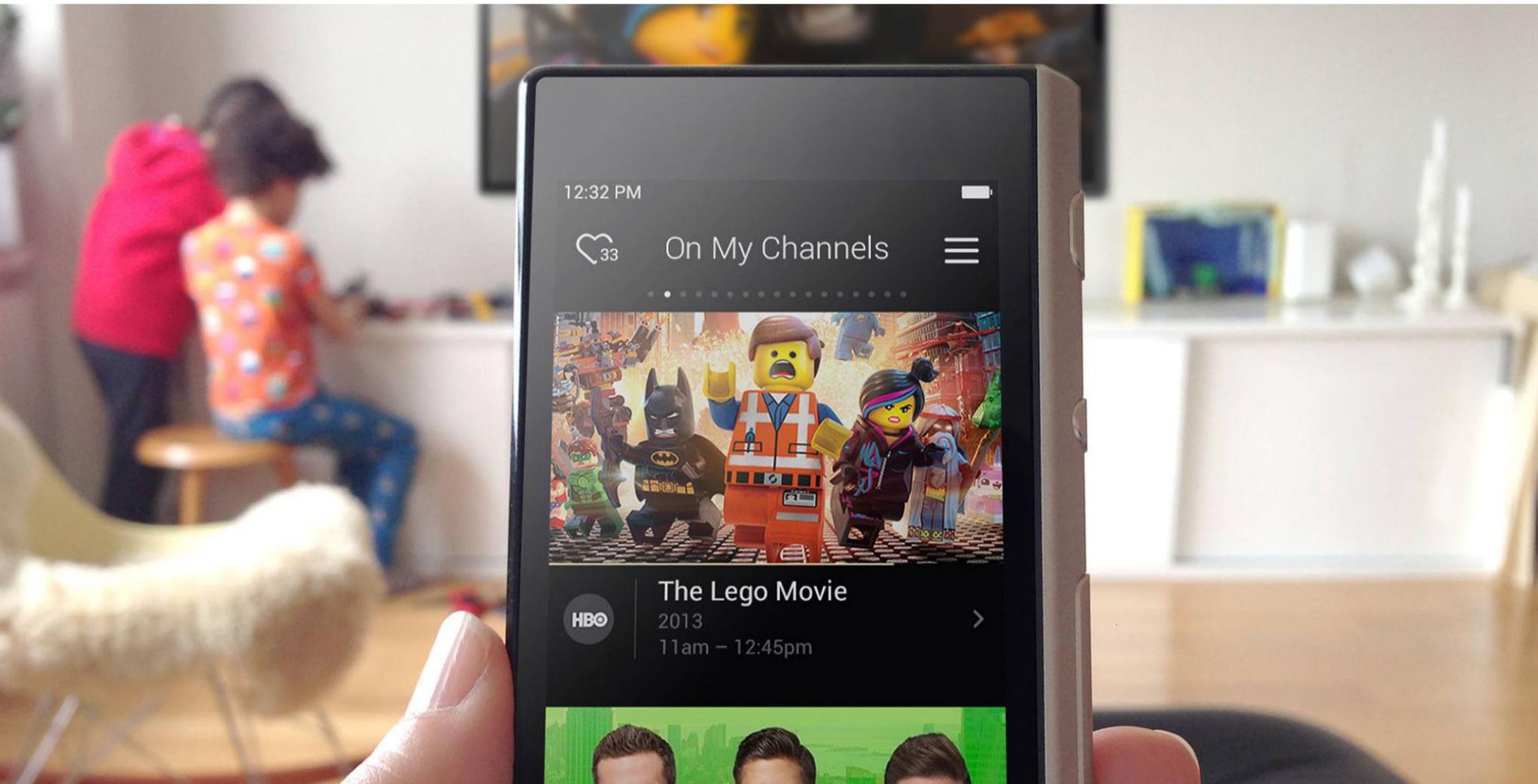
Everything old is new again, including retro game controllers. The Nintendo Entertainment System hit shelves in the 1980s, but 8Bitdo is getting nostalgic with the world's first portable full-buttons wireless controller. Boasting a built-in ARM Cortex-M3 32 CPU, upgradeable firmware, and the classic NES D-Pad design, the device supports Android and iOS games, as well as PC and Mac titles.

\$39.99 8bitdo.com



What We Love Most This Month

BY STEPHANIE MLOT



RAY SUPER REMOTE

Watching TV shouldn't be stressful (unless you're keeping up with the presidential election). So ditch the mess of remotes and turn on Ray, a touch-screen device that controls and manages all of your entertainment. Compatible with thousands of devices—including set-top boxes, TVs, receivers, Roku, soundbars, DVD and Blu-ray players, media players, Apple TV, Xbox, and Nest—Ray learns what you like and helps you find what to watch next. More apps, and more options, are expected to roll out in the future.

\$249 ray.co



What We Love Most This Month

BY STEPHANIE MLOT



SMART ROPE

For some, jumping rope harkens back to school playgrounds and childhood rhymes. But for others, like pro athletes and that really fit guy at your gym, it's a fat-burning fitness trick. Tangram modernizes the 400-year-old toy with embedded LED lights and a companion mobile app. More than 20 LEDs display your fitness data—for now, that means the number of jumps you've completed—in the smart rope as you skip. Meanwhile, the Smart Gym application tracks your progress and offers some friendly competition.

\$89.99-\$99.94 tangramfactory.com



Opinions

MATTHEW MURRAY

SASCHA SEGAN

TIM BAJARIN

DOUG NEWCOMB

**If you don't
like what they
say on Twitter,
you don't have
to follow them.**

MATTHEW MURRAY
TWITTER'S WAR ON SPEECH



Twitter's War on Speech

It's a tragic irony of our time that, although we've never had more ways to express ourselves instantly to more people all over the world, speech is becoming more restricted than it's been in decades. There's been plenty of talk of late about what's happening in certain places that seem as if they should be the most open—college campuses, for example—so I won't rehash those arguments here. But somewhere the squelching of speech is being felt significantly, especially for those who follow and love technology, is a place that built its name, its reputation, and its fortune on rapid-fire, unbridled discussion: Twitter.

The company has fired many disturbing salvos over the past year. Independent conservative journalist Charles C. Johnson was banned from the service in May after a perceived threat against Black Lives Matter activist and current Baltimore mayoral candidate DeRay Mckesson that involved the phrase “take out,” something that any reasonable person would consider a rhetorical flourish (and not an uncommon one) rather than an actual call for violence. Breitbart News editor Milo Yiannopoulos, another conservative, had his “Verified” checkmark removed at the beginning of this year, due to some vague, unexplained violations of Twitter's terms of service. In early February, Twitter announced its Orwellian-named “Trust & Safety Council,” which was formed with the stated goal of “ensur[ing] people can continue to express themselves freely and



Matthew Murray, *PC Magazine's* managing editor, has edited its hardware, software, and consumer electronics content, and previously served as an editor at *Computer Shopper*.

safely,” but partnered with “more than 40 organizations and experts from 13 regions,” of which none apparently believe in traditional concepts of free speech. Then, less than two weeks before this issue was published, Twitter announced a new “algorithmic timeline” designed to determine for you which tweets are important and worth reading, a move some fear will make it even easier to silence certain users. (I fear that it will make Twitter even more like Facebook, which uses a similar system and routinely fails to deliver vital status updates from my friends, but that’s a subject for another time.)

I frequently disagree with the words and tactics deployed by Johnson and Yiannopoulos, just as is the case with two of their ideological opposites, Anita Sarkeesian and Jonathan McIntosh (who run the Feminist Frequency commentary website and Twitter account). But I would never demand that any of them be silenced merely because of my own distaste for what they do and how they do it. In fact, I think Twitter is better this way. By presenting their unvarnished personalities and opinions to the world, they tell you who they are and what they stand for, and force you to confront them on those terms. This gives you a much more well-rounded vision of where ideological disagreements in online discourse lie. If you don’t like what they say on Twitter, you don’t have to follow them. And if you change your mind about them later, you can unfollow, mute, or outright block them, taking the matter into your own hands. They still have their right to speak, and you have (and are exercising) your right to not listen to them.

This is not to say I encourage threats of murder, rape, doxxing (revealing another user’s personal information online), or swatting (making fake

reports to the police that result in a full-on visit from the local SWAT team)—I don't. And when terrible events such as these happen, they should be dealt with to the furthest extent of the law. Some things you don't have a right to do in any situation. And Twitter's proactive behavior in stamping down on occurrences like these should be commended.

But through its recent actions, Twitter has suggested strongly that it's trying to protect against not violent speech, but rather uncomfortable speech—or, even more frighteningly, certain kinds of uncomfortable speech—and that's where we should all draw the line. Services like Twitter become useless once it becomes impossible to actually speak on them. And without an open exchange of ideas, even conducted from behind the safety of pseudonyms, it's little more than a giant junkyard where there's not much to do but wade through bad jokes, links to inconsequential Web stories, emoji, and spam. That's not why I signed up for Twitter—I don't think it's why anyone did. And yet it seems to be the kind of service the folks who work there are increasingly interested in creating.

Twitter is a private company, of course, and may set whatever rules it likes on its usage. But if it wants to continue presenting itself as a viable, open discussion platform, Twitter must embrace all viewpoints, even those it does not like—*especially* those it does not like. That means giving Johnson the same latitude it does Mckesson, who has made many provocative statements during his time on Twitter, or that it recently gave thousands of users who sent Supreme Court Justice Clarence Thomas' name trending by wishing for his death after his colleague, Justice Antonin Scalia, passed away on



Twitter must embrace all viewpoints, even those it does not like—*especially* those it does not like.



February 13. That means not using the Verified checkmark as a bludgeon, but rather for its stated purpose of signifying identity, for Yiannopoulos no less than Sarkeesian. And, ultimately, it means listening as much to those who like an idea as to those who don't like an idea—because that's how we learn and grow as a society.

Since its inception, Twitter has played instrumental roles in giving voices to the voiceless at the times they needed the outlet most. Among these: the 2009 civil unrest in Moldova and election protests in Iran, the Tunisian Revolution that began in 2010, the Egyptian Revolution in 2011, and the Euromaidan in Ukraine in 2013. There's no way to know how those countless thousands of people's lives—and history itself—would have changed without a “public” place to organize with each other and communicate with us. But for their sakes, and the sakes of so many others, it's almost certainly a good thing that that's a world in which we no longer live.

If we want to continue to live in a world where speech matters and defines us, we need services that don't just deign to let us speak about some things, but encourage us to speak about *everything*. At one time, Twitter appeared to be that service. Its reputation is now in jeopardy. Hopefully that will change. But if it doesn't, Twitter had better watch out, because it could easily be relegated to the dustbin of digital history by a service that genuinely cares what its users—*all* of its users—have to say.

matthew_murray@pcmag.com



We need services that don't just deign to let us speak about some things, but encourage us to speak about everything.



What the US Mobile Fiasco Says About Google Fi

Alphabet was briefly the most valuable company in the world. You'd think it would do anything it wanted to, but there's one thing it can't do: upset the U.S. wireless carriers. That's why you aren't going to see Google's Project Fi expand much beyond what it's doing now.

The U.S. has four major wireless carriers: AT&T, Sprint, T-Mobile, and Verizon. If you want to start your own service, you can start an "MVNO"—a virtual carrier that uses one of those networks. Maybe you'll also lean on Wi-Fi a lot, like Republic Wireless does, but ultimately, you'll need to make an MVNO deal. There's no way around it—there just aren't enough goTennas in the world to fill in all of the big gaps between Wi-Fi networks.

Your MVNO deal will have specific terms. But it will also have unspoken terms. That's what upstart US Mobile ran into in early February, as its CEO, Ahmed Khattak, inadvertently tested T-Mobile's patience with a very loud, public rollout of Xiaomi and Meizu phones.

In US Mobile's case, Khattak got a call from someone at his enabling carrier—which, for contractual reasons, he never actually identifies as T-Mobile—saying that they wanted those phones to go through some additional testing.



Sascha Segan is the lead mobile analyst for *PC Magazine*. His commentary has appeared on Fox News, CNBC, CNN, and on radio stations and in newspapers around the world.

Khattak didn't have to comply, of course, but it's generally not a good idea to be on the wrong side of the folks providing your network service. Things could happen. So US Mobile is doing what T-Mobile strongly suggested it do.

NICE MVNO, WOULDN'T WANT ANYTHING TO HAPPEN TO IT

And so we get to Google Fi. It combines Sprint, T-Mobile, and Wi-Fi, and is a technology demonstration of how Google can intelligently knit together heterogeneous networks and get all the handoffs and billing straight. From the Sprint and T-Mobile perspective, it may also be an experiment in seeing whether roaming on each other's networks makes a good nationwide alternative to having to roam onto the larger, but more expensive, AT&T and Verizon networks.

But Fi can't go from being a beta to becoming a revolution. The biggest virtual carrier, TracFone, was allowed to get so big because it's seen as serving a low-income market that the major carriers otherwise wouldn't be easily able to tap. (TracFone also has at least one weird, old contract that couldn't be duplicated today, insiders have told me.) Other MVNOs tap into other niches, such as people who do a lot of international calling. Remember that Boost, Virgin, Cricket, and MetroPCS aren't virtual carriers, they're just parts of the big guys.

Fi customers, who own expensive phones and use a lot of data, are generally pretty high-revenue users. The carriers don't want to lose those users from their own more expensive postpaid brands, so they're only willing to let Google try its experiment up to a point. I wouldn't be surprised if there was a maximum user figure built into Google's MVNO contract, after which the rates it

would pay to T-Mobile and Sprint would get much higher. Even if there isn't an explicit rule, there's almost certainly an unspoken agreement.

It's actually easier to build an ISP than a wireless carrier, because mobile phones move. Google Fi can go city by city. WISPs such as Starry could even roll out neighborhood by neighborhood. But with a wireless carrier, it's either go nationwide, or you're stuck paying through the nose to the big carriers for roaming. This is the painful math that has gobbled up every regional carrier other than U.S. Cellular.

All this goes to say that they who own the spectrum and run the towers make the rules, and you shouldn't look for a revolution from anyone who doesn't own their own spectrum and run towers. This also emphasizes why we can't let any of the big four carriers merge with each other: As there's nobody else buying nationwide spectrum and building out towers across the country, no truly disruptive upstarts are likely to rise up anytime soon.

sascha_segan@pcmag.com



It's actually easier to build an ISP than a wireless carrier, because mobile phones move.



How Midrange VR Could Save the PC Market

In a recent post on my personal blog, I questioned whether Apple should jump into virtual reality.

At the time, Cupertino had not publicly discussed VR, but Apple rarely discusses what it has in its pipeline. By the end of that week, though, news leaked that Apple had hired a VR expert and purchased a company or two with roots in the technology. If the tech press is to be believed, we could see an Apple VR gadget this year or next.

Given all of the activity in the VR space, and the potential the technology has to provide a more immersive computing experience, Apple would be crazy not to explore VR.

From my studies, it seems that a high-end market for VR is emerging in which one needs a powerful PC, an additional graphics card, and a relatively expensive set of smart goggles (such as the Oculus Rift). At the lower end, you have a smartphone-powered VR experience that can be viewed either with a special set of low-cost goggles like Samsung's Gear VR headset or Google's \$20 Cardboard goggles.

But I wonder if there's another \$249-\$349 layer in this VR mix that could be delivered by a relatively powerful PC that does not need an advanced graphics card to power the goggles.

It turns out that major PC players are pondering this exact question. And in what could



Tim Bjarin is the president of Creative Strategies and a consultant, analyst, and futurist covering personal computers and consumer technology.

be an interesting twist, a PC-based VR solution with affordable goggles may even help drive PC sales up again. In this model, PCs and laptops would have advanced processors and integrated graphics that could drive the VR goggle experience, yet they'd be priced around \$800 to \$1,000 as a whole.

From a historical standpoint, PC users are well accustomed to good-better-best scenarios, as Intel and its partners have positioned Intel's Core processors accordingly: A Core i3 processor is considered good, a Core i5 processor better, and a Core i7 is best. One can imagine a VR experience that maps this idea. A lower-cost VR solution would be good, a PC-based VR system would be better, and a gaming PC or console would deliver the best VR experience available.

What's interesting in this scenario is that the quality of the PC experience and that of the tethered goggles rely on the kind of advanced processing available to drive the VR. The lower-end models are driven by smartphones that clearly have powerful processors in them and even solid graphics performance, but the Cardboard or \$99 goggles have mediocre optics in the glasses themselves that make the experience only good rather than great.

On the other hand, the best goggles, like the ones from Oculus, not only have better optics, but optics that are powered by the PC processor and graphics cards, making the VR experience really clear and more immersive. The big challenge for the mainstream PC vendors will be to create a powerful enough PC with integrated graphics in the processor that could be tied to a lower-cost set of goggles.

Contacts in China tell me there are some

amazing VR goggles being designed that could be driven by PCs without expensive graphics, but that also deliver advanced PC-driven optics for less than \$349. Apparently they will work well with most VR content being created today except that which needs an Oculus Rift or Sony PlayStation VR.

Because these goggles would require PCs with at least a Core i5 processor, even the lower end of the PC market may be tempted to upgrade to a VR PC experience much sooner than they have in the past.

The more I look at the market for VR, the more I see this big hole between existing VR experiences. Perhaps a PC-based “better” VR experience could fill this gap. If so, I sure hope PC makers move things in this direction so more people can experience solid VR for themselves.



Even the lower end of the PC market may be tempted to upgrade to a VR PC experience.



Why Your Car Needs “Nanny Tech” Riding Shotgun

Check the comment sections from almost any online article about autonomous cars or driver-assist technology and you’ll read things like, “I don’t want the car to drive for me,” or “People should just learn how to drive.”

I consider myself a good driver. I haven’t had a major collision or a moving violation in more than a decade, and I’ve fortunately never been involved in an injury-causing car accident. But after testing more than 50 new vehicles a year, many with driver-assist systems, and having an aftermarket system in one of my own cars, I’m glad that many automobiles these days are equipped with “nanny” technology.

Why? A few close calls and the effectiveness of the technology has impressed me—and certainly saved me from damage to my car, my body, and my bank account.

Years ago I had an aftermarket system from Mobileye, the primary provider of cameras systems to most automakers, installed in my 2008 Honda CR-V for a test I did. During a drive, I looked down for just a second to change the radio station, when I received a warning from the lane-departure feature. I looked up just in time to see that I was too



Car tech expert Doug Newcomb has written for *Popular Mechanics*, *Road & Track*, and other publications, and is the author of *Car Audio for Dummies*.

close to the cement wall center divider. On another journey, I was amazed at how the system's camera and software detected lane markings on a snowy road.

The constant warnings from the rudimentary Mobileye system can become aggravating after a while, and newer active safety systems that take control of the car can become too intrusive. But technology is helping solve these issues as well.

AN AMAZING AMOUNT OF CONTROL

For example, the 2017 Audi Q7 I recently tested is a technology tour de force when it comes to driver assists. In addition to now-common features such as frontal collision warnings and rear cross-traffic alerts with automatic braking, our test car also had a Driver Assistance option package that included adaptive cruise control with a "congestion assist" feature. That allowed the Q7 to essentially drive itself on the highway by keeping the car centered in its lane.

But the best thing about the Q7's large collection of driver-assist technologies is the remarkable amount of control the driver has over the systems' warnings. Within the menu of the Q7's MMI interface, the driver has the ability to adjust everything from how much the audio is lowered when an alert is triggered to how brightly the blind spot monitoring warning lights flash.

And here's another new twist: In addition to LEDs on the exterior mirrors that blink to tell drivers that another vehicle is in their blind spot, a thin strip of ambient lighting on the inside of the front doors that's normally a muted white flashes red to also call attention to a potential hazard.

Similarly, Infiniti vehicles like the 2015 Q70L 5.6 now provide a single switch to turn off or on

all driver-assist warnings, without you having to dig into menus to adjust each one.

Here's the thing that the Luddite, mostly car enthusiast commenters in those websites I mentioned earlier don't understand: Autonomous driving and driver assists are not either-or propositions. You can choose to use the technology or, in many cases, turn it off. Use it during a long, boring freeway drive or mundane daily commute, but switch it off when driving for pleasure on a back road.

Based on my experience, though, even if you're a great driver, I recommend always having an electronic nanny riding shotgun just to be on the safe side—and silencing it only when necessary or overly annoyed.



**Autonomous
and driver
assists are
not either-or
propositions.**



Reviews

CONSUMER ELECTRONICS

Perfect Bake Pro and Perfect Drink Pro

HARDWARE

Acer Aspire Switch 11 V (SW5-173-632W)

Dell Inspiron 11 3000 Series 2-in-1 Special Edition (3153)

Lenovo IdeaPad 100S-11 (80R2003XUS)

Shuttle XPC Nano NC01UWIN10HE

HP Envy Curved 34-A051 Signature Edition All-in-One

TP-Link AC1750 Wi-Fi Range Extender (RE450)

SOFTWARE & APPS

Dashlane 4

Our Favorite Apps for March



Perfect Bake Pro
Perfect Drink Pro

\$99.99 (each)



Cooking and Cocktails, Perfect Every Time

Recipes, like sheet music, are most effective when they're precisely written and precisely followed. But improvisation and substitution always occur, intentionally or otherwise, and that's why amateur bakers and mixologists can sometimes get so frustrated. "It tasted amazing before—why doesn't it *now*?" With its Perfect Bake and Perfect Drink systems, Perfect Company is trying to solve exactly that problem—and, if the packages are far from necessary, using them as intended will indeed deliver exactly the results you (and your taste buds) crave.

DESIGN

Perfect Bake Pro and Perfect Drink Pro share the same essential nature: Each consists of a wireless Bluetooth kitchen scale, with a backlit monochrome alphanumeric LCD that displays the ingredients' total weight and offers

prompts as you go along, and an Android or iOS app that instructs you on which ingredients to add when, where, and how. The scale's LCD is flanked by two buttons on either side: Timer and Bluetooth on the left, and On/Up and Off/Down buttons on the right. Perfect Drink Pro comes with a stainless steel shaker and a coarse strainer; with Perfect Bake you get three colorful mixing bowls and a simple oven thermometer. Both also include a stand for your phone or tablet. (Also important: The same scale will work with both apps, so if you supply your own mixing hardware, you'll only need to buy one Perfect package, not two.)

The scale pairs with your mobile device with just one touch in the app itself, after which your device will display the weight of whatever the scale is measuring. Of course, what makes the real difference is the combination of the scale's measurements and the apps' extensive and easy-to-follow recipes.

THE APPS

Each app contains hundreds of recipes, ranging from classics to new favorites. Perfect Bake pairs traditional cakes (Really Red Velvet) and cookies (Gourmet Chocolate Chip) with the less common Kalamata Olive

Perfect Bake Pro Perfect Drink Pro

PROS Bluetooth connectivity. Straightforward instructions. Good selection of recipes, customization tools. Same scale works with both apps.

CONS Pricy. Light on accessories. Some questionable recipes.

WE'LL TAKE A GLASS TOGETHER

Perfect Drink Pro gives precise measurements for each ingredient and stirring times, which lead to an ideal cocktail.



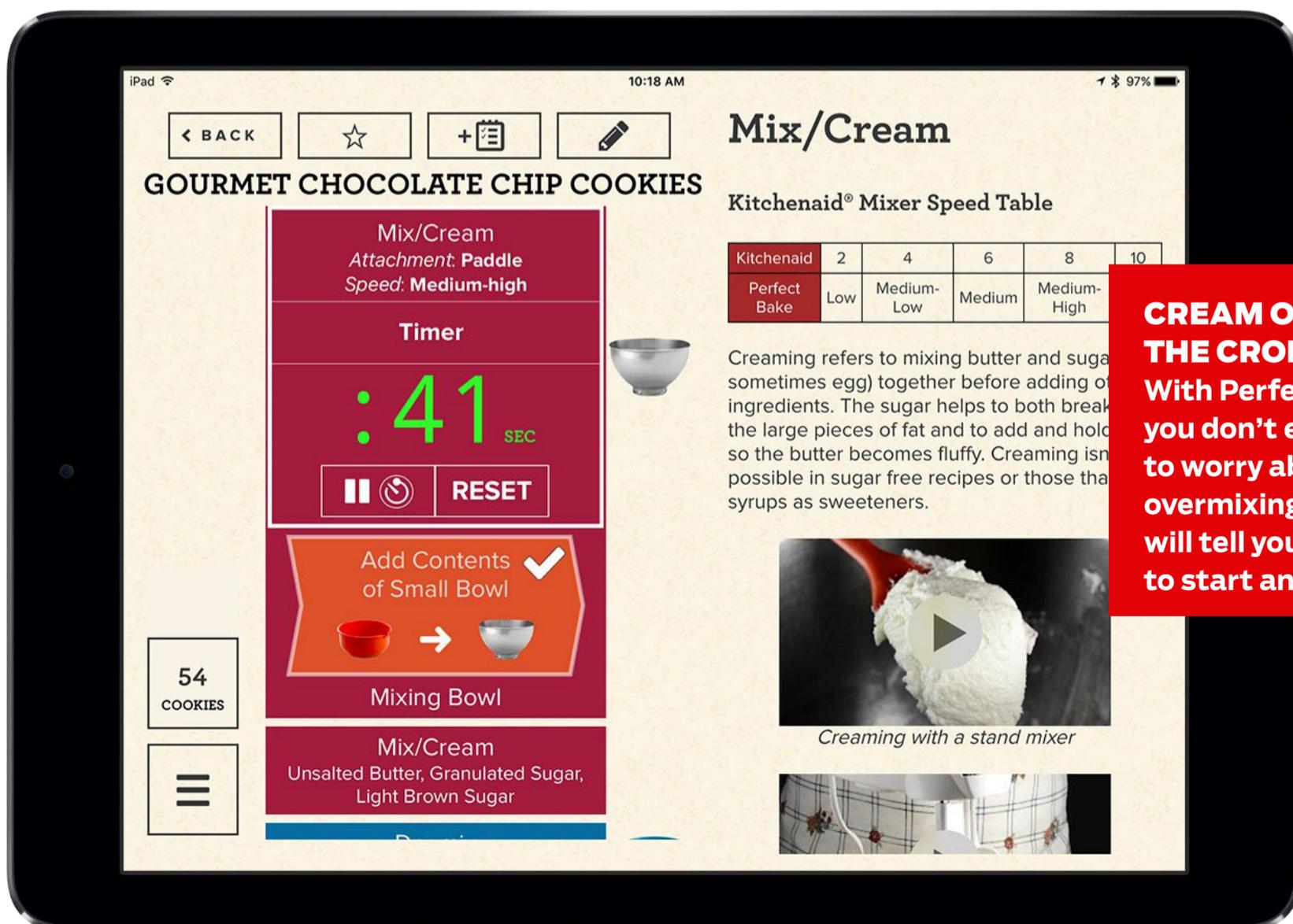
& Rosemary Loaf (bread) and Bird Seed Bites (vegan candy). Perfect Drink recipes range from Martinis and Old Fashioneds to the obscure Toronto (a Manhattan with Fernet-Branca) and the Silver Monk (a margarita-like beverage with Yellow Chartreuse and cucumber).

Some of the recipes are a bit questionable—sorry, Perfect Drink, but a Martini requires at least the implication of vermouth—but you can edit copies of all the recipes to match your tastes. And if the hundreds of recipes currently on offer fail to satisfy you, and you don't want to wait for the many free recipe pack updates, you can whip up your own using helpful in-app templates. (Of course, those you enter yourself won't have the built-in recipes' mouthwatering photos, though you can add your own shots to pretty them.) There is, however, no way to share the recipes you devise with the apps' other users.

Additional tools make it easy to automatically track which ingredients you have on hand, and which you need to buy. And it's a snap to populate a shopping list and favorite a recipe to try again later.



Sorry, Perfect Drink, but a Martini requires at least the implication of vermouth.



CREAM OF THE CROP
With Perfect Bake, you don't even have to worry about overmixing—the app will tell you just when to start and stop.

PERFECT PROPORTIONS

Even if you're afraid to step foot in the kitchen, the Perfect systems make baking and mixology simple and enjoyable. After you choose your recipe, you'll see a flowchart of the ingredients and actions needed to make it. The process is pretty foolproof and highly customizable. If you don't have the right size pan for the cake you want to bake, for example, you tell Perfect Bake to use a larger or smaller size and it will instantly adjust. Or for drinks, you can change the number of servings using buttons that recalculate ingredients for doubles, triples, and pitchers.

The scale detects weight changes automatically, but in some cases you may need to tap a button in the app or on the scale to move to the next step. A built-in timer with an alarm informs you how long your dish needs to be in the oven, or how long you need to stir your cocktail. Follow the instructions carefully, do any necessary prep work (preheating the oven, filling the shaker with ice, and so on) ahead of time, and it's hard to go wrong. Even if you add too much of an ingredient, the apps can adjust so your mistake won't require you to start over.

We did run into a couple of challenges. Perfect Bake's oven times sometimes resulted in overdone goodies, the lack of visual cues in the recipes a slight impediment to perfectly consistent results. And Perfect Drink sometimes moved along before we were ready because it thought we'd finished pouring. But the issues were minor, and for the most part the apps worked correctly.

ACCESSORIES INCLUDED

In addition to the scale, the Perfect Bake comes with three colorful mixing bowls, a device stand, and an oven thermometer; with Perfect Drink you get a shaker and strainer.





THE RESULTS

Our *PC Magazine* coworkers graciously agreed to swap their tech tests for taste tests for a couple of days and let us know what they thought of our recipes.

Perfect Bake Pro scored high marks for its Pull-Apart Rolls (which compared favorably with a similar America's Test Kitchen recipe), and a gluten-free analyst adored the moist and rich Flourless Peanut Butter cookies. The small and crisp Gourmet Chocolate Chip Cookies and the 250-Dollar Cookies (essentially chocolate chip oatmeal with pecans) were more divisive, but the lack of leftovers was its own success story.

As for the cocktails, the Electric Kamikaze was universally considered too heavy on the lime juice (the recipe called for equal parts of it, vodka, Triple Sec, and Blue Curacao), but Godfathers (whiskey and amaretto), Leathernecks (Canadian whiskey, lemon juice, and Blue Curacao), and Whiskey Sours (using lemon juice and simple syrup) were all well received. Of the Godfather, one of our pickier editors said, "I wouldn't order it, but I'd drink it if it was put in front of me." For him, that's a compliment.

Both the Perfect Bake Pro and Perfect Drink Pro are fun, albeit pricey, ways to make baking or mixing cocktails effortless and reliable. Do you need either? No—read the recipe, measure meticulously (even with a non-connected scale), and err on the side of caution, and most any recipe will work consistently. But if you've been afraid to take that first step in front of the oven or behind the bar, Perfect Company's innovations will give you all the courage you need.

MATTHEW MURRAY

WILL GREENWALD



Switch Up Your Computing With This Affordable Hybrid



Last year's Acer Aspire Switch 11 earned our first Editors' Choice for midrange detachable-hybrid tablets, thanks to its impressive mix of performance, smart design, and affordability.

The new Switch V improves on its predecessor in just about every way. It may not be anything revolutionary, but the Switch 11 V is slimmer and faster all around. We still have a few gripes with its design and weight, but Acer has sweetened the pot by dropping the price, too (from \$649.99 to \$599.99)—not a bad way to build on a best-in-class system.

**Acer Aspire
Switch 11 V
(SW5-173-632W)**

\$599.99



DESIGN AND FEATURES

Almost identical in proportions to its predecessor, the Switch 11 V measures 0.8 by 11.8 by 8.1 inches (HWD) and weighs 3.17 pounds; 1.57 pounds of that weight is the tablet itself, with the included keyboard dock making up the remainder. The keyboard feels heavier than it should, weighted toward the back to provide balance when attached, but the result is a system that seems heftier than it really is. The awkward weight and the plastic dock don't make it feel as though you're holding a premium device, but the tablet on its own, which is a brushed silver metal with a darker textured plastic strip running along the top edge, is sleeker in your hand. The system latches into the dock magnetically with a satisfying snap, and the connection is secure, with a hinge that doesn't flop around. It's easy to remove and reattach the keyboard with a simple tug, though you may occasionally fumble for a few seconds when you're lining up the connections.

The detachable design lets you use the tablet in a variety of modes. You can use it as a clamshell-style laptop (Notebook mode), remove the keyboard entirely to use it in Tablet mode, attach the screen in the opposite direction to show off media (Display mode), or stand the system upside down in Tent mode for cramped spaces or movie viewing. Typing on the dock is pretty standard, with short key travel and a spacious layout for an 11-inch system. The touchpad is nothing special, but it's responsive, and I didn't encounter any issues in testing.

The 11.6-inch full-HD In-Plane Switching (IPS) display is excellent. The 1,920-by-1,080 screen offers ten-point touch, and edge-to-edge Gorilla Glass 3

Acer Aspire Switch 11 V (SW5-173-632W)

PROS Generally good performance. Affordable. Attractive display. All-around speed improvement over its predecessor.

CONS Deceptively heavy for its size. Awkward keyboard dock.



STATE OF THE UNION

The Acer Aspire Switch 11 V can be used in several different modes, including Tent mode (shown here).

prevents scratches. The picture is sharp and clear, and the IPS panel provides wide viewing angles, which are especially helpful if you want to, say, watch a movie in Tent mode or use Display mode for showing photos or data to friends or coworkers.

The tablet includes a microSD slot, a micro USB 2.0 port, a micro HDMI port, and a DC-in port on its right side; the headphone jack, the Power button, and the volume rocker are on the left. The keyboard only has a USB 3.0 port, which is located on its right side. The system also includes Bluetooth 4.0 and dual-band 802.11ac Wi-Fi. There's a 1-megapixel, 1,280-by-720-resolution front-facing webcam, which merely suffices for video chat, but the 5MP, 2,592-by-1,944-resolution rear-facing cam takes nice, clear photos.



A 128GB solid-state drive (SSD) provides the same amount of storage you get on similar systems like the Microsoft Surface 3, the Asus T300 Chi, and the Acer Switch 11. (The Lenovo Miix 2 only has 64GB of flash memory, and the Asus T200TA-C1-BL includes a 64GB SSD, though you can add more storage into its dock.) The Switch 11 V is covered by a limited one-year warranty.

SWITCH UP
With speedier hardware and a lower price, the Switch 11 V is an improvement on its predecessor, the Switch 11.

PERFORMANCE

An 800MHz Intel Core M 5Y10c processor with Intel HD Graphics 5300 powers the Switch 11 V, and there's 4GB of memory on board. The tablet scored 2,275 on the PCMark 8 Work Conventional productivity test, behind only the more expensive Asus T300 Chi (2,615). The Switch 11 is third best, with 2,113. The Lenovo Miix 2 (1,392), the Microsoft Surface 3 (1,610), and the Asus T200TA-C1-BL (1,719) trail all three.

The Switch 11 V performed well on our multimedia tests, finishing Handbrake and Photoshop in 5 minutes, 46 seconds, and 7:22, respectively. These times are faster than on most other systems, notably the Switch 11 (6:26 in Handbrake, 8:01 in Photoshop) and the Surface 3 (6:05 and 12:16). Only the pricier T300 Chi performed better, finishing Handbrake and Photoshop in 3:01 and 4:18, respectively. The Switch 11 V also leads with its CineBench score of 161—the Switch 11 scored 152, the T200TA-C1-BL scored 127, and the Surface 3 scored 124, with the other systems unable to even run the test.

On the 3DMark Cloud Gate graphics test, the Switch 11 V scored 3,317, which is again higher than similarly priced systems. The Surface 3 (2,468), the Miix 2 (1,295), and the Switch 11 (2,423) lagged considerably, with only the T300 Chi (4,687) getting a better score, though none of these systems is fit for gaming. Most of these tablets couldn't produce more than 10 frames per second (fps) on either the Heaven or Valley gaming tests, with the Switch 11 V hitting 7 frames



**FOR GAWKING,
NOT GAMING**
Though it has an attractive full-HD screen, the Switch 11 V has weak video hardware that makes it poorly suited for playing most games.



per second (fps) and 5fps, respectively. The sole exception was the T300 Chi, which still only reached a still-unplayable 12fps.

Battery life on the Switch 11 V was decent, though unimpressive, at 6 hours, 8 minutes, on our rundown test. The older Switch 11 actually lasted slightly longer (6:21), and the Miix 2 (7:47) and the Surface 3 (9:52) fared significantly better. Only Asus' T300 Chi (5:54) and T200TA-C1-BL (5:25) clocked lower times.

CONCLUSION

Although some aspects of the Acer Aspire Switch 11 V's physical design could stand to be improved, its performance and high-quality display are highlights. Across the board, it's faster than the similarly priced or less expensive competition, and is an upgrade on the already-good Switch 11. Although many of the physical characteristics remain the same, the Switch 11 V performs better and adds dual-band Wi-Fi for \$50 less, giving us good reason to award it our Editors' Choice for midrange detachable-hybrid tablets.

MATTHEW BUZZI



Convertible Power at a Budget-Friendly Price



The Dell Inspiron 11 3000 Series 2-in-1 Special Edition is a convertible-hybrid laptop that falls at the top end of entry-level pricing for the category. Its compact shape and versatile design, combined with a touch display and speedy components, make the system an ideal companion for work and travel. The general look remains mostly unchanged from the 2014 iteration, but the addition of a solid-state drive (SSD), a faster processor, 2GB more memory, and dual-band Wi-Fi make it a much more capable machine—for only \$150 more.

**Dell Inspiron 11
3000 Series
2-in-1 Special
Edition
(3153)**

\$599 (as tested)



DESIGN AND FEATURES

The Inspiron 11 is an attractive system that measures a compact 0.76 by 11.8 by 7.9 inches (HWD) and weighs 2.98 pounds. The soft plastic lid, which on our review unit was a handsome color that Dell calls Midnight Blue, has a nice metallic sheen to it, though it does retain fingerprints. The bottom of our laptop was also blue, with silver plastic around the keyboard and a black bezel.

The 11.6-inch touch display has a low 1,366-by-768 resolution, which is expected at this price, even at the top of the range. The display features In-Plane Switching (IPS) technology for wider viewing angles than you'll find on many similar laptops, though the screen is reflective, which can be annoying in bright lighting. The display doesn't particularly stand out, but it's clear and serviceable.

The keyboard and touchpad are well made. The chiclet-style keys feel good to type on, are nicely spaced, and have intermediate travel. The solid build quality is evident throughout the whole system, with two sturdy hinges making it possible for the laptop to transform into different modes. You can use the Inspiron 11 in standard Laptop mode, fold the keyboard back behind the screen for Tablet mode, prop the system upside down on its edges for Tent mode, and put the keyboard facedown with the display standing upward in Stand mode. It's just about light enough to carry around as a tablet without discomfort, though the weight and size might bother you over extended periods. Pushing the screen or keyboard backward and forward to switch modes is easy, thanks to the hinges, and you can hold the system by either half without it feeling flimsy or fragile.

The 128GB SSD is a big step up from the slower 500GB hard drive found on the

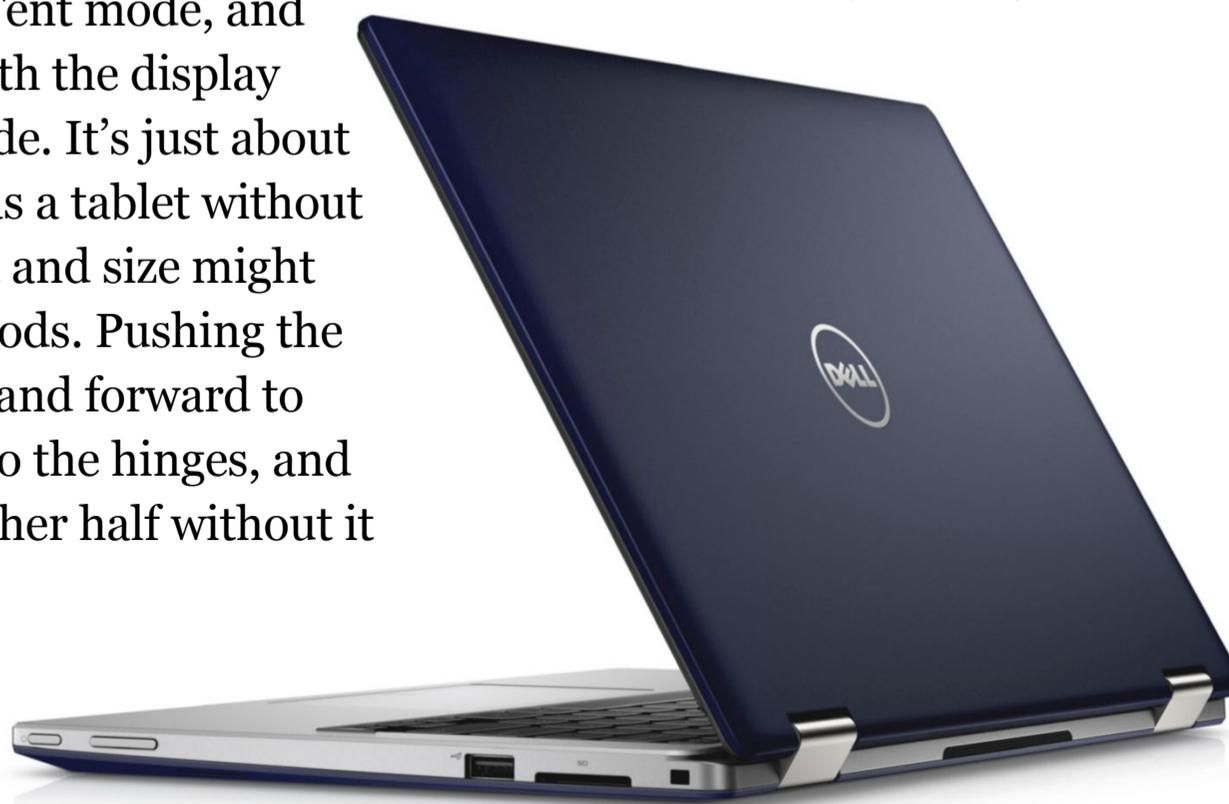
Dell Inspiron 11 3000 Series 2-in-1 Special Edition (3153)

PROS Attractive, sturdy convertible design. Uses powerful hardware. Includes dual-band 802.11ac Wi-Fi.

CONS Somewhat expensive. Overly reflective display. Unimpressive battery life.

NOT ON DISPLAY

The Dell Inspiron 11 3000 Series 2-in-1 Special Edition has an unexceptional, highly reflective display, but an attractive exterior finish (if one that attracts fingerprints).



previous Inspiron 11 3000, and not common among systems at this price. The Acer TP200SA, for example, has only 64GB of flash memory; the Toshiba Satellite Radius 14, the Lenovo ThinkPad Yoga 11e, and Dell's own Inspiron 17 5000 Series Non-Touch all opt for 500GB hard drives.

The system's I/O ports are pretty standard fare. On the left side are two USB 2.0 ports, an HDMI port, the Power port, and a headphone jack. On the right, there are a USB 3.0 port, an SD card slot, and a Noble lock slot. The laptop offers dual-band 802.11ac Wi-Fi and Bluetooth 4.0 (the previous Dell Inspiron 11 featured 2.4GHz Wi-Fi only). Dell supports the laptop with a limited one-year warranty.



PERFORMANCE

Powering this Inspiron 11 are a 2.3GHz Intel Core i3-6100U processor with Intel HD Graphics 520—a pretty zippy CPU for a budget system—and 4GB of RAM. Its score of 2,806 on the PCMark 8 Work Conventional test is well ahead of the previous version's 1,712 and the Asus TP200SA's 1,524 points; the Inspiron 17 5000 was a bit closer, with 2,097. The new Inspiron 11's performance on the multimedia tests was similarly superior, finishing the Handbrake and Photoshop tests in 3 minutes, 9 seconds, and 6:25, respectively, while posting a score of 234 on the CineBench test. This handily beats the older

Inspiron 11 (5:54 on Handbrake, 12:35 on Photoshop, 123 on CineBench) and the Inspiron 17 5000 (5:48 on Handbrake, 8:35 on Photoshop, 129 on CineBench), and crushes the TP200SA (11:05 on Handbrake, 11:55 on Photoshop, 30 on CineBench).

The Inspiron 11's 3D test results were decent, with scores of 2,548 on 3DMark Cloud Gate and 124 on Fire Strike Extreme. The Asus TP200SA (1,217 on Cloud Gate, 116 on Fire Strike Extreme) and the Dell Inspiron 17 (2,387 on Cloud Gate, 150 on Fire Strike Extreme) were only a little behind this time, though the previous Inspiron 11 scored a much lower 1,564 on Cloud Gate and was unable to run the Fire Strike Extreme test. This means that any demanding game is out of the question. We also saw this with our Heaven and Valley gaming tests, where the Inspiron 11 was unable to hit more than 8 frames per second (fps) at medium quality settings. None of the other laptops fared any better.

Battery life on this Inspiron 11 was actually shorter than that of its predecessor: 6 hours, 10 minutes on our rundown test, compared with 8:24. This is disappointing, considering the newer model is displaying at the same resolution. The higher-powered components this time around are likely responsible, but more than two hours is a big difference regardless. The TP200SA lasted a class-leading 11:55, and the Dell Inspiron 17 5000 just 5:20.





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**The Dell
Inspiron 11
3000 Series
2-in-1 Special
Edition
represents
a fairly
comprehensive
upgrade.**
”

CONCLUSION

Although it resembles the same-named system of a year and a half ago in design and appearance, the Dell Inspiron 11 3000 Series 2-in-1 Special Edition represents a fairly comprehensive upgrade. The new Intel Core i3 processor and additional 2GB of memory, along with an SSD and dual-band Wi-Fi, make the system snappier all around. The only disappointing aspect is the battery life, but that's the price you pay for improved performance. The Asus Chromebook Flip, our Editors' Choice–winning chromebook, is worth considering as a significantly less expensive option, but the Inspiron 11's Windows compatibility, better display, and broader port selection will make it a better option for many. A less-expensive Windows laptop alternative is the Lenovo IdeaPad 100S-11, our new Editors' Choice budget ultraportable, which only costs \$179.99 and has excellent battery life, though it's best suited to basic computing tasks (read the review in this issue). Even though it's at the high end of the budget price range for the category, its worthwhile features make the Dell Inspiron 11 3000 Series 2-in-1 Special Edition our Editors' Choice for entry-level convertible-hybrid laptops.

MATTHEW BUZZI



A Budget Ultraportable That's No Lightweight



The Lenovo IdeaPad 100S-11 is a low-price ultraportable laptop that's built for those who need to accomplish basic work on the go. Its lightweight but solid design makes it ideal to take with you on your commute, and the extra-long battery life will keep you working throughout the day. The 32-bit Windows 10 operating system and Atom processor mean the 100S-11 is better suited to simple tasks than heavy computing, but that's to be expected at this price. In most respects, this computer is a terrific deal.

**Lenovo IdeaPad
100S-11
(80R2003XUS)**

\$179.99 (as tested)



DESIGN AND FEATURES

Measuring 0.68 by 11.4 by 7.9 inches (HWD) and weighing just 2.29 pounds, the 100S-11 is certainly compact. In addition to its bold color scheme (a bright red lid and bottom, with black in the middle), the Lenovo is all-plastic and thus not especially premium-feeling, though there's a sturdiness to the system and its hinge is strong. The keyboard shows some flex because the system is so thin, and the keys themselves are a little loose. The touchpad, though small, is solid and responsive.

The 11.6-inch display features a 1,366-by-768 resolution, which is typical for the budget laptop category. The HP Stream 13, the Lenovo S21e-20, the E-Fun Nextbook 10.1, and the Dell Inspiron 15 Non-Touch all offer the same resolution. Higher, full-HD-resolution screens are generally found on more expensive systems, so 720p makes sense here to keep the cost down. The viewing angles on the IdeaPad 100S-11 aren't great, however, so there's definitely a sweet spot. The picture gets too dark and washes out quickly if you move too far in any direction from the center of the display, an issue we also experienced with the Stream 13. Otherwise, the display is generally bright and clear.

You don't get a generous amount of storage—32GB of eMMC, with about 25GB free out of the box—but it's not too far off from other systems in this range.

Connectivity options include two USB 2.0 ports on the right side of the laptop, and an HDMI port, a headset jack, and a two-in-one (SD and MMC) card reader on

Lenovo IdeaPad 100S-11 (80R2003XUS)

PROS Very inexpensive. Light and well-made build. Excellent battery life in testing.

CONS 32-bit OS. Narrow viewing angles on display. Keyboard exhibits some flex. Average performance on some of our tests.





the left, which means you can expand the built-in storage by quite a bit. There's also Bluetooth 4.0 and 802.11b/g/n Wi-Fi for wireless connectivity. Lenovo covers the laptop with a one-year warranty.

PERFORMANCE

The system includes a 1.33GHz Intel Atom Z3735F processor, Intel HD graphics, and 2GB of memory. As is typical of many budget ultraportables, the IdeaPad features a 32-bit operating system that means it isn't qualified to even run complete several of our benchmark tests. But the system performed adequately on those it could run, scoring 1,399 on the PCMark 8 Work Conventional test and 1,174 on the 3DMark Cloud Gate test. Its more expensive competition did edge it, however, with better overall scores for the HP Stream 13 (1,771 on PCMark, 1,245 on Cloud Gate), the Lenovo S21e-20 (1,533 on PCMark, 1,150 on Cloud Gate), the Intel Celeron-equipped Acer Aspire One Cloudbook 14 (1,561 on PCMark, 1,513 on Cloud Gate), and the Dell Inspiron 15 Non-Touch (1,554 on PCMark, 1,213 on Cloud Gate).

All of these other systems were able to run the full set of multimedia tests, and the IdeaPad posted the best Handbrake time of the five, at 7 minutes, 50 seconds. The Stream 13 finished in 9:50, the Inspiron 15 Non-Touch and the Cloudbook 14 both in 11:00, and the Lenovo S21e-20 in a very long 19:21. The IdeaPad couldn't complete the CineBench and Photoshop tests and neither it,



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**A full
Windows 10
computer for
\$179.99 is
an excellent
value.**
”

nor any of the other systems, scored even remotely playable frame rates on the Heaven or Valley tests at medium quality settings. Basic gaming is all you can get here.

Battery life is where the IdeaPad stands out. It lasted an impressive 11 hours, 31 minutes, on our rundown test. Only the Cloudbook 14 lasted longer, at 13:59. The Stream 13 was the next closest at 9:09, followed by the Inspiron 15 Non-Touch (6:19) and the Lenovo S21e-20 (6:03). The longer-lasting battery life over the Stream 13 is a nice boon for those who plan to take their system on the road or away from the desk for long periods.

CONCLUSION

A full Windows 10 computer for \$179.99 is an excellent value. And at that low price, the Lenovo IdeaPad 100S-11 boasts outstanding battery life, a light, but sturdy build, and hardware that's plenty competent for the cost. The portable design is particularly appealing in this category, as it's a fine system to take on the go. The 64-bit HP Stream 13 is slightly more powerful and offers a larger display, but its battery won't last as long. Because of the incredibly low price, portable build, and extra-long battery life, the Lenovo IdeaPad 100S-11 is our Editors' Choice for budget ultraportable laptops.

MATTHEW BUZZI

Shuttle XPC Nano

NC01UWIN10HE

\$279 (as tested)



This Tiny PC Is Packed With Huge Potential



Shuttle is a name that's familiar to DIY and barebones PC enthusiasts, but its kit-based computers require a lot of prep work. The Shuttle XPS Nano NC01UWIN10HE is a fully built, ultra-small-form-factor desktop PC loaded with all the bare essentials and bearing a stunningly low price. It's perfectly suited for connecting to a television to stream online media or working with cloud services, but it's also quite expandable, giving you a reason to buy it as a project PC if you're a tinkerer. In other words, it has something to offer both novice and advanced PC users.

DESIGN AND FEATURES

The XPC Nano is very, very small, measuring only 1.14 by 5.6 by 5.6 inches (HWD). The system is small enough to disappear behind an HDTV or other large-screen monitor, and Shuttle includes a VESA mounting bracket to help

you hide the system behind the display. Its glossy black and copper case, however, is attractive enough that you may well want to leave the system out and visible.

Connectivity is excellent, especially when compared with what you get from the even smaller Intel Compute Stick. An SD card slot and two USB 3.0 ports are on the front panel, and a serial port is on the left side of the case. Ports on the back panel include two USB 2.0, Ethernet, HDMI, Mini DisplayPort, a headset jack, and a Power jack for the included AC adapter. Bluetooth and 802.11ac Wi-Fi handle wireless connections. As with most of these computers, you'll have to provide your own keyboard, mouse, and display.

Shuttle XPC Nano **NC01UWIN10HE**

PROS Very affordable. Compact build. Many connectivity options. Supports 802.11ac Wi-Fi. Expandable memory, storage. Ships with VESA mount. Three-year warranty.

CONS Limited default RAM, storage. Doesn't include keyboard, mouse.



Shuttle has used modest components in the XPC Nano to keep its price low, but they're sufficient if you're using the system just for streaming media playback and accessing cloud-based services like Office 365 or Dropbox. If you're a tinkerer, you can pop the top cover and upgrade the SO-DIMM memory from 2GB to as much as 16GB (one slot is free out of the box), or upgrade the default 32GB PCIe-mounted M.2 solid-state drive or supplement it by adding a drive to the free

WHAT YOU SEE IS WHAT YOU GET

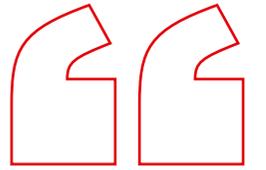
The Shuttle XPC Nano packs plenty of ports for connecting devices and storage, but you'll have to supply the keyboard, mouse, and display.

2.5-inch bay. (Of course, the externally accessible SD card slot and USB 3.0 ports are other options.) This desktop offers much more expandability than you get from the Apple Mac mini, which has its memory permanently soldered to its motherboard, or the sealed Intel Compute Stick. The system comes with a three-year warranty, which is considerably longer than the one-year warranty most similarly priced PCs have.

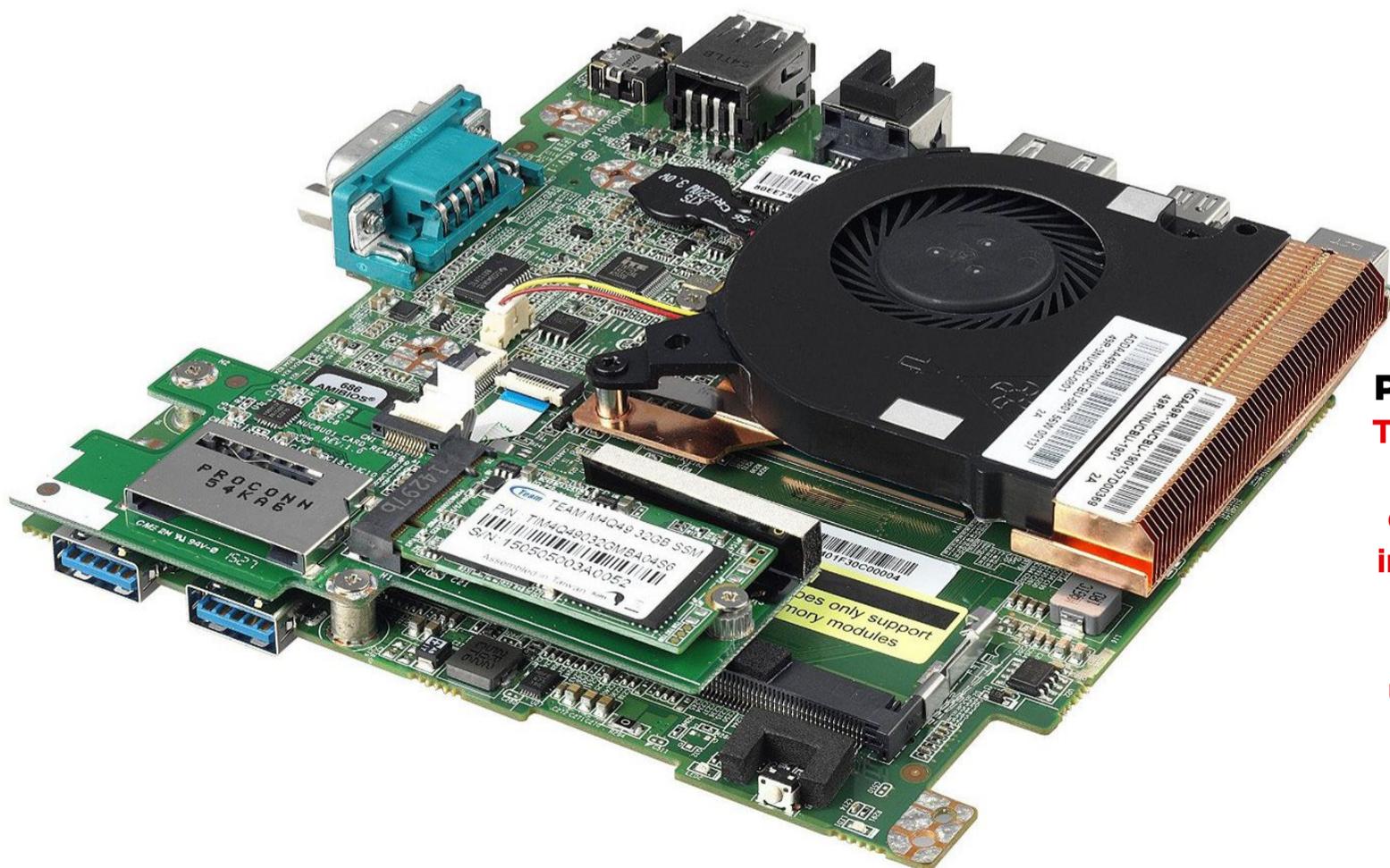
PERFORMANCE AND CONCLUSION

You shouldn't expect workstation-class performance from a \$279 PC, but the XPC Nano's Intel Celeron 3205U processor (with Intel HD Graphics) is more powerful than the Intel Atom CPUs found in most competing compact computers. For example, the XPC Nano's good score of 2,062 on the PCMark 8 Work Conventional test was significantly ahead of that of the Atom-equipped Compute Stick (1,324), as well as the Zotac Zbox CI320 nano Plus (1,496), which has an older Celeron N2930 processor.

Likewise, on the multimedia tests, the XPC Nano was an adequate performer for a budget system. It took 7 minutes, 6 seconds, to finish our Handbrake test. That's much slower than the larger Acer ATC-605-UB11 (1:47),



This desktop offers much more expandability than you get from the Apple Mac mini.



PINT-SIZE POWER
Tiny though the XPC Nano may be, its components, which include a higher-end Intel Celeron processor, are unusually powerful.



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**It's one of
the best
values in
desktop
PCs for
users of all
experience
levels.**
”

but still significantly faster than the Compute Stick (8:53) or Zotac's Zbox Pico PI320 (8:14). The system scored 118 on CineBench and finished our Photoshop test in 10:04 (the Compute Stick and Pico PI320 couldn't even complete that test). Frame rates in our 3D game tests were far from playable, but they did match the capabilities of the HP Pavilion Mini, an Intel Core i3-equipped system that costs \$450.

About the only way to get a less expensive desktop PC than the Shuttle XPC Nano is to buy a chromebox (such as the Asus Chromebox M004U, which comes in at just under \$160), but you will have to give up Windows compatibility. Alternately, you can go with a Windows 10 desktop in a stick form factor like the Intel Compute Stick, but you very little expandability. The XPC Offers the best of all these worlds, and more: It's a full Windows 10 PC, it's expandable, it's an excellent performer for its category, and it's one of the best values in desktop PCs for users of all experience levels. True, the \$599.99 Acer Aspire ATC-605-UB11 is a better performer if you're doing any sort of content creation, but if you're simply shopping for a basic PC, you're unlikely to care about that. That's why the XPC Nano is our new Editors' Choice for budget desktop PCs.

JOEL SANTO DOMINGO

HP Envy Curved 34-A051 Signature Edition All-in-One

\$1,949



HP's Terrific All-in-One Is Graded on a Curve



The HP Envy Curved 34-A051 Signature Edition is an all-in-one desktop with an ultra-wide curved screen. It gives you an unprecedented amount of real estate for your Web browsing, game playing, and general computing needs—it's like having a pair of monitors on your desk that are permanently and seamlessly bonded together. But beyond this, it also has the power, the technology, and the wow factor it needs to be a major all-in-one consideration.

DESIGN AND FEATURES

The Envy Curved 34 looks like a prop from the rebooted *Star Trek* movie series. It has a matte black face in front, a bright white panel in back, and shiny chromed stands that give the system a cantilevered look. Speaker grilles on the sides of the screen look fine in place, making the system look more like an

HDTV than a PC. Adding to that consumer electronics appearance, the system is built into the body of the display. This means the Envy Curved 34 is big all around: It measures 36.58 by 18.37 by 6.63 inches (HWD) and weighs 29.8 pounds. It's reasonably easy to move from room to room, though you probably won't want to do it often.

The chromed stands that support the screen have integrated hinges that let you tilt the screen forward or backward over a 25-degree range, enough for both seated and standing users. The screen doesn't have touch capability, so you don't have to worry about laying the screen almost flat for tabletop touch games and the like. The system comes with a wireless keyboard and mouse. Both are quite usable, if simple, but the keyboard feels a little cheap for a \$2,000 system, especially when compared with, say, the Magic Keyboard that comes with Apple's higher-end iMac all-in-ones.

The screen is the thing, measuring 34 inches diagonally. It has a resolution of 3,440 by 1,440, whereas most all-in-one PCs max out at 1,920 by 1,080. The benefit of the wide screen is that you can place four websites in four windows side-by-side, or even tiled in the four corners of the screen, and still be able to read all four sites simultaneously. Or you can work in a window snapped to the right in your photo editing program, while snapping another window with a Web development program to the left. The screen's landscape orientation is also good for viewing wide, busy spreadsheets. The curved screen takes a bit of getting used to, as habit makes you expect straight lines around your monitor. But once you do adapt, the sheer breadth of the screen fills your field of view quite well.

Images are sharp and colors are spot on, because the screen is Technicolor certified. What that means is that the screen is tested and calibrated to match the displays used by Hollywood film editors and game developers, so that images are as accurate when they're being displayed as when they were created. Ideally, the Envy Curved 34

HP Envy Curved 34-A051 Signature Edition All-in-One

PROS Excellent ultra-wide screen. Powerful hardware. No bloatware.

CONS No side-mounted ports. Uncommon aspect ratio may hinder full-screen video viewing. Curved display takes some getting used to. Included keyboard feels cheap.



is an awesome way to watch movies because its 21:9 screen matches that of CinemaScope widescreen movies like those in the *Star Wars* series or the Marvel Cinematic Universe.

This brings us to one of our strongest nits about the display. Although the ultra-wide screen could mean watching many more movies without those annoying black bars above and below the screen (so-called letterboxing), most streaming services don't account for screens wider than 16:9. So instead of full-screen video, you'll see black bars at both the sides and the top and bottom. Some videos on Amazon Prime Video and YouTube will account for this and display correctly, but those are rare. The majority of videos online are mastered for 16:9 and 1080p HD displays and the black bars are hard coded into the video streams, so this will continue to be a problem until the necessary optimization is more mainstream. There are

The majority of videos online are mastered for 16:9 and 1080p HD displays.



Chrome plug-ins that will zoom into the picture and eliminate the black bars entirely, but that is at the cost of some of the video's resolution. The stream services may adapt the way they did when 16:9 became the standard, but I wouldn't hold my breath.

The 2-megapixel 1080p HD Intel RealSense 3D camera above the screen is sufficient for quick snapshots. It features the ability to record videos with green-screen-free virtual backgrounds and for Windows Hello logins, and improved gesture control for games and programs. RealSense 3D is another one of those technologies looking for a problem to solve, but it's still neat.

Like most all-in-one desktops, the Envy Curved 34 is sealed and can't be opened up and upgraded by the end user. Sure, there are videos online showing people cracking the case with a screwdriver and a plastic card, but unless you're an advanced tinkerer, you'd be better off bringing the desktop to an authorized service center for repairs and upgrades. Not that you'll need them, as the system comes with 12GB of DDR4 system memory, a 128GB M.2 PCIe-based solid-state drive (SSD) for Windows and programs, and a 1TB 5,400rpm SATA drive for storing your data. Better yet, the Envy Curved 34 is a Signature Edition, which means that it's been cleaned up by the folks at the Microsoft store, so it doesn't have any bloatware preinstalled.

Although you can't install any internal components, there are ample ports for external peripherals. The back panel has the system's AC adapter jack, an Ethernet port, an HDMI-in port, an HDMI-out port, and four USB ports (two 2.0, two 3.0). We give props to HP for the HDMI-in port, which you can use to hook up an external Blu-ray player or game console. There are a few ports on the bottom face of the screen, including two more USB 3.0 ports and an SD card reader. We prefer a more convenient auxiliary port placement, such as on the MSI Gaming 24GE 2QE-014US, which has two USB 3.0 ports and an SD card reader on the left side panel. The Envy Curved 34's headphone jack is on its lower-left edge. The system's six built-in speakers are Bang and Olufsen branded and tuned, with terrific sound quality and enough volume to fill your home office. Wireless connections are handled by dual-band 802.11ac Wi-Fi and Bluetooth 4.0. The system comes with a standard one-year warranty on labor and parts.

PERFORMANCE

The desktop is equipped with an Intel Core i7-6700T processor running at 2.8GHz and an Nvidia GeForce GTX 960A video processor (which cannot be upgraded). The Envy Curved returned an excellent score of 3,233 on the





PCMark 8 Work Conventional test. That's just behind the MSI Gaming 24GE 2QE-014US (3,423) and the HP Sprout (3,381). Although the Envy Curved aced the Handbrake test with a first-place time of 1 minute, 4 seconds, and the CineBench test with a score of 707, it lagged slightly on the Photoshop test (3:24) compared with the HP Sprout (3:18). Even so, the Envy Curved should be fine for productivity tasks and heavy multitasking on its huge screen.

Gaming is a good use for the Envy Curved. It returned butter-smooth frame rates on the Heaven (76 frames per second, or fps) and Valley (94fps) tests at medium quality settings. When pushed to high levels of detail it didn't do quite as well (25fps in Heaven, 19fps in Valley), but the Envy Curved should be able to play at 1,920 by 1,080 with a little tweaking. By extension, less-taxing games like Diablo III, League of Legends, and Minecraft should be playable full-screen at lower quality settings. The Envy Curved 34 also led the scores in the 3DMark Cloud Gate test (18,324) and attained place in the 3DMark Fire Strike Extreme test (2,006), just behind the Asus Zen AiO Pro Z2401C (2,024).

CONCLUSION

The HP Envy Curved 34-A051 Signature Edition is a system that rivals, and in some cases eclipses, other major all-in-ones like Apple's Retina display-equipped 27-inch iMac and the Asus Zen AiO Pro Z2401C. It may cost a lot, but you get power, storage, and features that are worth the price, even given the full-screen video issues. Plus, it's more comfortable to multitask on the Envy Curved than on a traditional desktop with dual monitors. That's a recipe for success, and the reason the system is our new Editors' Choice for high-end all-in-one desktop PCs.

JOEL SANTO DOMINGO

The Best Way to Extend Your Wi-Fi Network's Range



If your router lacks the signal strength needed to bring Wi-Fi to the far corners of your house, give your network a boost with the TP-Link AC1750 Wi-Fi Range Extender RE450. This dual-band 802.11ac extender plugs into any wall outlet and delivers solid throughput speeds and good signal range. Even though it's bulky and lacks a pass-through outlet, its performance in our tests, particularly at long distances, was quite impressive.

DESIGN AND FEATURES

The RE450 has maximum data rates of 450Mbps on the 2.4GHz band and 1,300Mbps on the 5GHz band. With two fold-out antennas on either side and a third that pulls out of the top, the glossy white-and-gray device looks like something from a *Star Trek* episode. Measuring 6.4 by 3 by 1.2 inches (HWD), it is about the size and shape of a 6-inch smartphone and at least twice as thick. Its bulky frame blocks access to the second outlet in a two-outlet receptacle, and it lacks a pass-through outlet.

The front of the RE450 sports a large Range Extender (RE)/Wi-Fi Protected Setup (WPS) button with an LED ring around its outer edge. The ring glows blue when the extender has a good connection to the router, and red when it is too far away. It blinks blue while a WPS connection is in progress, and is off when there is no active connection. Below the button are 2.4GHz- and

TP-Link AC1750 Wi-Fi Range Extender (RE450)

\$119.99



5GHz-band status indicators and a Power indicator. The left side holds Power and Reset buttons and a button that turns off the LED lights. On the right side is a single Gigabit Ethernet port, and there's a two-pronged plug at the rear.

The RE450's Web-based management console lets you view your network status and create SSIDs for both bands. You can also select a security protocol (WEP, WPA, or WPA2) and assign passwords for each band. Other settings include access controls with whitelist and blacklist modes that limit which devices can use the extended network, a DHCP option with a DHCP client list, a system log, and a firmware upgrade option.

INSTALLATION AND PERFORMANCE

Installing the RE450 is a snap, especially if your router supports WPS. Start by plugging the RE450 in to an outlet that's close to your router and wait for the Power light to turn blue. Press the WPS button on your router and immediately press the WPS button on the extender. Once the LED ring changes from blinking blue to solid blue, you're done. You can now move the extender to a location that is ideally halfway between your router and the dead spot in your home. If the LED ring turns red, you have to move the extender closer to your router.

If your router doesn't support WPS, plug in the extender, connect to its SSID using a laptop or a mobile device, and type <http://tplinkrepeater.net> in your browser address bar. This takes you to the Quick Setup page, where you can scan for networks to extend and apply security settings.

The RE450 delivered very good scores on my throughput and range tests. Its result of

TP-Link AC1750 Wi-Fi Range Extender (RE450)

PROS Easy setup.
Good throughput,
range performance.

CONS Bulky. No pass-through outlet.





47.6Mbps on my 2.4GHz close-proximity (same-room) test was right behind that of the Netgear Nighthawk EX7000 (50.2Mbps) and the TP-Link AC750 Gigabit Wi-Fi Range Extender RE210 (32.5Mbps), but nowhere near what we saw with the Linksys RE6700 (93.9Mbps) and the Amped Wireless High Power AC1750 Plug-In Wi-Fi Range Extender REC33A (89.1Mbps). It did, however, beat all comers on the 25- and 50-foot tests with results of 44.5Mbps and 42.5Mbps, respectively. The RE450's speed of 32.1Mbps at 75 feet is the fastest we've seen from any range extender.

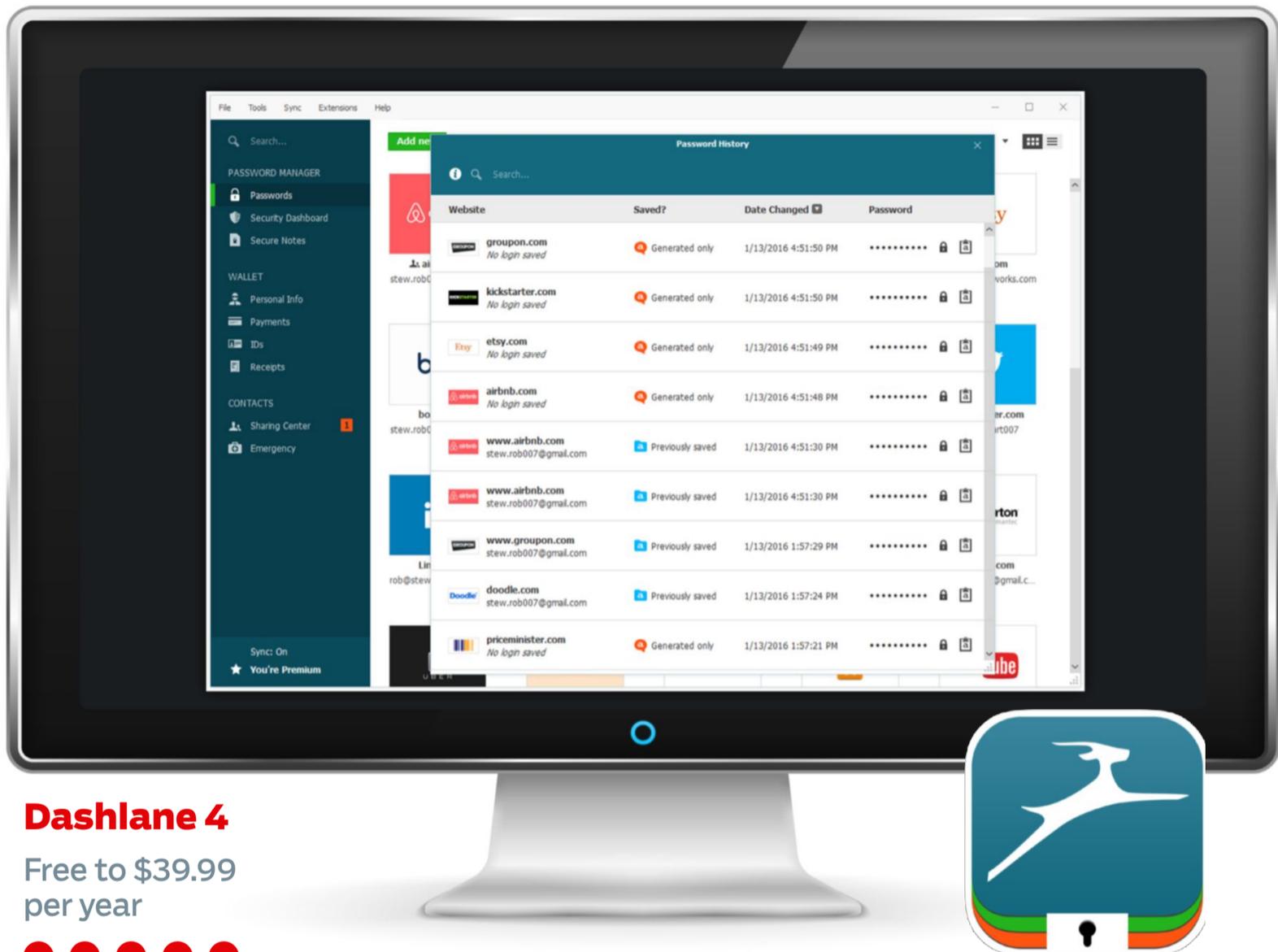
On the 5GHz tests, the RE450 delivered solid throughput speeds as well. Its score of 192Mbps on the close-proximity test beat the Netgear EX7000's 179Mbps and the Linksys RE6700's 177Mbps, but couldn't catch the Amped REC33A's 210Mbps. It delivered a league-leading 152Mbps on the 25-foot test, and its speed of 86.9Mbps on the 50-foot test was second only to that of the Netgear EX7000 (105Mbps). Once again, the RE450 led the pack with its result of 85Mbps on the 75-foot test. The next closest contender was the D-Link Wi-Fi Dual Band Range Extender DAP-1650 (39.5Mbps).

CONCLUSION

The TP-Link AC1750 Wi-Fi Range Extender RE450 is an excellent choice if you're looking to extend the reach of your wireless network. It offers solid close-proximity throughput, and performed wonderfully on our range tests.

Moreover, it's a cinch to install. Granted, it takes up two outlets and doesn't have a pass-through outlet, and it doesn't offer as many LAN ports as the Netgear EX7000, another top pick. But it's a better all-around performer than the Netgear model and costs around \$50 less, which is enough to make it our Editors' Choice for wireless range extenders.

JOHN R. DELANEY



Dashlane 4

Free to \$39.99
per year



Premium Password Tools For All Your Devices



When your password manager is famed for its interface and ease of use, finding ways to improve can be tough. But Dashlane 4 is even slicker, more attractive, and easier to use than previous versions—and it costs the same. That's not all. Its automated password changer now handles more than twice as many popular sites, and advanced features like emergency access and secure sharing keep Dashlane at the top of the heap.

BASIC USE

Dashlane is free to use only on any one device; to install it on more, you'll need to pay \$39.99 per year. With the free LastPass 4.0 you can sync any number of desktops, any number of smartphones, or any number of tablets, as long as you stick to one of those three categories. LogMeOnce Password Management Suite Premium is free without any similar limitation.

You can access Dashlane via either a browser menu or the full user interface (which is needed for some activities). Dashlane naturally captures credentials as you log in and replays them when you revisit sites without any need for either the pull-down menu or the full interface. You can view your saved logins as tiles or as a sortable list, though it's easiest to type in the predictive search box at the top left of the interface and open a site from the list of results.

The interface also rearranges the options in the left-rail menu for better consistency. The Wallet category still includes payment-method data for filling in forms and the receipts Dashlane has collected for you.

Personal Info and IDs (also used for forms) are now under Wallet as well.

The folks at Dashlane want to make it easy for you to get started. You can import passwords stored (insecurely) in Chrome, Firefox, and Internet Explorer, or import data exported from LastPass, RoboForm Everywhere 7, and several other competitors.

As noted above, Dashlane automates the process of capturing login credentials as you type and playing them back when you revisit a website for which you've saved data. If multiple logins are available, it displays them as a menu. You may occasionally run across a site with a weird login screen that Dashlane doesn't recognize. Dashlane doesn't include a way to manually save all data fields the way LastPass, RoboForm, and Sticky Password Premium do.

Dashlane now fully supports seven languages in its interface and program actions: English, French, Spanish, Portuguese, German, Italian, and Japanese.

PASSWORD PROTECTION AND GENERATION

As always, it's important to use a strong password as your master password. Dashlane requires a minimum of eight characters, including at least one digit, one lowercase letter, and one uppercase letter. That bar is

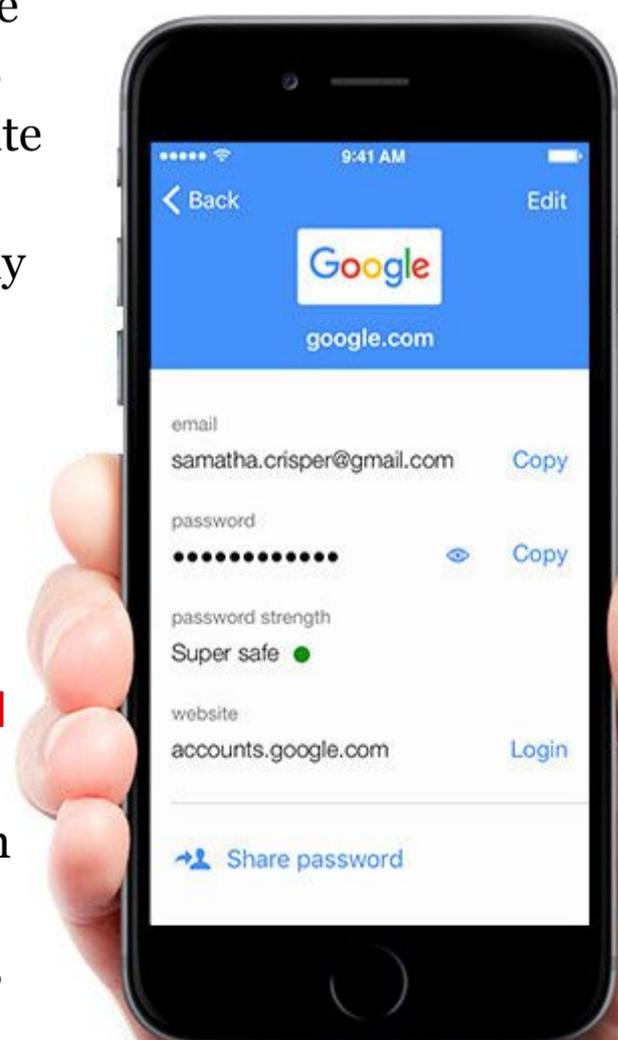
Dashlane 4

PROS Improved user experience. Supports PC, Mac, Android, iOS. Offers a wide selection of powerful, useful features.

CONS Password generator defaults could be more secure. Few two-factor authentication options.

LIFE IN THE DASHLANE

The \$39.99-per-year paid version of Dashlane lets you install the password manager on all your devices, for maximum security.



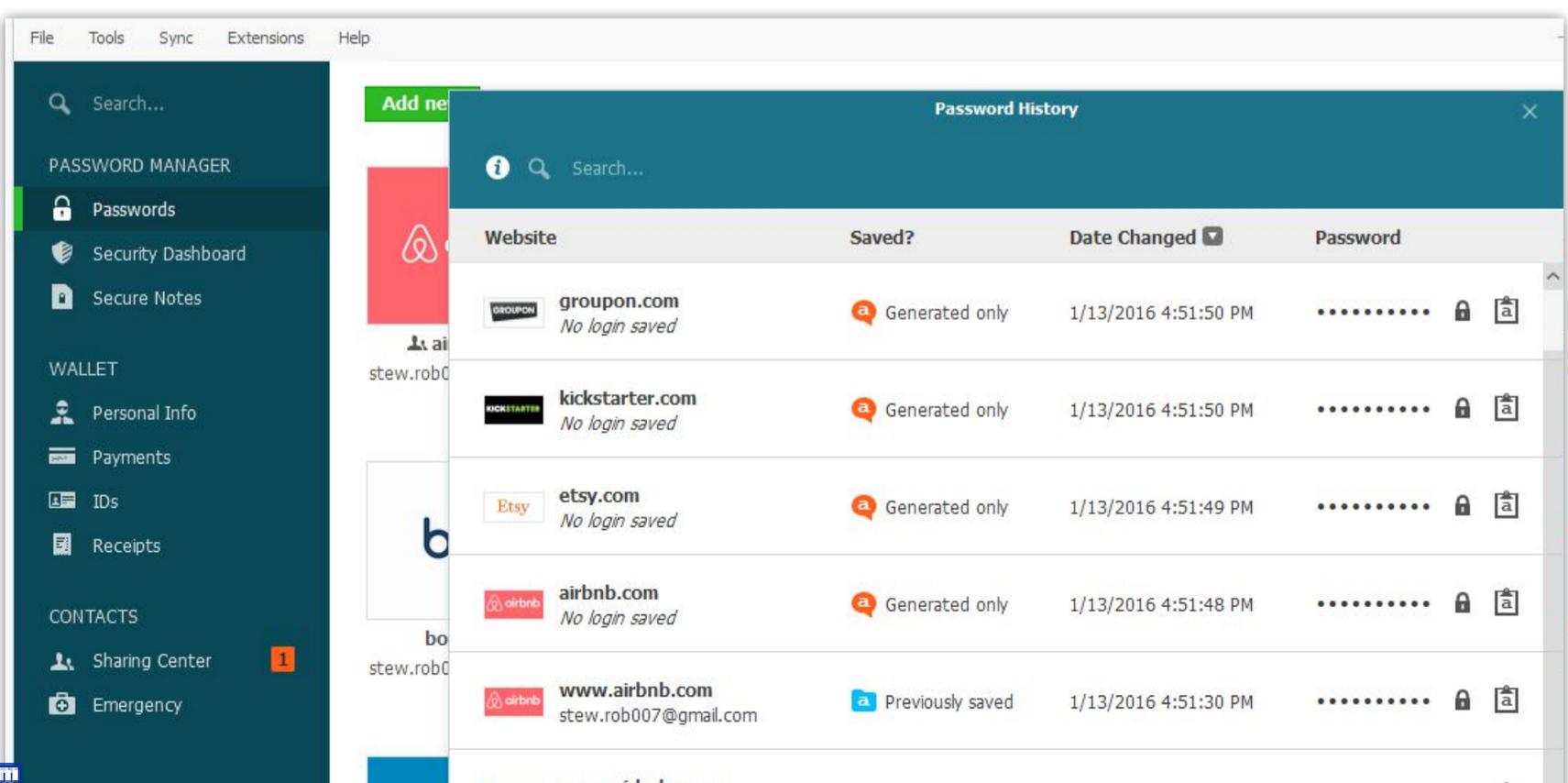
set pretty low; I would strongly advise at least 12 characters, using all character sets. For added security, you'd be well advised to enable two-factor authentication, whether for every login or just when there's an attempted login from a new device. Dashlane specifically supports Google Authenticator and work-alikes such as the free Duo Mobile and Twilio Authy. Just snap the QR code displayed by Dashlane with your authenticator app to make the connection. You can also set Dashlane to authenticate using Touch ID on iOS devices that support it. That said, Dashlane still supports fewer authentication options than most of its major competitors.

Any time you click in a password field to create a new account or change an old password, Dashlane offers to generate a secure password for you. If you want more control over how the password manager works, click the browser toolbar button and click the password generator button. Here you can set the generated password length and choose from three character sets, digits, letters, and symbols. Dashlane doesn't distinguish between upper- and lowercase letters.

Like LastPass, Dashlane defaults to a 12-character password using just letters and digits. That's up from a default of eight characters in the previous edition, but I suggest you raise the length to 16 characters and check the box to use symbols as well, then click the "Use as Defaults" button.

EXTENDED FEATURES

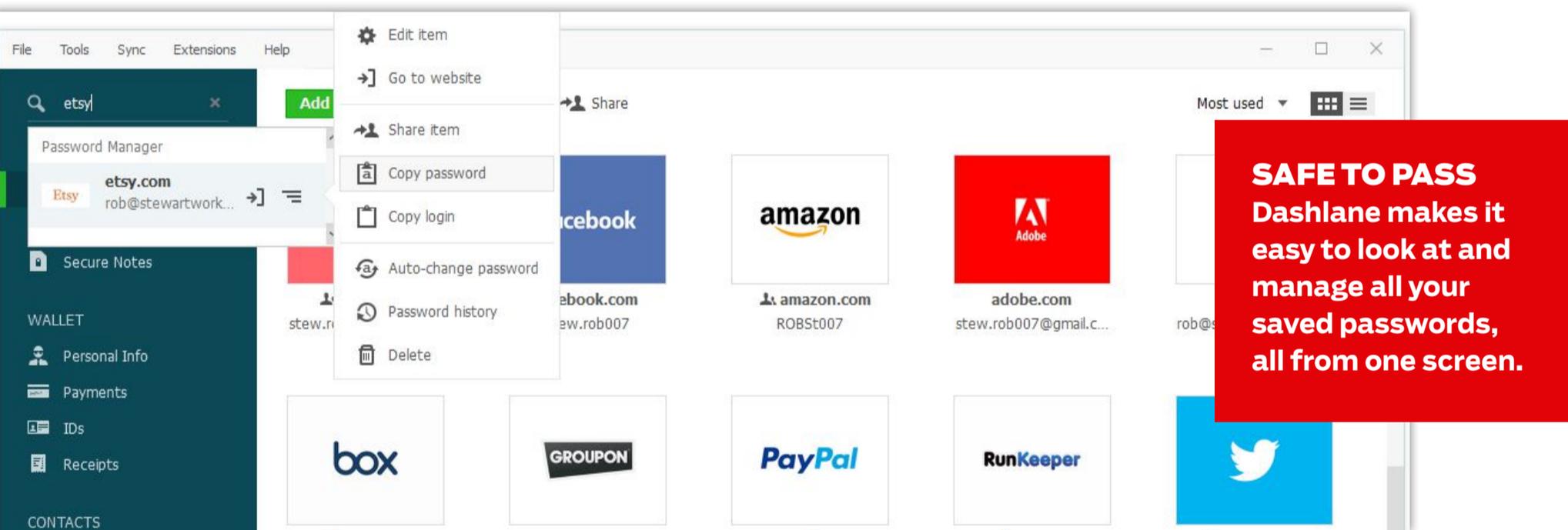
After you get your passwords into Dashlane, you need to clean them up, fix any that are weak, and replace any that you've used on multiple sites. Don't worry—Dashlane makes this process extremely simple. Click the Security Dashboard item on the left-rail menu for a quick percentage rating of your security level; Dashlane also offers suggestions for improving your score.



The real action takes place when you click to view the detailed password analysis. Here you can view all your passwords or just those that are weak, reused, or compromised, or haven't been changed in a long time. You can also sort this list by safety level, and point to any item for details on how it received that rating. You can begin the process of changing each offending password by clicking a button here, too.

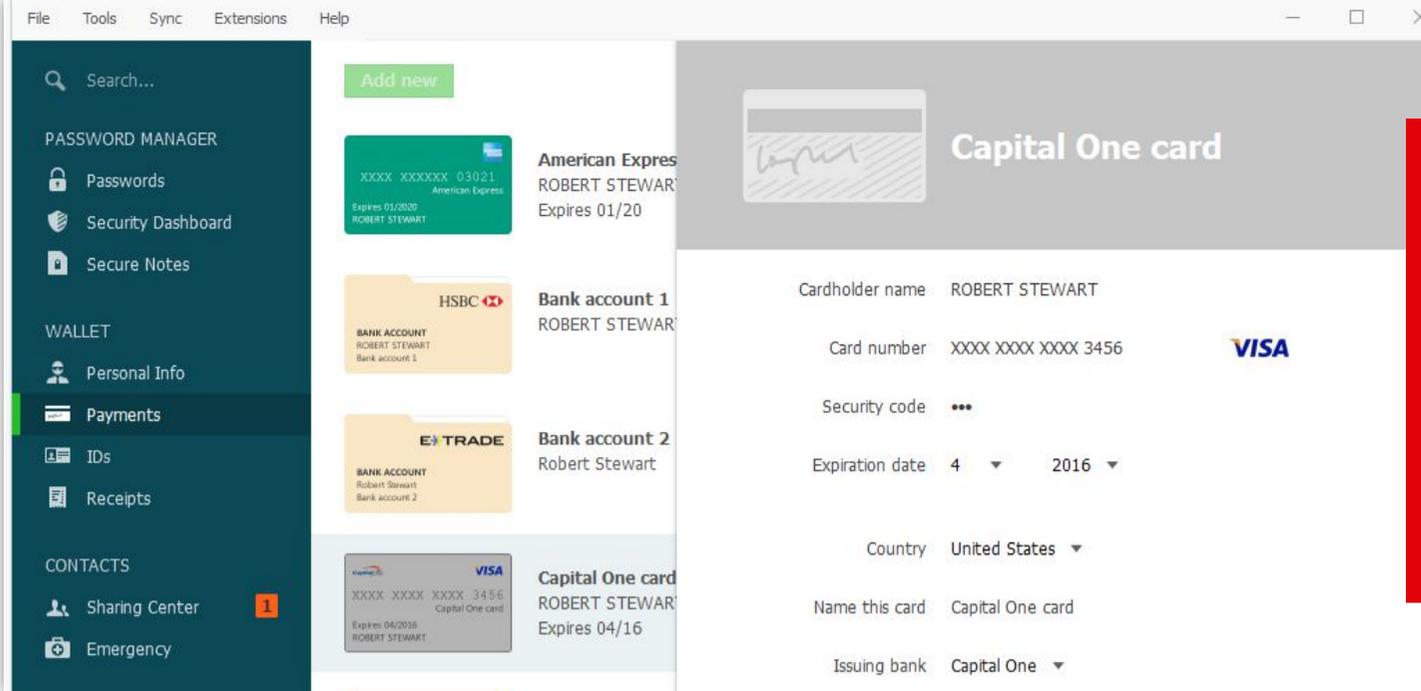
Dashlane 4.0 includes an automatic Password Changer that uses data from hundreds of popular sites to devise scripts that will give you a secure password with no extra work required. This is an outstanding feature, but remember that some passwords you just have to type yourself (such as your Microsoft ID for logging into Windows 10) and some sites have password requirements that Dashlane's generator can't meet. But for most sites, it's fantastic.

Sharing a password is easy, too. Select one, click "Share item" from the menu, then tell Dashlane the recipient's e-mail address and how much access you want to offer (you can change or revoke access later). The recipient will both receive an email (with an optional personal message from you) and get a notification in Dashlane's sharing center; a recipient who doesn't yet use the software will need to set up a free account.



The process for passing on passwords after you die is similar, but there's one important difference: You can set a waiting period for full access. If your supposedly trusted contact tries to get your credentials while you're still around, you can respond to the notification email to deny access.

Dashlane is unusually good with filling out Web forms. It divides your personal information into name, email, phone, (snail-mail) address, company, and website. You can add any number of each type. When Dashlane detects a Web form, it puts a tiny impala icon in each entry field. You click in any field and select the desired entry from the pop-up menu. At that point Dashlane fills



PICK A CARD
Thanks to Dashlane's detail-heavy display, you can tell at a glance which credit card or photo ID you're using to fill in Web forms.

in all the fields using the first available entry, but you can change any of those with another click. Credit cards, passports, driver's licenses, and other IDs receive customized icons that let you tell between lots of options with just a single glance.

On shopping sites, Dashlane offers to capture its own receipts for transactions, with the full amount and, when possible, a list of purchased items. It even snaps a screenshot or two, in case you have trouble with the merchant and need to show some added proof. In the event Dashlane doesn't capture the item name, you can edit that before saving.

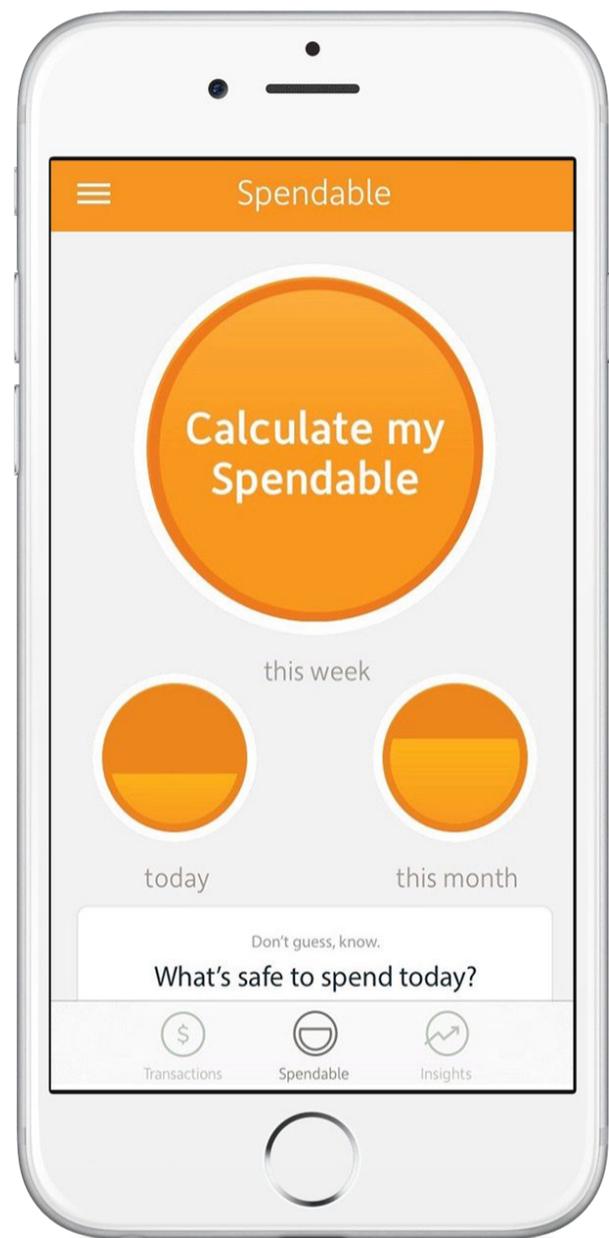
Although the Android and iOS versions of Dashlane 4 are almost identical to the Windows edition, there are a few differences. The mobile editions don't capture receipts for your purchases, and they can only manage passwords for apps that support the Dashlane App Extension. (This includes more than 180 apps, including eBay, Flipboard, Tumblr, Twitter, and Uber). The Android edition also supports auto-login for apps. Once you give it a few Accessibility permissions, it can log in to any app, with no special app extension required. Both mobile editions include a browser for completing passwords and forms, and both can be configured to fill in passwords in your device's default browser.

MORE CAPABLE THAN EVER

Dashlane 4's user interface is even slicker and easier to use than before, and natively supports more languages. It offers uncommon features like secure sharing and password inheritance, as well as a unique receipt-capture feature for your online shopping. And you can use it on all your Windows, Mac, iOS, and Android devices. It's still a winner, and still one of our Editors' Choice password managers, alongside LastPass 4 and Sticky Password Premium.

NEIL J. RUBENKING

Our Favorite Apps



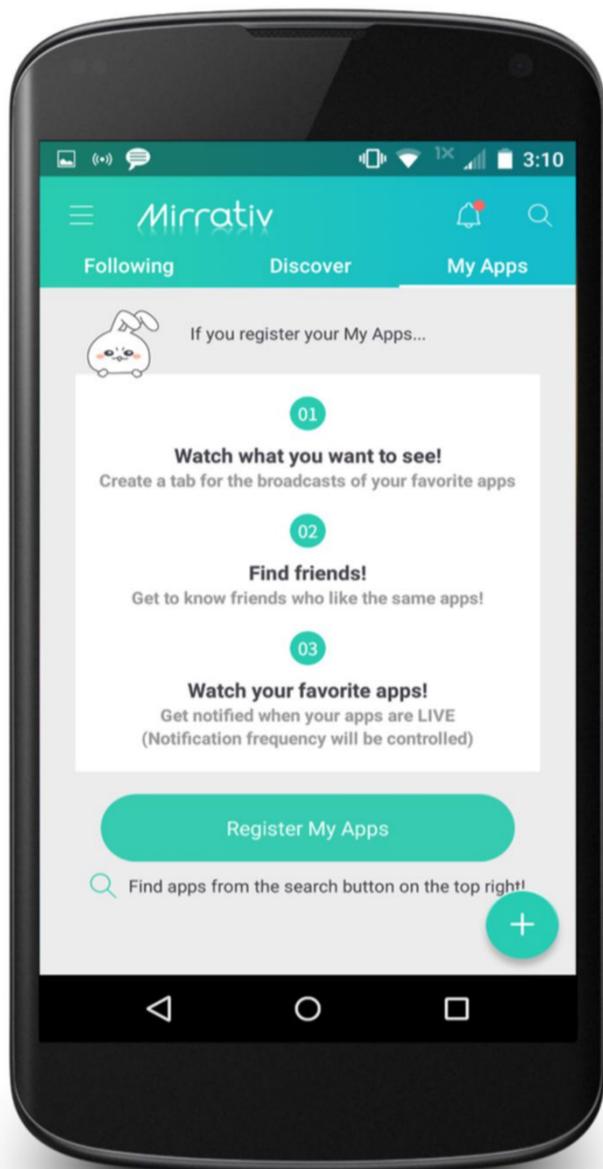
Level Money Android, iOS



Are you completely in the dark regarding how much money you can afford to spend each day? Level Money looks at income, bills, and intended savings to help you figure out your basic monthly budget and guide you toward an appropriate amount of spending money. Because this app doesn't provide any way to track and manage financial goals, we still recommend Mint.com for more complex money management chores. But if simple daily spending guidance is all you need, Level Money is good to have around.



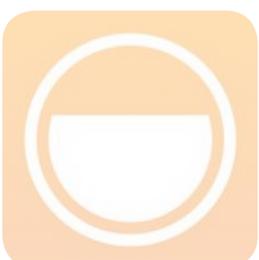
Our Favorite Apps



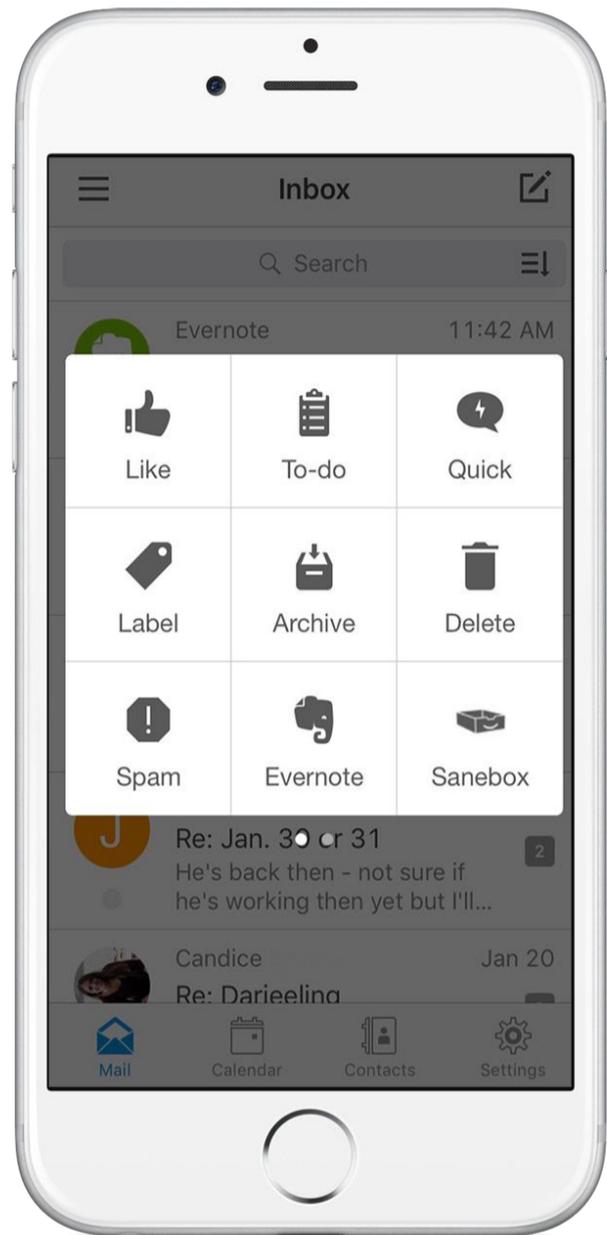
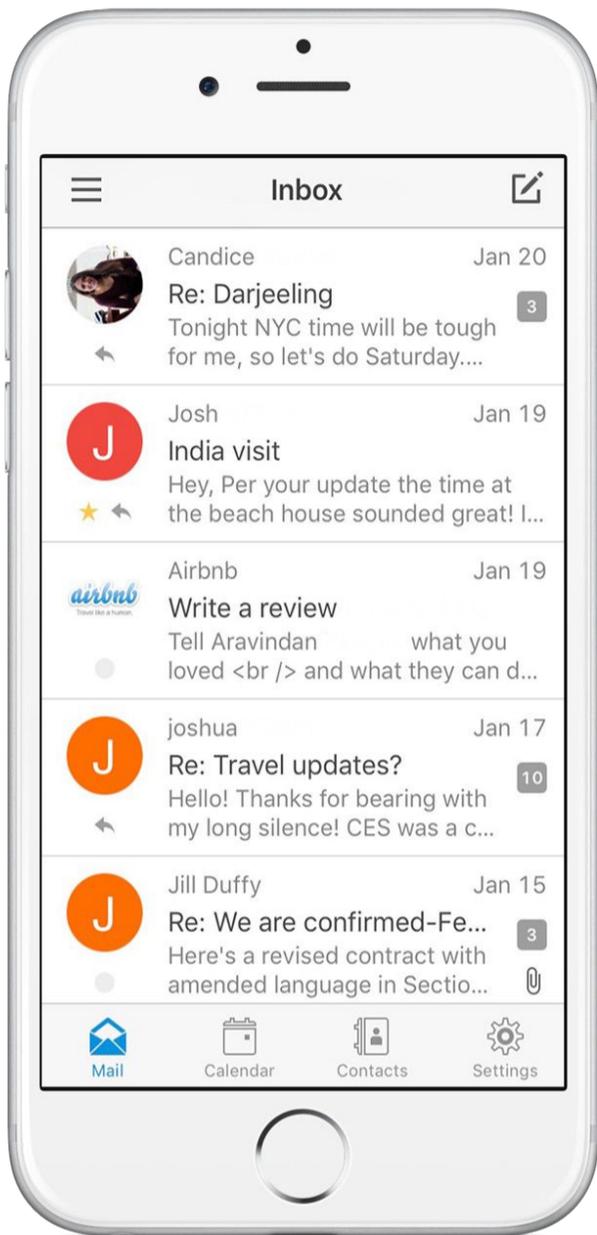
Mirrativ Android



Until now, the video game live-streaming phenomenon pioneered by Twitch.tv has been limited to PC and console games. If you want to broadcast yourself enjoying some top-notch Android entertainment, check out Mirrativ. This free app makes it easy to stream whatever is happening on your phone or tablet's screen, or to find, subscribe to, and watch others' ongoing live streams. The biggest downside at this point: Mirrativ's community is a bit limited compared to what you'll see on Twitch.tv or YouTube Gaming. For no-frills streaming, however, it's a good way to go.



Our Favorite Apps



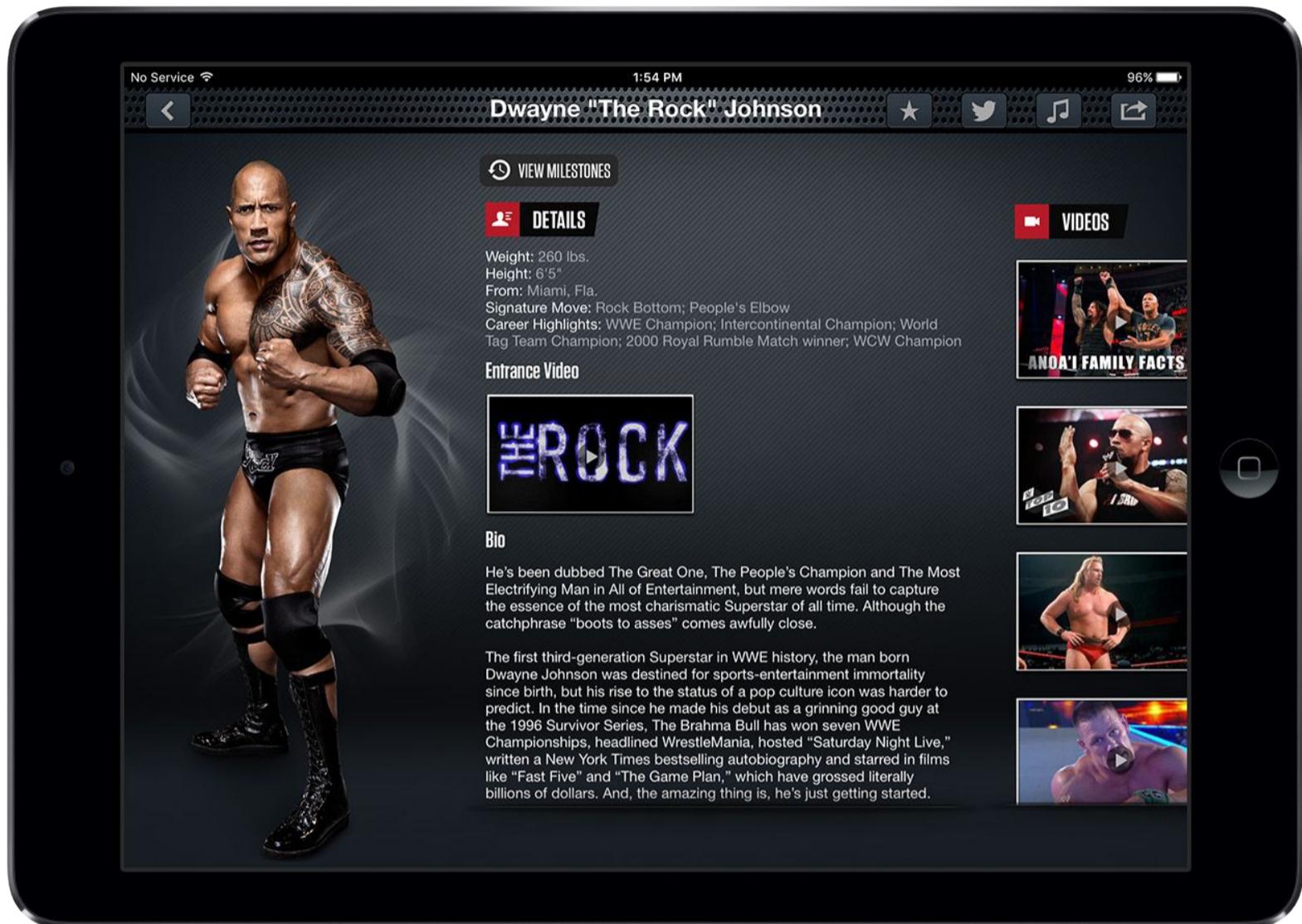
Boxer Android, iOS



Finding an email app that gives you the tools you need to better manage your inbox can spell the difference between clutter and productivity. If you want a lot of control, Boxer is for you. Its fast notifications, plentiful customization options, and integrated calendar and contacts list make it one of the most flexible choices out there. (The \$4.99 Pro version adds Dropbox integration, support for Exchange and multiple accounts, and custom signatures and alert tones.) It lacks the smart features of the official Outlook and Gmail apps, but if you prefer the hands-on approach, you won't be able to do much better than Boxer.



Our Favorite Apps



WWE Multiple

EDITORS' CHOICE ● ● ● ● ○

Fair warning: If you're not a die-hard lover of wrestling, there's no point in downloading the WWE app (which is available for Android, iOS, Kindle, and many other platforms). But for big wrestling fans, it offers a wealth of features, with an expansive video library and photo gallery that are packaged within a superb, smoothly navigable interface. You'll get even more if you pony up \$10 per month for a subscription, which nets you gorgeous 720p streaming content of hundreds of matches and free pay-per-view events (which typically run \$50 or \$60 each). Maybe the app's appeal is limited, but it couldn't be better executed.

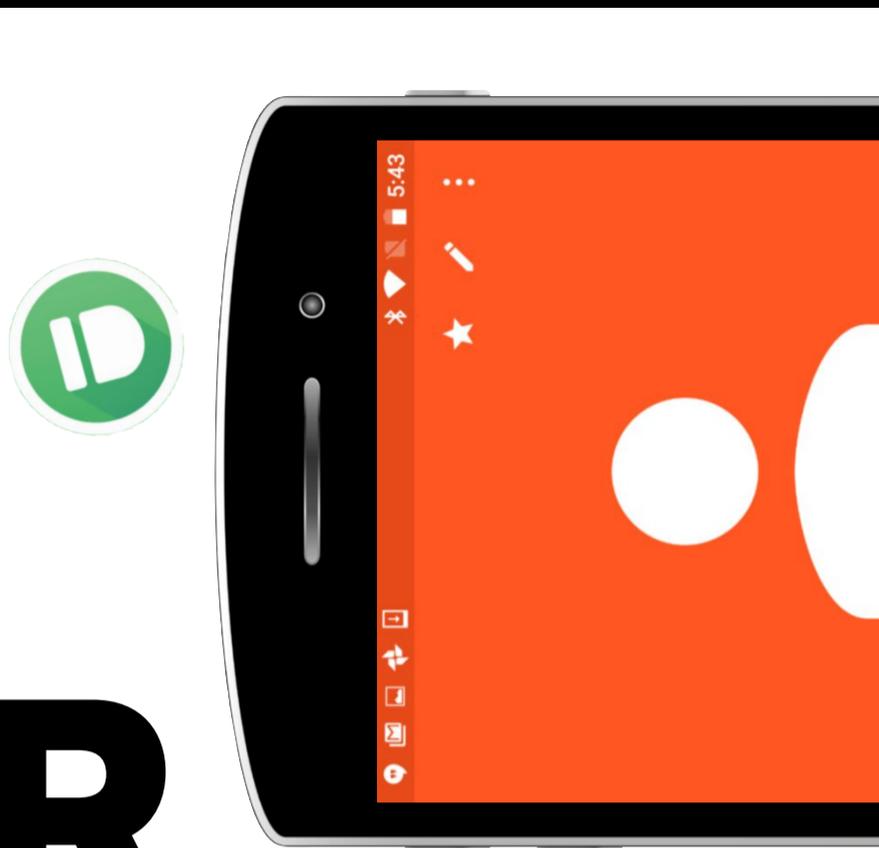
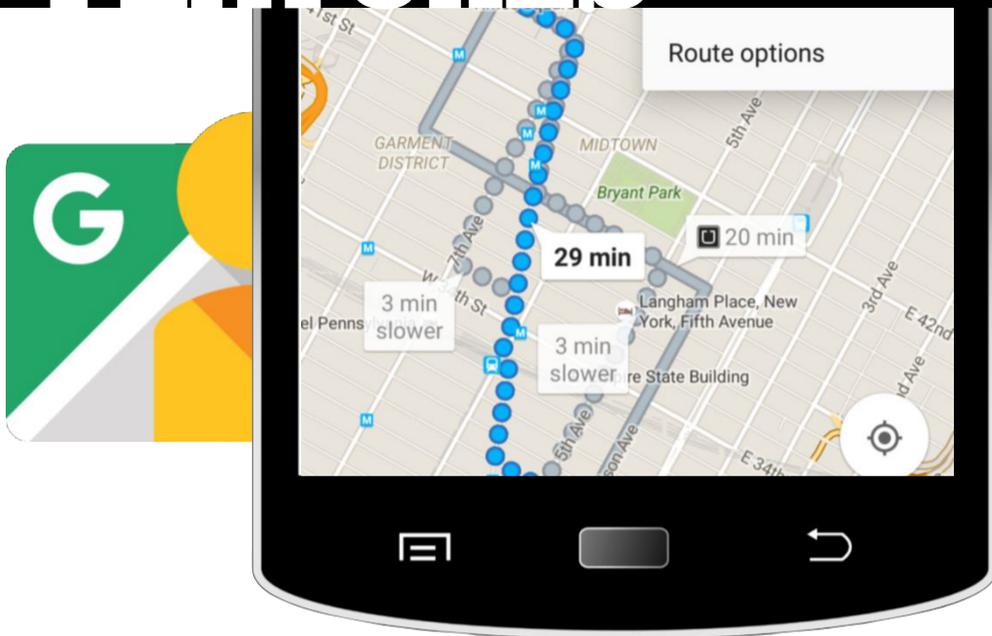


Features

KILLER ANDROID TIPS

**TURBOCHARGE
YOUR TAXES**

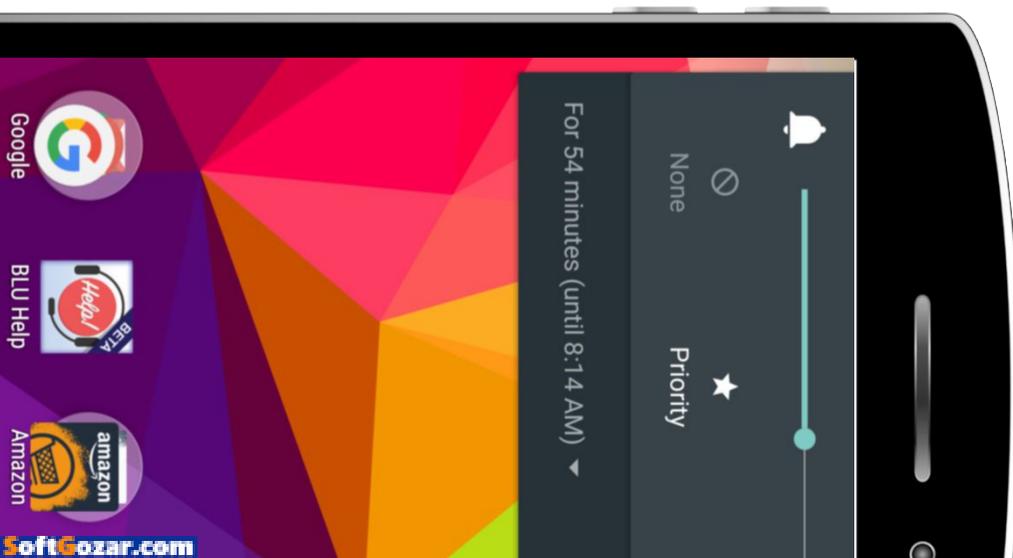
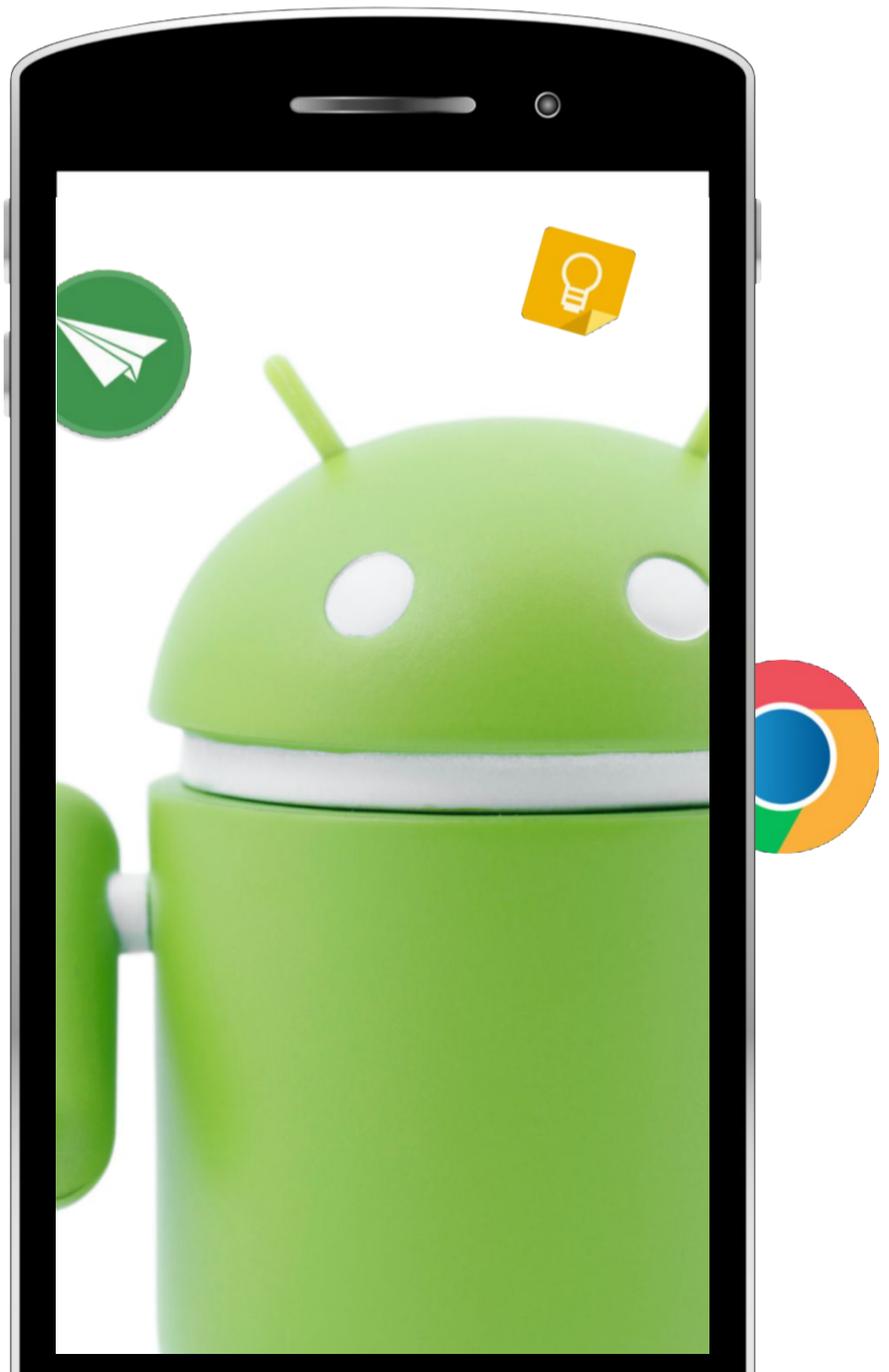
FEATURES



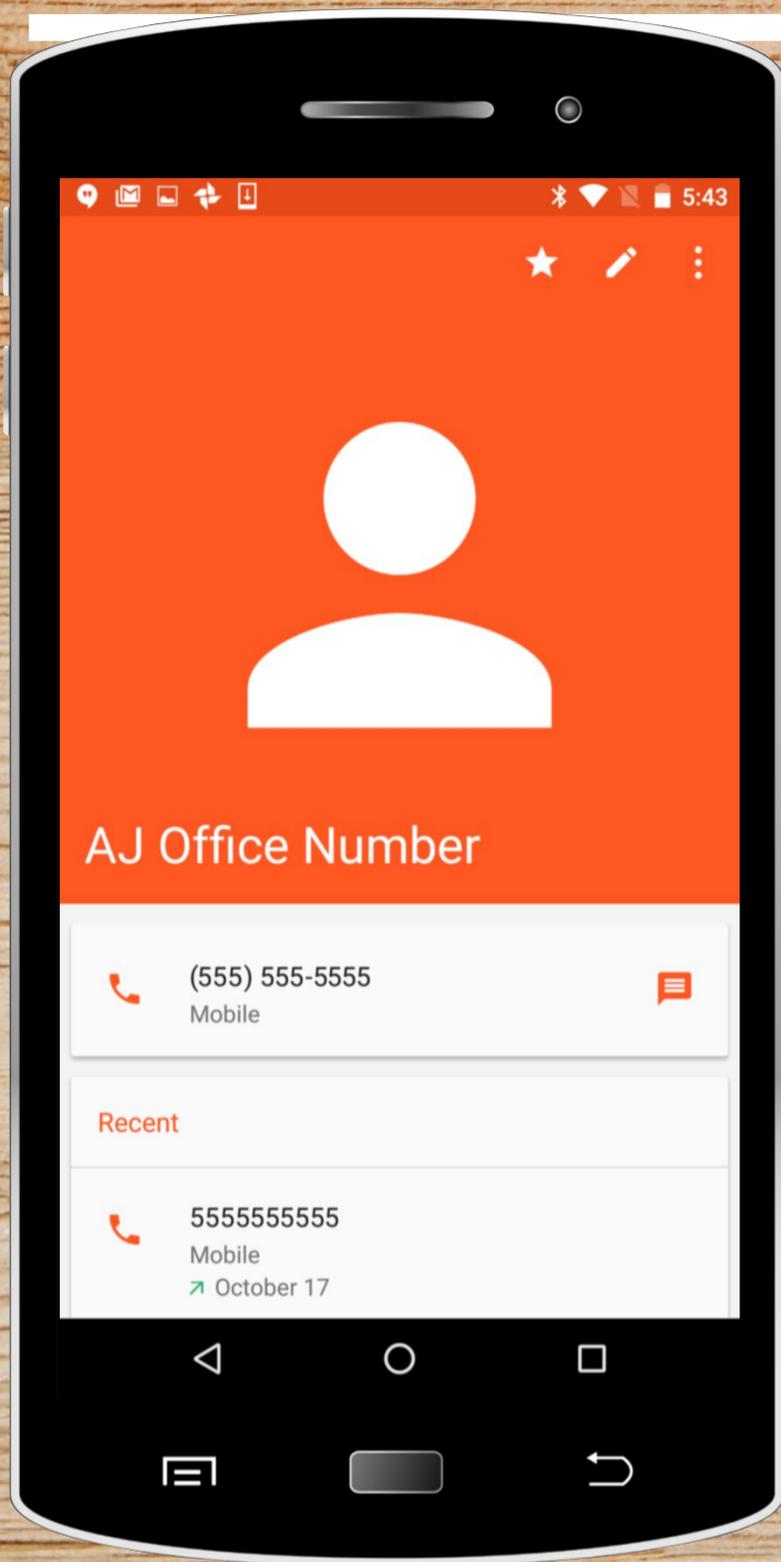
KILLER ANDROID TIPS

Google's open mobile operating system is bursting with capabilities you probably don't even know about. These tips will make you a master of Android, inside and out, no matter how you use your Lollipop (Android 5.0) or Marshmallow (Android 6.0) device.

BY PC MAGAZINE STAFF



FEATURES & SETTINGS



MAKE A CONTACT A FAVORITE

If you frequently contact the same people, why bother searching for them? Tap the star in a person's Contacts entry to ensure that that person always appears in the Favorites section (of both Contacts and the dialer).

SHARE DATA BETWEEN APPS

Tap the Share command when you're looking at an image or have highlighted text, and then send it to any other relevant app with just one more tap on the proper icon.

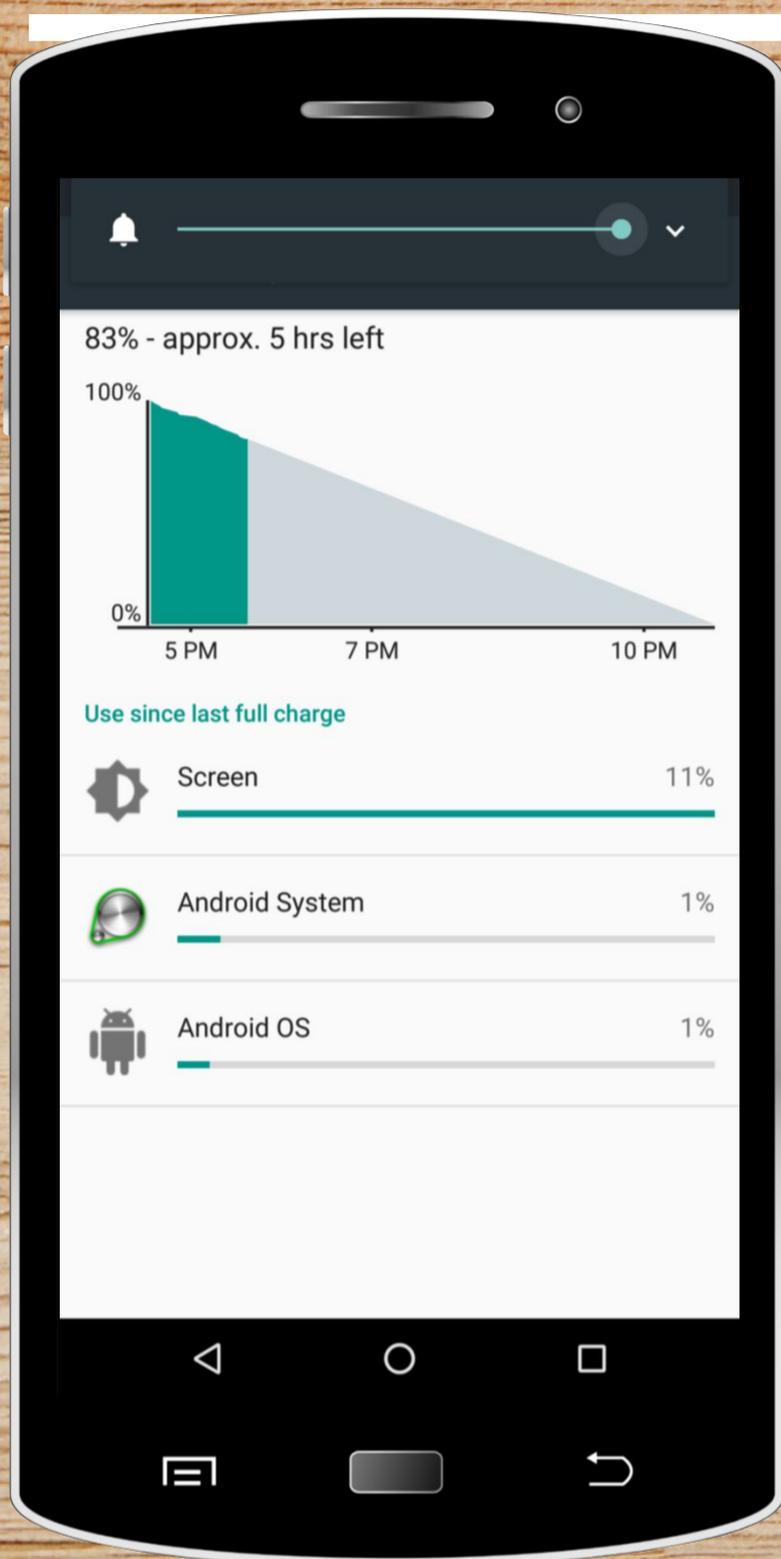
BEAM CONTENT TO ANOTHER DEVICE

A part of system sharing since Lollipop, Beam lets you send photos, files, contacts, and more to another Android device when it's nearby. Just select "Android Beam" from the sharing menu and put the two devices back-to-back to transfer.

FIDGET WITH WIDGETS

Widgets let you keep basic Android functions on your home screen at all times—no tapping required. To add them, tap and hold on your home screen until the Widgets option appears. Tap it, then tap and hold to select a widget, and drag it to where you want it on the screen.

FEATURES & SETTINGS



TRACK BATTERY USAGE

Check out Settings > Battery for an organized breakdown of what's consuming power on your phone, with the hungriest apps and features at the top. You can then make educated choices about what to disable or remove in order to improve battery life.

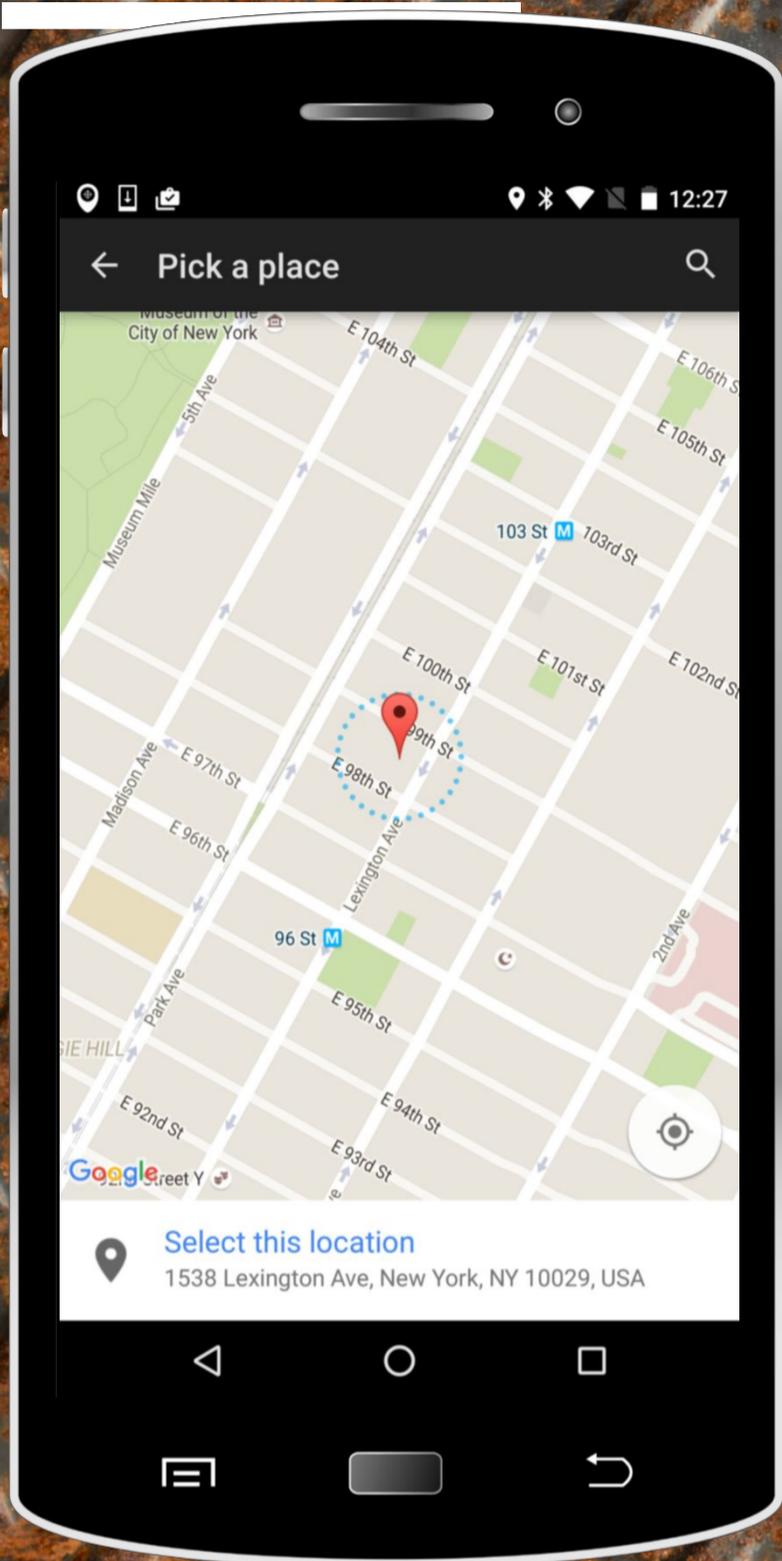
USE EXTERNAL STORAGE

If you have a phone that supports USB On-the-Go (check your Storage options under Settings) and an external drive with a micro USB connector and adapter, you can plug the drive into your phone and easily move around files without needing a PC.

CORRECT FOR COLOR-BLINDNESS

If you are color-blind, a setting will let you "correct" certain screens to make them easier to read. Find it in Settings > Accessibility > Display > Color correction, then choose the appropriate setting for your kind of color-blindness. Note that enabling this feature may affect performance.

SECURITY



PLACE-LOCKING

If you're not using Smart Lock, you're missing out on some handy security features. You'll need to set up full security on your lock screen (via either a pattern, PIN, or password), but once you do, go to Settings > Security > Smart Lock. Tap "Trusted places" to configure your device to always be unlocked when you're at home (or anywhere else you feel comfortable).

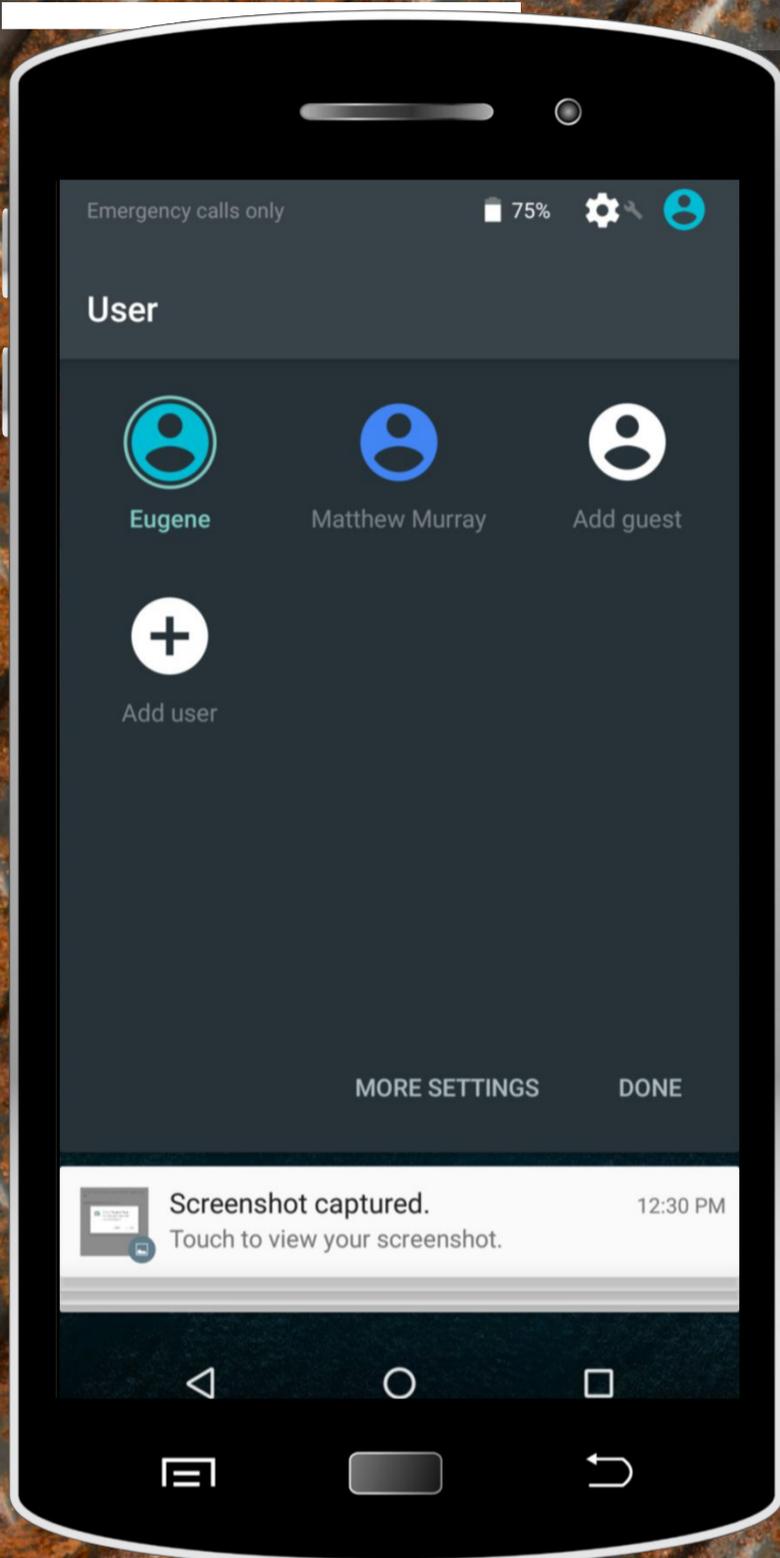
CONFIGURE A TRUSTED BLUETOOTH DEVICE

Also under Smart Lock, you can tap "Trusted devices" so you can tell your phone that you always want it unlocked when a certain Bluetooth device is nearby.

UNLOCK YOUR PHONE WITH YOUR FACE

What do you have with you even more often than your home or your laptop? That's right: your face. From the Smart Locks menu, tap the "Trusted Face" option. Follow the instructions to take a photo and correctly outline for your face for unlocking. You can also train your phone to improve matching to account for different lighting, hairstyles, and so on.

SECURITY



SET UP GUEST ACCESS

Let someone borrow your phone but not access your apps, data, or settings, or send text messages. Swipe down twice from the top of your phone to open Quick Settings. Tap “Add guest” to start up a bare-bones instance that keeps your information and your privacy safe.

PIN SOMETHING TO YOUR SCREEN

Don't lose your place when you need to loan out your phone for a minute. Enable Screen Pinning in the Security settings, then tap the pushpin icon on the app of your choice in the Overview screen to lock it down; no one will be able to access anything else. Unpin the screen again by tapping and holding both the Overview and Back buttons at the same time.

DISABLE THE PHONE FOR GUESTS

Want to further restrict what a borrower can do on your phone? Tap the gear icon next to the account for Guest (or any other user you control) in the “Users” section of your system settings and disable the “Turn on phone calls” or “Turn on phone calls & SMS” setting.

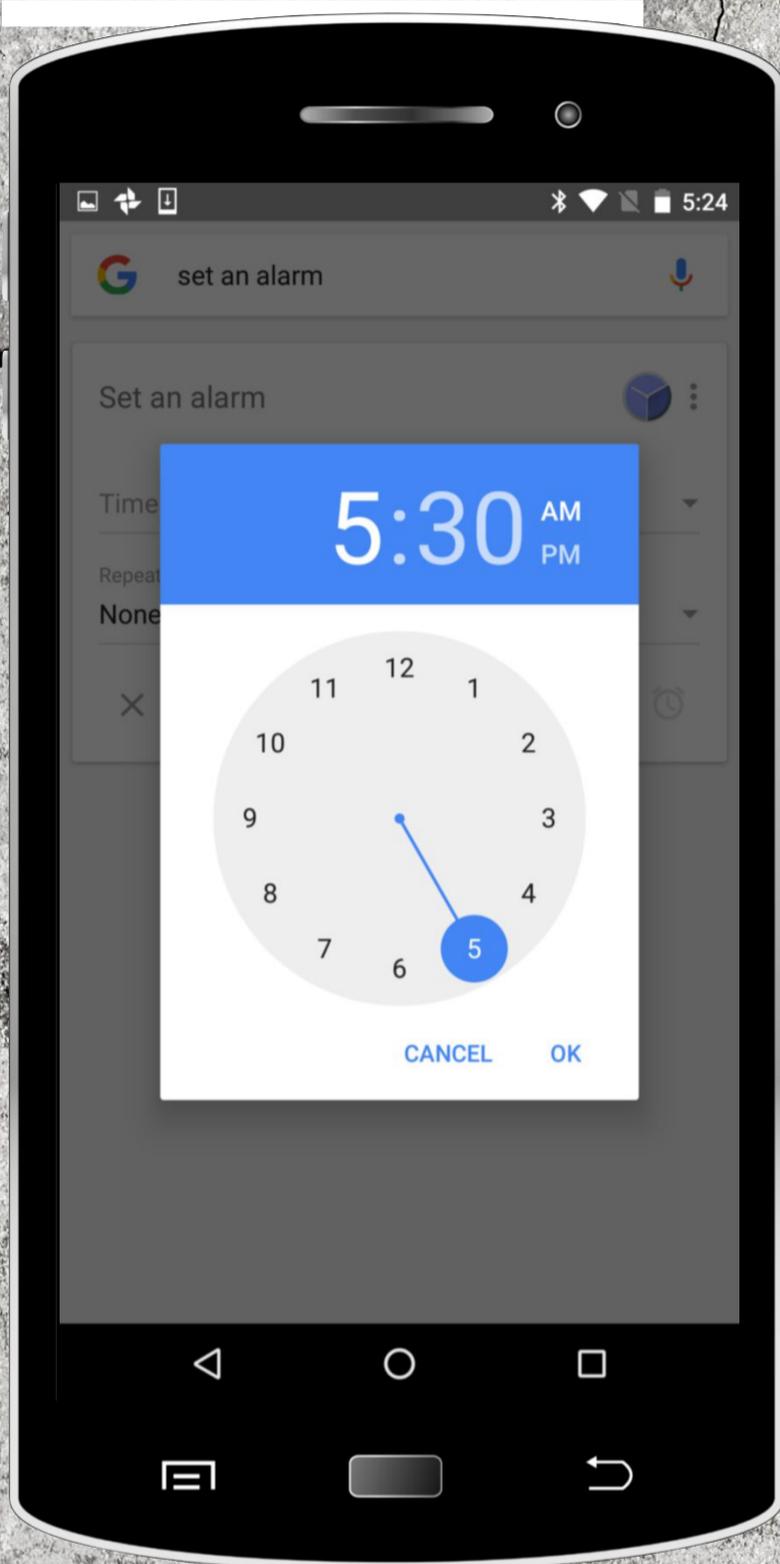
FIND YOUR LOST PHONE

Android Device Manager can be a tremendous help if you lose your phone. Enable it in the Security settings (under “Device administrators”). If you misplace your phone, type “find my phone” into Google's search engine, and you'll see your device's last known location. You can either ring it, lock it, or erase it altogether the same way.

ENCRYPT YOUR PHONE

Full encryption is one of the best ways to keep all the data on your device safe. If you're using Marshmallow, good news—it's already enabled by default. If you're using Lollipop, you can (and probably should) enable it yourself. Make sure you have a password set up, then go to your Security settings and choose the encryption option. (If you choose, you may later decrypt your phone from this same menu.) The process can take more than an hour, so fully charge your phone and keep it plugged in the whole time.

GOOGLE APPS



SET ALARMS

Don't forget important events or activities. Type "set an alarm" into Google to configure an audio reminder at the date and time you specify.

CHANGE DEFAULT CALENDAR EVENT DURATION

Not every event you want to schedule is an hour long. Access additional options by going to the app's settings then looking in General > Default event duration. From there, you can change the time to 15, 30, 90, or 120 minutes.

CUSTOMIZE CALENDAR NOTIFICATIONS

To change notifications for a calendar, tap it in the app. Under "Default notifications" or "Default notifications for all-day events" you can specify when you'll receive the notifications. Note that you have to do this per calendar, not once for the app as a whole.

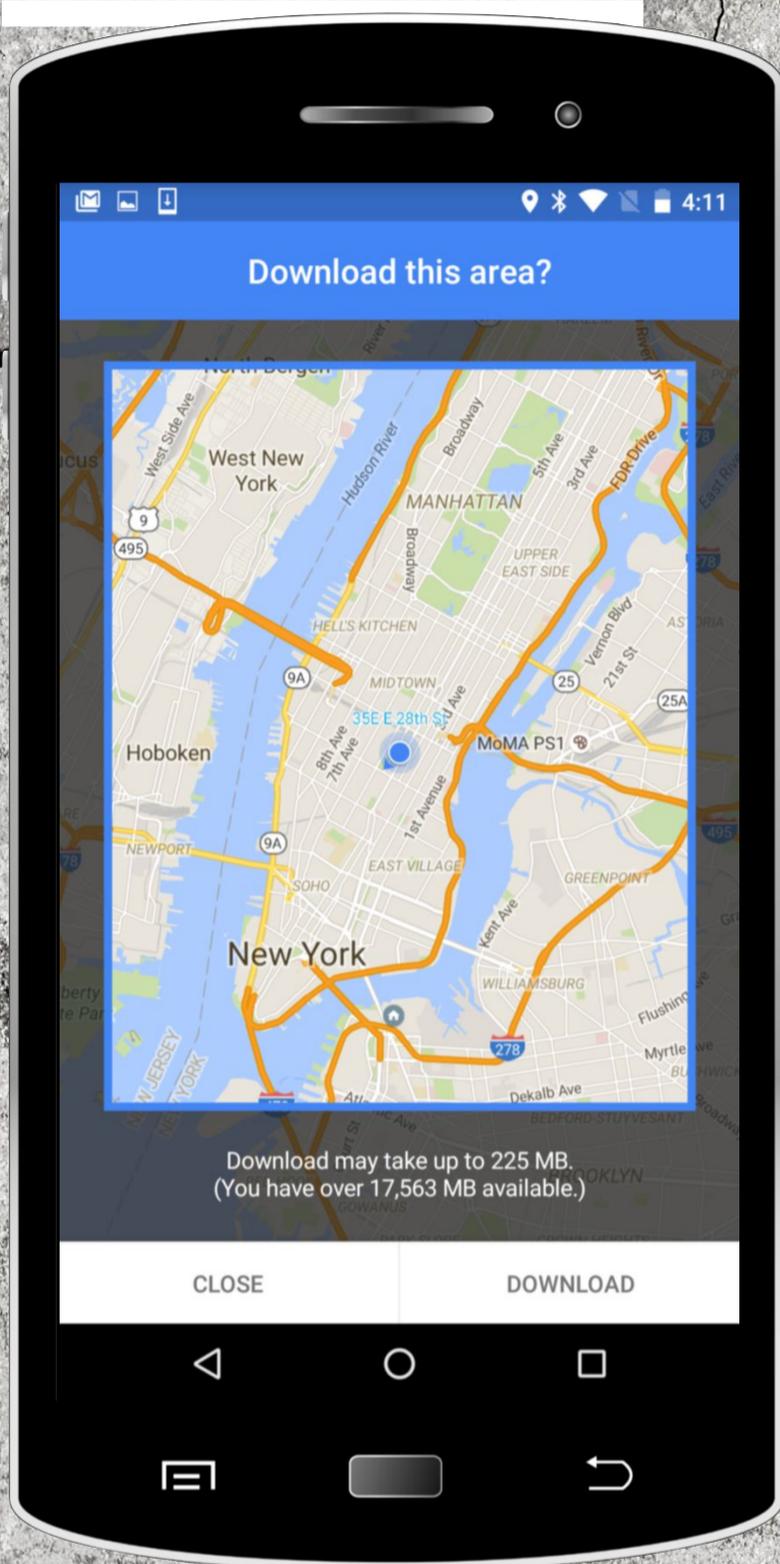
SEND MAPS DIRECTIONS FROM YOUR COMPUTER TO YOUR PHONE

Google's various mobile and desktop apps are well integrated with each other. How well? If you're looking at a map on your computer, you can transmit directions to your phone for hassle-free navigation. Click the "Send to Your Phone" button on the Maps screen, and the directions you need will appear there.

SHARE MAPS DIRECTIONS

Once you have a route and a transportation option set in Google Maps, you can help others get to your same destination by tapping the menu and selecting "Share directions." This will let you send the directions to Gmail, Messenger, or any other supported app.

GOOGLE APPS



SAVE MAPS FOR OFFLINE VIEWING

You may not always have connectivity when you need it to get around. Work around this by tapping in the Maps search bar and selecting “Download a new offline area.” Select the area of the map you want to save, tap the Download button, then name the area. You can access the maps you download by tapping “Offline areas” in the app’s settings. Note that they’ll delete automatically after about a month.

RESTRICT CHROME’S DATA USAGE

Chrome can be a bit of a data hog, but there’s a way to fix that. Open the Settings in Chrome and turn on “Data Saver.” This disables some features and reduces image quality in some cases, but you’ll still be able to access most sites—and more efficiently than before.

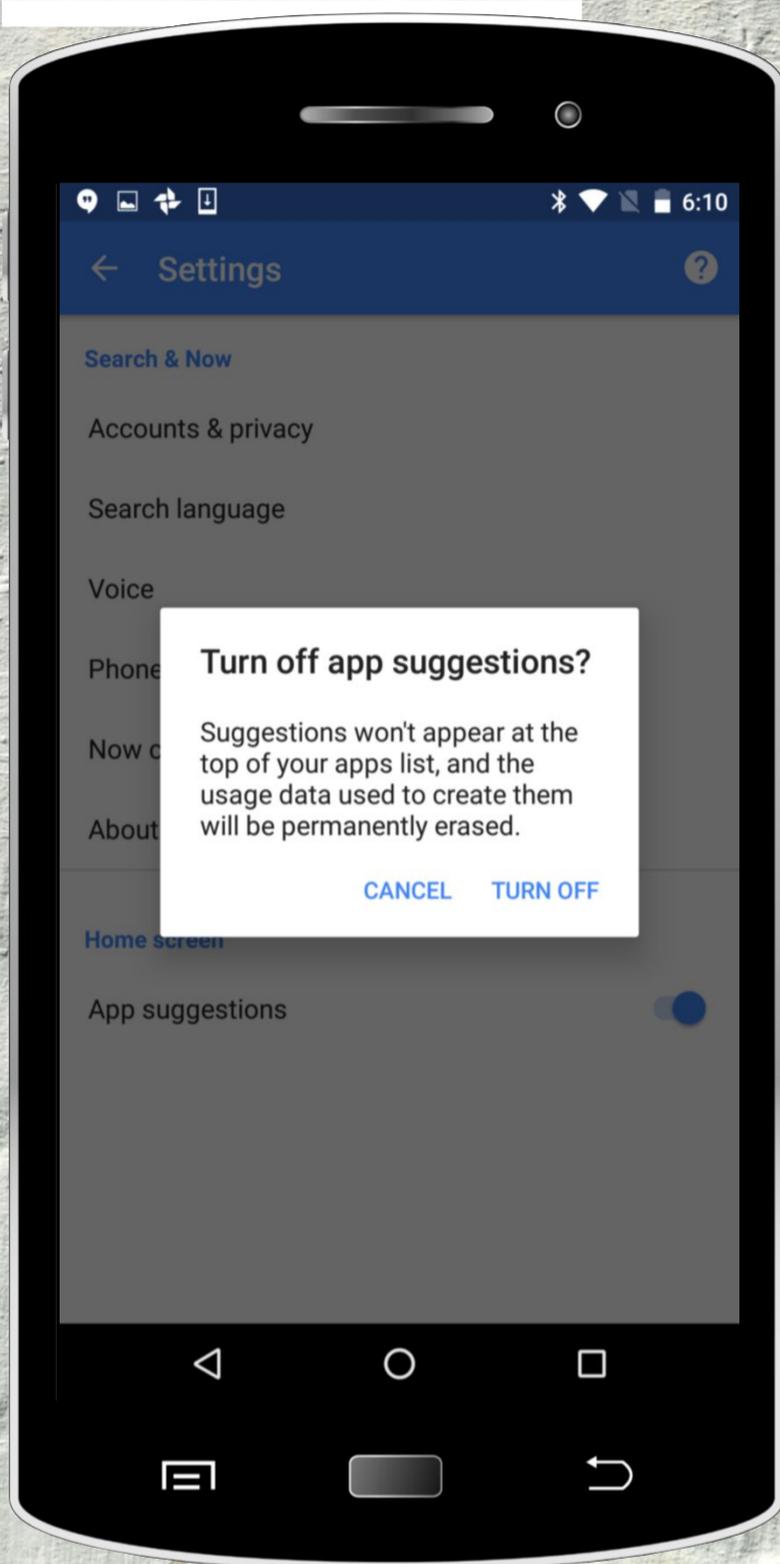
ZOOM IN ON ANY PAGE IN CHROME

Not every webpage lets you zoom in when you need a closer look, but you can change that. In Chrome’s settings, open the Accessibility section and select “Force enable zoom.”

CHANGE YOUR DEFAULT WEB BROWSER

Chrome not shiny enough for you? If you have more than one browser installed on your phone, change it under the Apps screen in Settings. This will let you avoid the prompt to select a browser every time you open a webpage.

OTHER APPS



TURN OFF APP SUGGESTIONS

The Google Now Launcher will put recommended titles at the top of the app drawer. If you don't like this, turn them off by swiping in from the left edge of Google Now, tapping Settings, and then toggling "App suggestions." Lastly, tap "Turn off" to confirm.

SHED LIGHT ON ANYTHING

Previous versions of Android relied on external flashlight apps, but Lollipop and later incarnations of the operating system have one built in. Pull down the notification pane twice, tap the flashlight icon, and never get caught in the dark again.

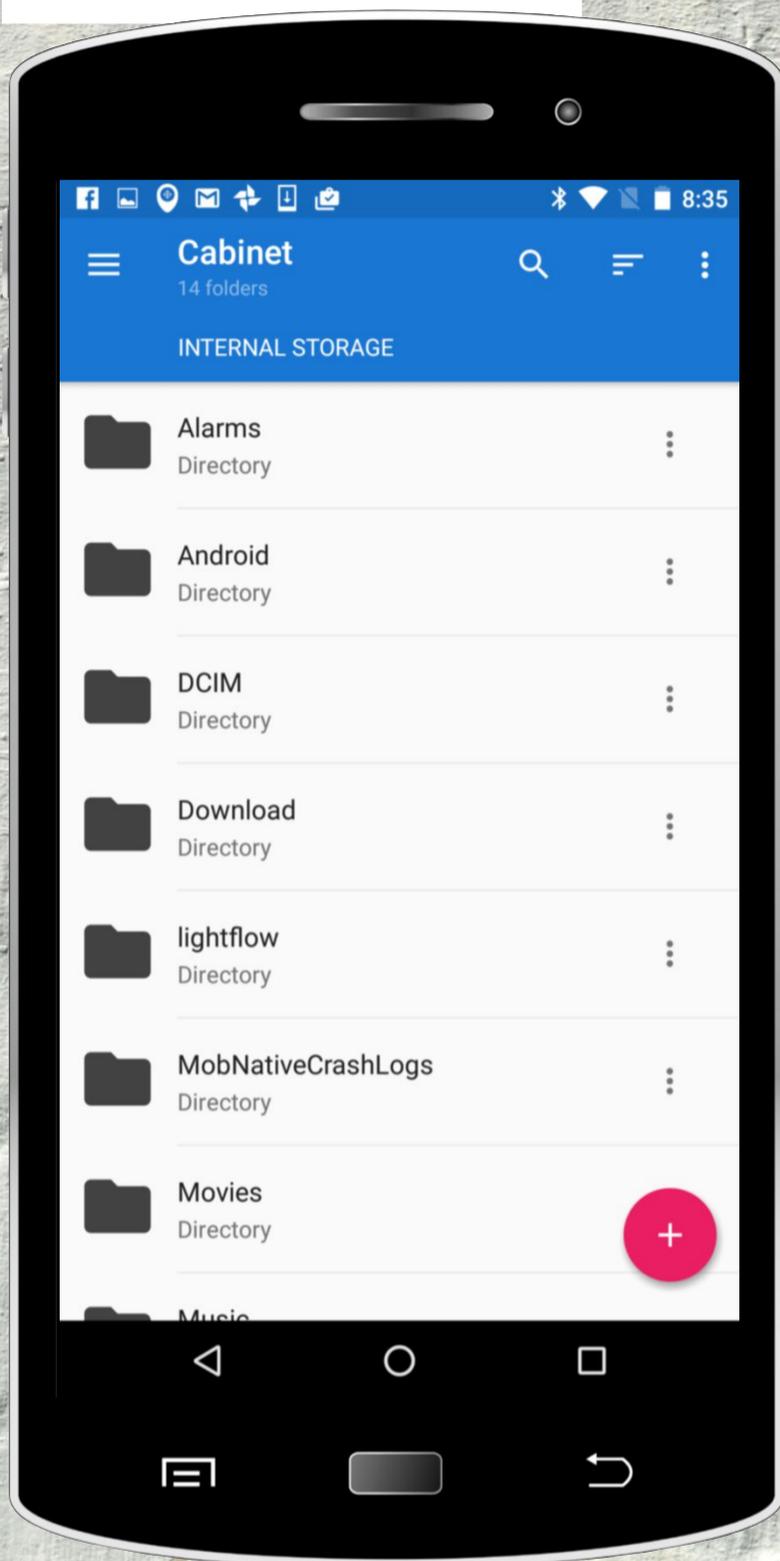
MAKE READING EASIER ON THE EYES

Night Light, a feature of the latest version of the Google Play Books app, automatically adjusts the color of the pages of your ebook to improve low-light reading (and your odds of falling asleep afterward). Turn the feature on within the book you have open, and rest easy.

MAKE YOUR CLIPBOARD UNIVERSAL

Install the Pushbullet Pro app (\$4.99 per month) on both your phone and your computer, and select "Universal copy & paste" in the settings. Now when you copy something on one device, it can be easily pasted onto the other.

OTHER APPS



MANAGE FILES AS THOUGH ON A PC

Easily access, move, copy, and delete files on your phone—even when your PC isn't handy—by using a file manager such as the free Cabinet.

SYNC YOUR PHONE WITH YOUR PC (SORT OF)

Download and install FolderSync (there's an ad-supported Lite version that's free, or a paid version for \$2.87 in the Google Play store) to sync files between your device and a number of cloud storage providers (including Amazon, Box, DropBox, Google Drive, and OneDrive). Then sync that provider with your PC.

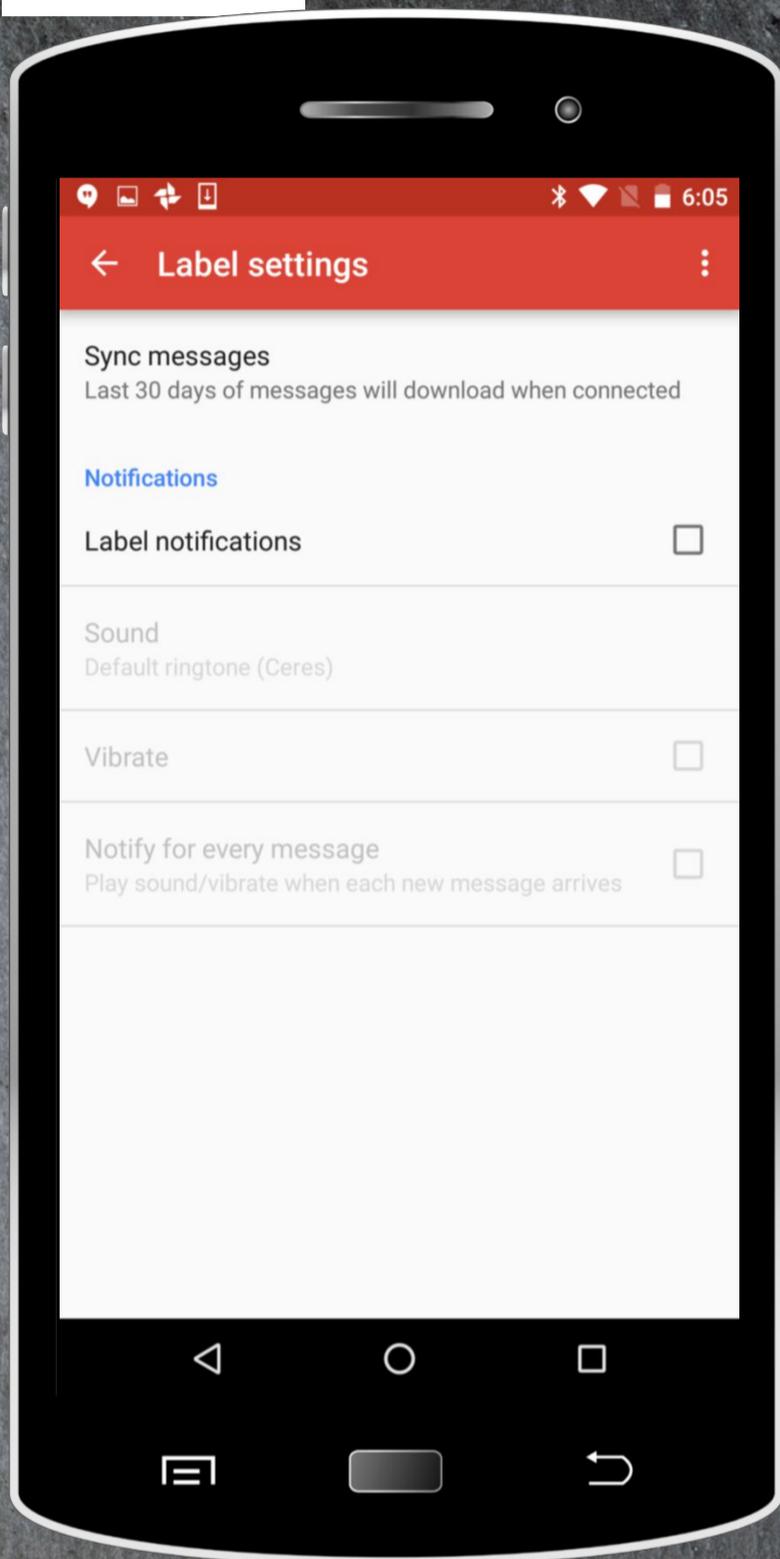
ACCESS YOUR PHONE FROM YOUR COMPUTER

The AirDroid app lets you send and receive texts and check missed calls from your phone, all on your computer. If your device is AirMirror certified, you can even access your home screen and control your phone from AirDroid, too.

ACCESS YOUR COMPUTER FROM YOUR PHONE

With the free Chrome Remote Desktop app on both your phone and your computer, you can access necessary files and programs on your PC, no matter where you are.

EMAIL



USE CUSTOM NOTIFICATIONS FOR LABELS

Choose how you're alerted when different kinds of e-mail arrive for you. Start by creating custom labels in Gmail (use the Web-based interface for this). Then go into the settings and select the appropriate account for the app. Make sure that the Notifications option is checked, then tap "Manage labels." Tap the label you want, then tap "Sync messages" and specify "Last 30 days" or "All." Check the box next to "Label notifications" and then select the sound and vibration options you want.

WORK WITH MULTIPLE MESSAGES

Don't waste time archiving or deleting messages one at a time. Tap and hold each message you want to select, then choose the action you want to perform. It will automatically apply to all the messages you have selected. (You can undo this if you change your mind.)

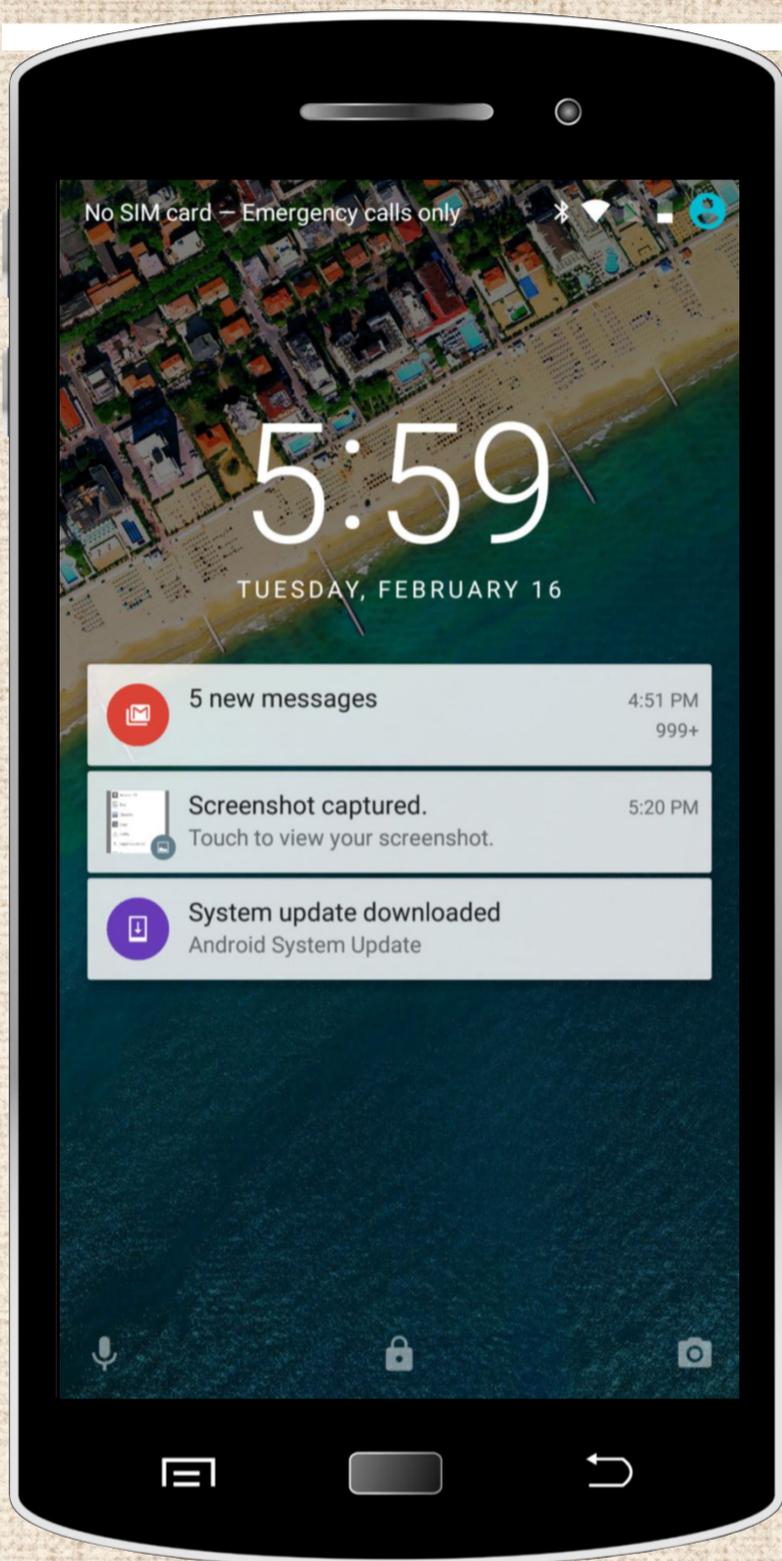
CONFIGURE A VACATION RESPONSE

You don't need to answer e-mails when you're of town or out of the country. (For that matter, do you *want* to?) In the Gmail app's settings, tap on any account name and then tap Vacation Responder to configure an automatic reply message for the time you'll be gone.

ADD EXTERNAL EMAIL ACCOUNTS

You're no longer limited to just Google accounts in the default Android Gmail app. Tap the menu icon in the top-left corner, select "Add Account" from the Settings, and you can input the specifics of your external POP or IMAP email account.

NOTIFICATIONS, NOTES, & REMINDERS



INTERACT WITH NOTIFICATIONS ON THE LOCK SCREEN

You can interact with many notifications right from the lock screen. Swipe one left or right to dismiss it, double-tap it to open it, or swipe down to access any associated quick actions.

SUPPRESS NOTIFICATIONS ON LOCK SCREEN

Don't want notifications to appear on your lock screen at all? In the "Sound & notification" settings, tap "When device is locked." Tap "Don't show notifications at all" if you're looking for complete privacy.

SEND A NOTE TO YOURSELF

Don't forget a sudden stroke of inspiration for a work project or that perfect plotline for the next Great American Novel (or Ebook, as the case may be). Type "note to self" into the Google app, followed by the text of the note, and you can then direct which app (such as Gmail) will send the message.

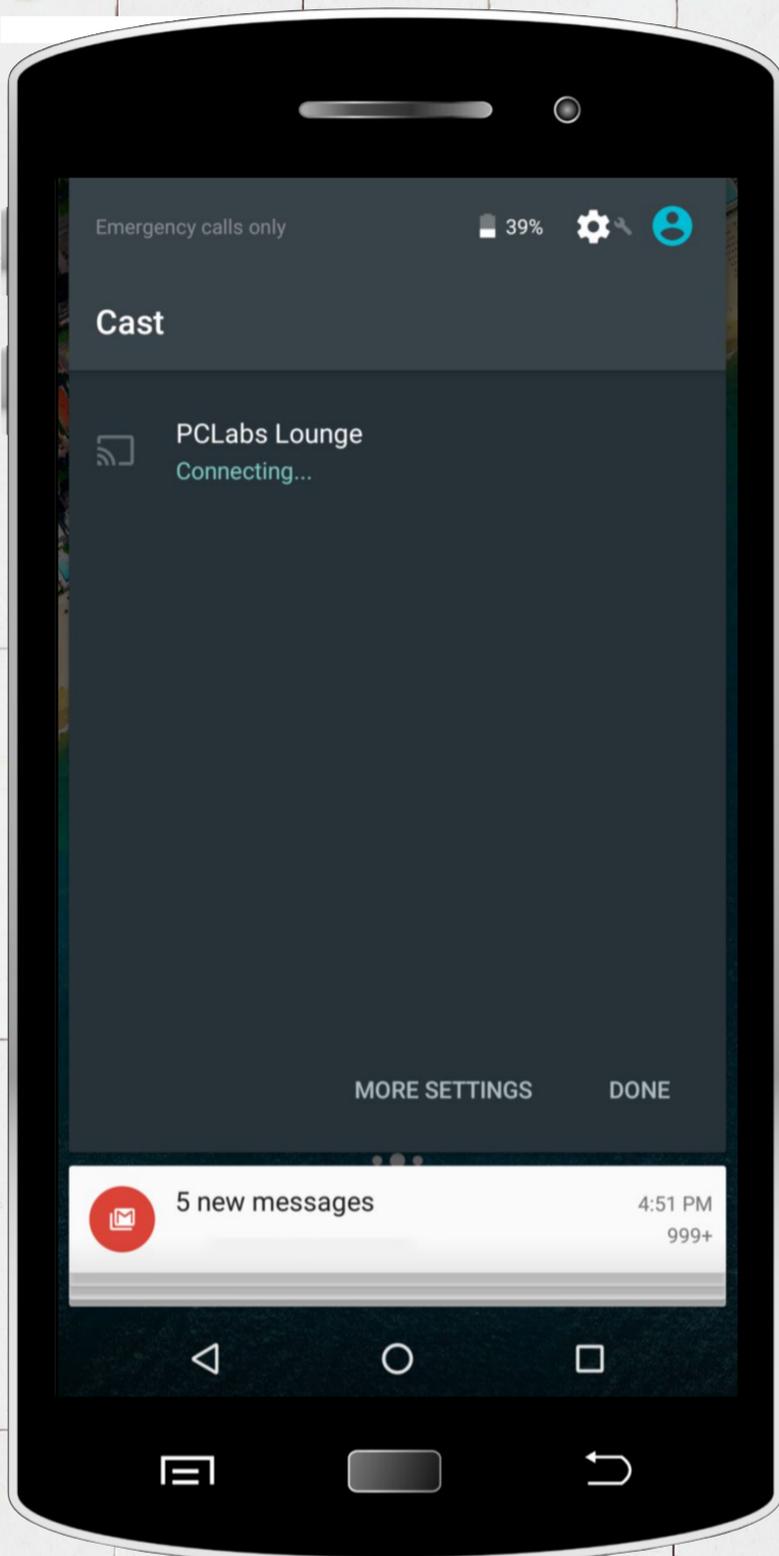
DON'T GET INTERRUPTED

Need some quiet? Shut off some of your phone's aural clutter by going to Settings > Sound & notification. (You may need to go into Interruptions or App notifications, depending on which Android version you're using.) You can block all interruptions from the app or just those you haven't defined as "priority" in that same screen. If you're in Do Not Disturb mode in Marshmallow or if you select Priority when you hold down the Up Volume button in Lollipop, you can specify to get notifications only from these apps, for the time period you choose.

REMIND YOURSELF

Don't forget to run that important errand. Type "remind me to" in the Google app, followed by what you want to remember. Google will remind you either at the time you choose, or when you're in the location you specify. Then you can type "show me my reminders" into Google whenever you're logged in to see all your upcoming and past reminders.

MEDIA



MIRROR YOUR SCREEN TO CHROMECAST

If you have a Chromecast, it's a snap to display your phone's screen on it. Turn on your connected Chromecast, then open the Chromecast app and tap "Cast screen" from the navigation tools. Then just select the appropriate Chromecast device on your network.

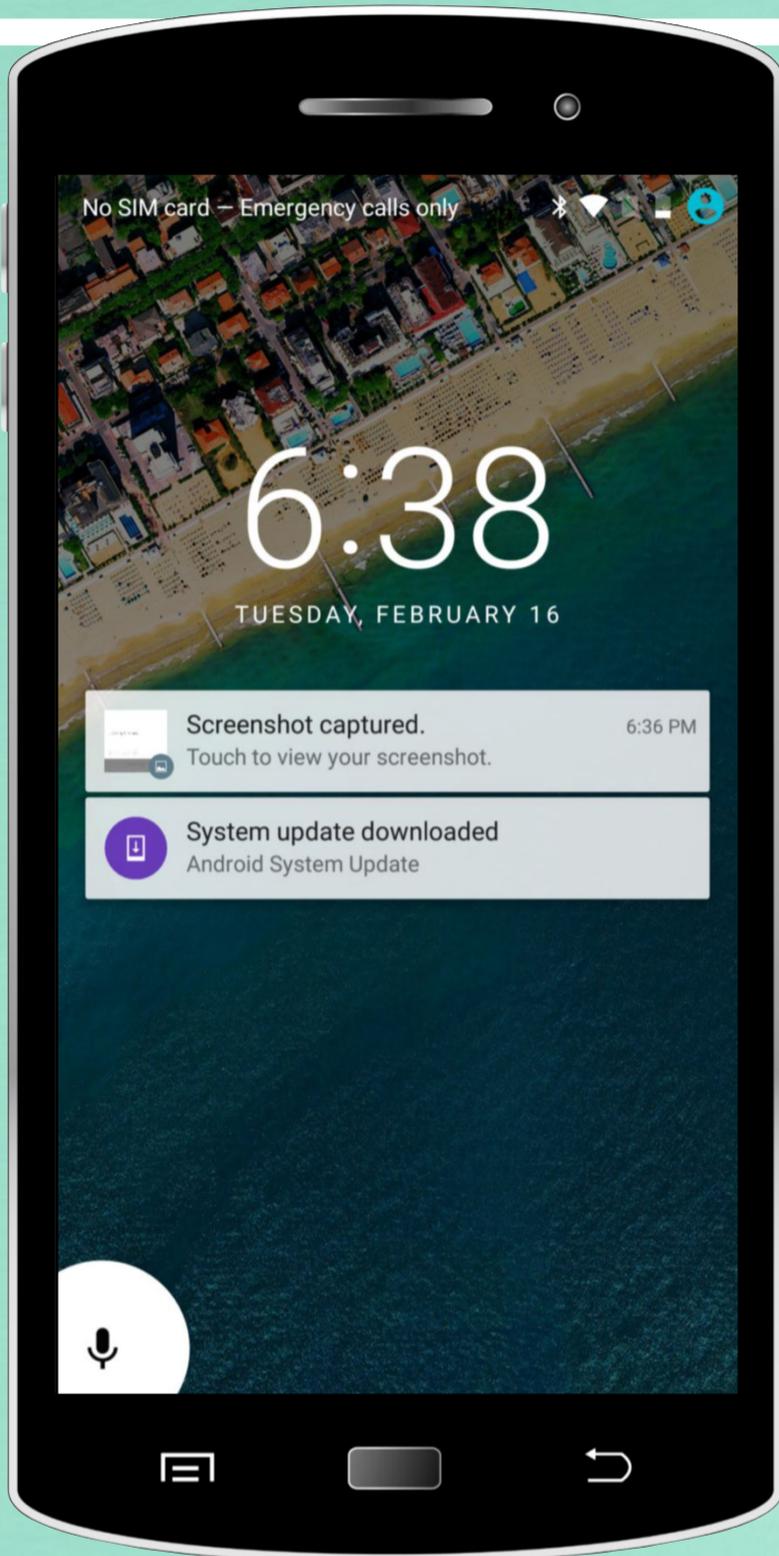
MAKE GOOGLE PLAY KID-FRIENDLY

Don't want your kids to see more mature content in Google Play? Tap "Parental controls" in the Play Store app's settings and then touch the slider to turn on the option. After you enter (and confirm) a PIN, you can restrict games, movies, and TV shows by rating, or books and music that are considered to have explicit content.

IDENTIFY A SONG

"What was the song?" is one of the most annoying questions to have spinning in your head. Luckily, a built-in Google Now feature makes it easy to answer. Tap the microphone in the search bar; say, "Okay Google, what's this song?"; and let Google do the rest. Of course, if the song is on Google Play, you'll be given a link to grab it there.

MARSHMALLOW ONLY



VOICE SEARCH FROM THE LOCK SCREEN

Another handy Marshmallow feature lets you look up information without unlocking your phone. Just swipe up on the microphone icon on the lock screen and start your voice search.

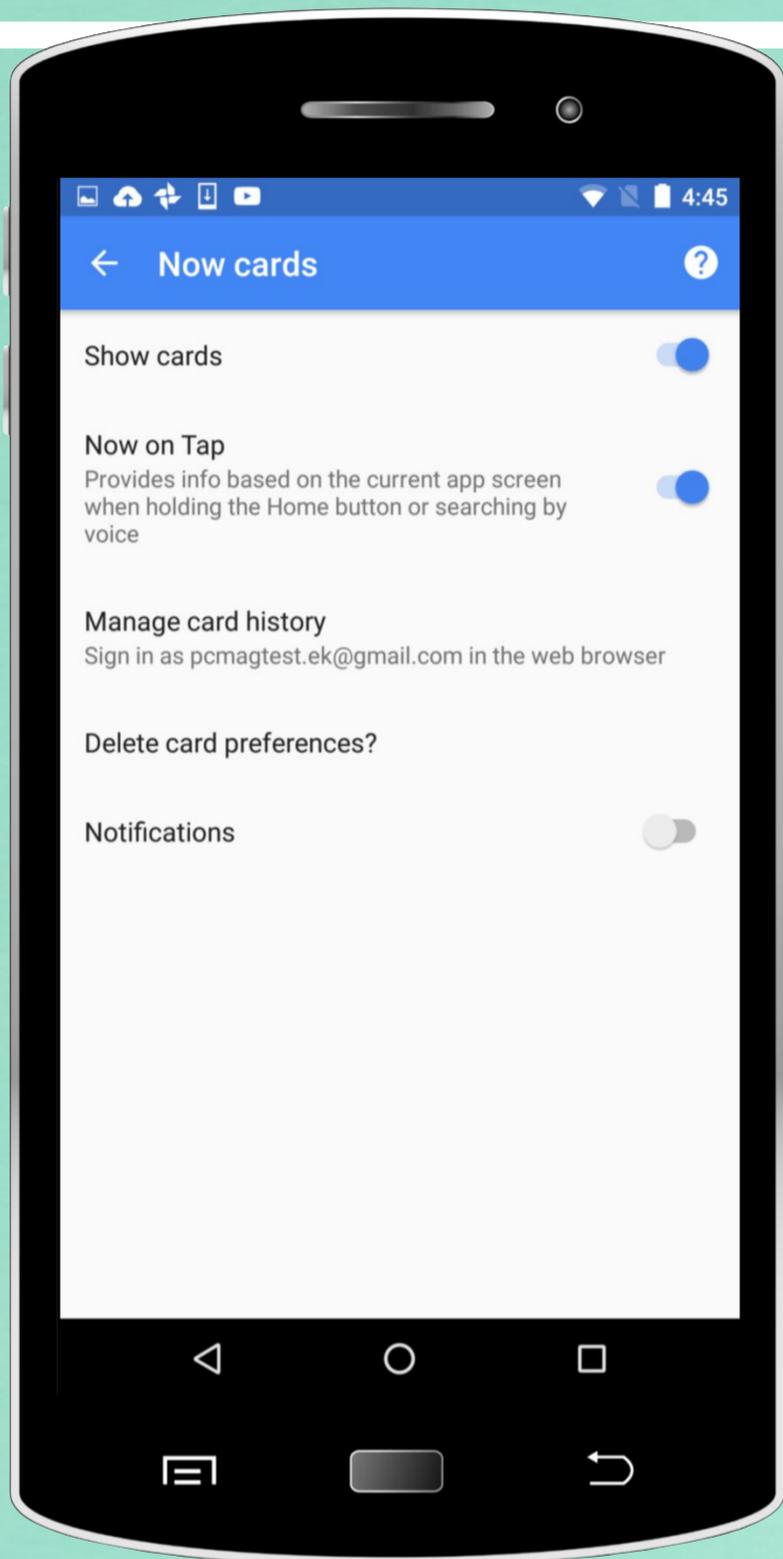
SET EXCEPTIONS FOR APP POWER SAVING

If you don't want Marshmallow to put inactive apps to sleep automatically, go to Settings > Battery > Battery optimization and turn off the "Optimize" option for any of the apps you see there. You can turn an app back on by going back to this screen.

CHANGE APP PERMISSIONS

Marshmallow gives you more control than ever over what apps can do what. Tap on any app in Settings > Apps and then tap Permissions and you can toggle access to any phone feature.

MARSHMALLOW ONLY



BRING BACK THE GOOGLE NOW HOME BUTTON

Not a fan of Now on Tap, the new Marshmallow feature that predicts the related content you'll want to access from an app? Turn it off in the settings (under Google > Search & Now > Now Cards) by unchecking "Now on Tap." Access Google Now at any time by tapping and holding your Home button.

TWEAK YOUR SYSTEM UI

Open quick settings (swipe down twice from the notifications), then tap and hold the gear icon until it spins. This adds Custom UI Tuner to the settings, so you can specify what's displayed on your status bar and how it appears. These tweaks are experimental, so you'll have to confirm that you'll accept associated risks before you can use them.

ONE-TOUCH DO NOT DISTURB

Shut up your phone on a second's notice. Press and hold the Volume Down button to turn on Do Not Disturb Mode, and turn it off again later by pressing and holding the Volume Up button.

FEATURES

TURBOCHARGE YOUR TAXES

Most of us only have to deal with our taxes once a year—but even that’s more than enough. But the process doesn’t have to be painful. If you’re sick of paying for professional help with your taxes, or if you’re having trouble sifting through which of the software solutions out there is the best one, our favorite online tax preparation package this year will help you net a huge refund on your sanity.

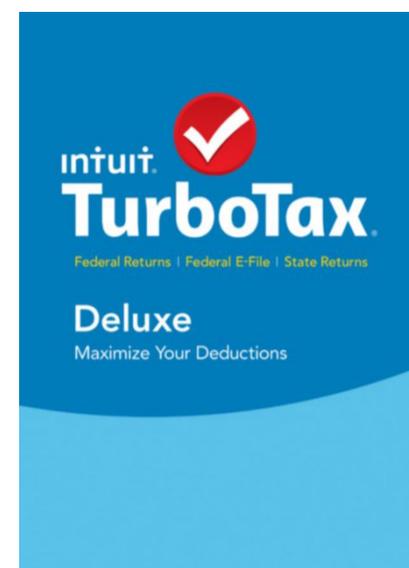
BY KATHY YAKAL

No one enjoys doing their taxes, but Intuit's TurboTax products makes the process a little less awful, with exceptional user interfaces, deep coverage of tax topics, excellent help systems, and voluminous guidance resources. They're also relatively expensive, but they're worth the price. We looked at TurboTax Deluxe, the middle-of-the-road offering that will be best for most people. It may not support as many IRS forms and schedules as some of the competition, but it's superior in every other area, and offers an unparalleled user experience among online tax preparation software. It's our top choice for filing your 2015 taxes.



SERVING THE MOST

Though 1040EZ and 1040A filers can prepare and submit both their federal and state returns for free (Intuit's Absolute Zero plan), TurboTax Deluxe currently costs \$34.99 for federal taxes and \$36.99 per state. These prices are scheduled to increase later in the tax season to \$54.99 for federal taxes and \$39.99 per state. (The early-filer prices are roughly comparable to the full prices for H&R Block Deluxe and Jackson Hewitt Deluxe Edition.) So if you're going to file with TurboTax (which we recommend), the price is another reason to do it early—besides peace of mind and getting your return back sooner.



Intuit TurboTax Deluxe 2016 (for Tax Year 2015)

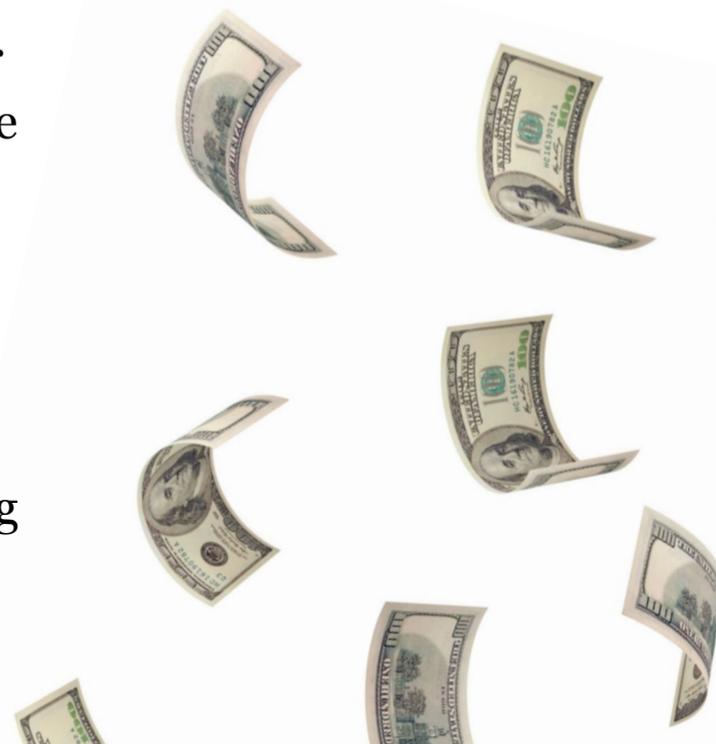
\$34.99 for federal returns, \$36.99 per state

EDITORS' CHOICE



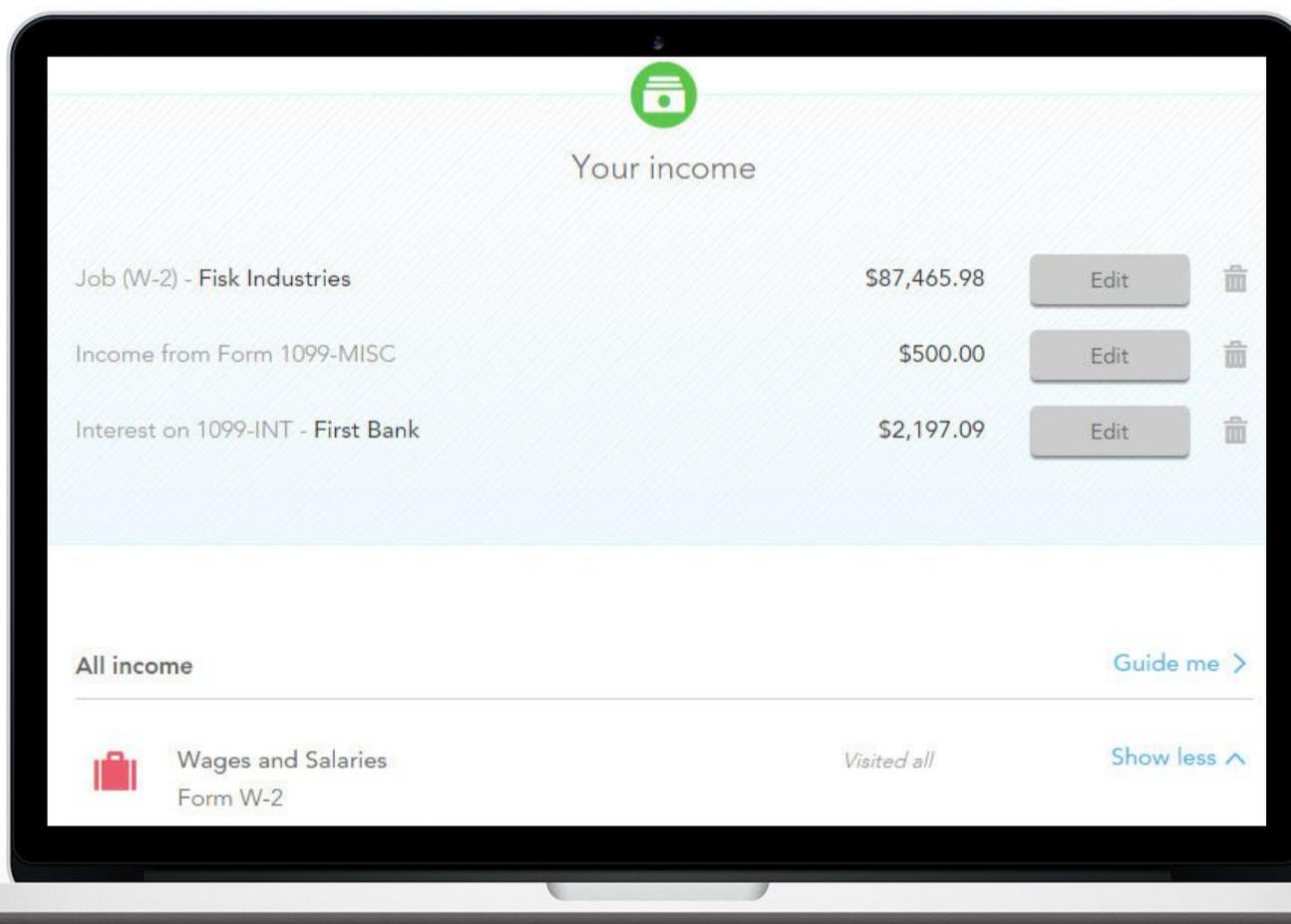
PROS Exceptional user experience. Clearly written, context-sensitive help. Consistent user interface, navigation throughout. Actively probes your financial situation. Excellent mobile versions.

CONS Pricy. Some forms, schedules not supported.



TurboTax's free version should suffice for tens of millions of taxpayers. TurboTax Deluxe is appropriate for another large percentage of the U.S. population: basically, individuals who don't have to claim farm or rental income, didn't sell property or other investments in 2015, and don't have to account for self-employment or small business income and expenses. The emphasis in TurboTax Deluxe is, rather, on finding as many deductions and credits as possible (mortgage or property tax, medical and dental expenses, charitable contributions, and so on) to offset W-2 wages and some 1099-MISC income.

In other words, if you're accustomed to completing IRS Forms C, D, E, or F, you'll have to pay more to use TurboTax Premier or Home & Business, or one of Intuit's competitors, H&R Block Deluxe (which lacks some forms and schedules) or TaxSlayer Classic Edition. TurboTax Deluxe deals only with the content in the Form 1040, Schedules A & B, and their supporting forms and schedules. Intuit moved some of these more advanced features out of TurboTax Deluxe a couple of years ago.



FORK IN THE ROAD
TurboTax provides summaries of what you've entered as you go through each major section of the site. You can click on "Guide me" for a directed tour.

The bottom line is that only one of the five sites we tested this year—TaxSlayer Classic Edition—supports the whole alphabet of federal forms. But for the vast majority of filers, TurboTax covers you—and does it better than the others.

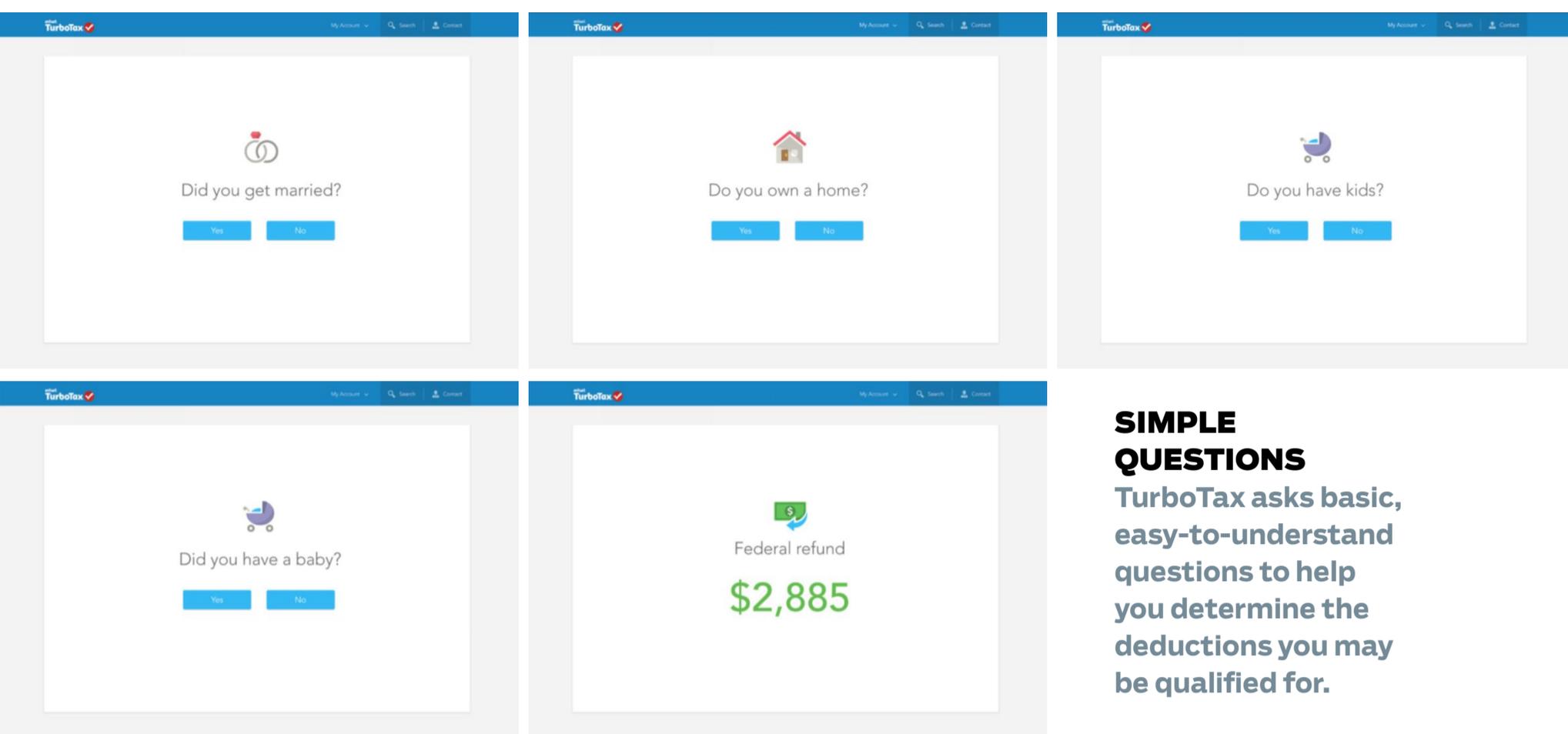
MOVING THROUGH THE PROCESS

Tax preparation websites don't necessarily tell you what form or schedule you're working on any more than accounting software makes you look at debits and credits. They tend to follow the path of the IRS 1040, starting with income and moving on to deductions, credits, and taxes. But all you have to do is answer the (usually) simply phrased questions on each screen and advance to the next. In the background, the site is placing your responses on the correct lines of the appropriate form or schedule. You don't see that happening. Instead, you see only what the official IRS documents look like at the end of your journey.

All tax preparation software works in essentially the same way. Answer a question by entering data or selecting from a list. Click Next. Answer the next question. Repeat. Some screens contain icons to represent functions like editing or deleting a form you've already started, and every site uses lists and toolbars to help you move to other sections out of



| | | | | | |
|---|------|--|------|--|--|
| Form | 1040 | Department of the Treasury—Internal Revenue Service (99) | 2015 | OMB No. 1545-0074 | IRS Use Only—Do not write or staple in this space. |
| For the year Jan. 1–Dec. 31, 2015, or other tax year beginning | | , 2015, ending | | , 20 | |
| Your first name and initial | | Last name | | See separate instructions. | |
| If a joint return, spouse's first name and initial | | Last name | | Your social security number | |
| Home address (number and street). If you have a P.O. box, see instructions. | | Apt. no. | | Spouse's social security number | |
| City, town or post office, state, and ZIP code. If you have a foreign address, also complete spaces below (see instructions). | | | | ▲ Make sure the SSN(s) above and on line 6c are correct. | |
| Foreign country name | | Foreign province/state/county | | Foreign postal code | |
| Filing Status Check only one box. | | 1 <input type="checkbox"/> Single 2 <input type="checkbox"/> Married filing jointly (even if only one had income) 3 <input type="checkbox"/> Married filing separately. Enter spouse's SSN above and full name here. ► | | 4 <input type="checkbox"/> Head of household (with qualifying person). (See instructions.) If the qualifying person is a child but not your dependent, enter this child's name here. ► 5 <input type="checkbox"/> Qualifying widow(er) with dependent child | |
| Exemptions 6a <input type="checkbox"/> Yourself. If someone can claim you as a dependent, do not check box 6a 6b <input type="checkbox"/> Spouse | | | | Boxes checked on 6a and 6b | |



SIMPLE QUESTIONS

TurboTax asks basic, easy-to-understand questions to help you determine the deductions you may be qualified for.

sequence. Other graphics represent links or are just there for decoration. All packages give you the option of selecting topics relevant to your situation from a list or letting the site walk you through all possible topics, skipping content that doesn't pertain to you and drilling down when necessary.

But although these tax sites' navigation systems employ a similar sequential process, each has its own unique user interface, its own distinct approach to guiding you through the Form 1040. Some are more effective than others, but TurboTax Deluxe trumps them all through the way it looks, the way it talks to you (not audibly—that would be creepy), and the way it makes the tax preparation experience feel like an organized, unified, and connected process.

There is one navigation area where TurboTax Deluxe differs greatly from some of its competitors: It lets you advance to the next screen without completing the current one. This can result in missing information (though the site's final review should pick up this unfinished business), but it does away with the hassle you'll undoubtedly experience if you're purposely skipping a piece of data for which you don't yet have all the information. (Some sites, like H&R Block Deluxe and TaxSlayer Classic, suffer from this problem.)

TurboTax Deluxe uses friendly, casual language to guide you from one page to the next, and always makes your next step clear. The site has slimmed down from previous years, almost to the bone. There are few links outside of the main working screen, so your focus is on only the current topic. If you need help or you want to jump to another section entirely, the navigational cues are there. There's a Search link in the upper right, and two horizontal toolbars at the top divide the site into its primary sections (like Federal



Taxes) and their corresponding subsections (Wages & Income, Deductions & Credits, and so on). Finally, the site shows a real-time running tally of your federal and state refund or tax due.

No other site this year is as clean or elegant—in terms of both its choice of fonts, graphics, and overall design—as TurboTax Deluxe.

HELP AT HAND

Tax preparation websites may be convenient, but none of them can completely replace a real live tax professional. If you have complex investment situations, you're self-employed and need to deal with topics like depreciation and the home office deduction, or you simply have trouble even answering the questions about your mortgage, you may want to cut to the chase and hire someone. But if you're going to tackle your taxes on your own, you may be able to get the answers you need using your site's help resources.

All of the sites offer several types of help. They'll either hyperlink words or phrases within questions or post a Learn More link at the end of them; clicking on these opens up small boxes with clarifications of the query referenced. Some, like TaxSlayer, offer mini-wizards that ask multiple questions to help you, for example, determine your filing status. Every one of them has some kind of searchable database that can be accessed from the site, and although H&R Block Deluxe's is particularly voluminous, so is TurboTax Deluxe's—and it provides cleaner, more context-sensitive hits.

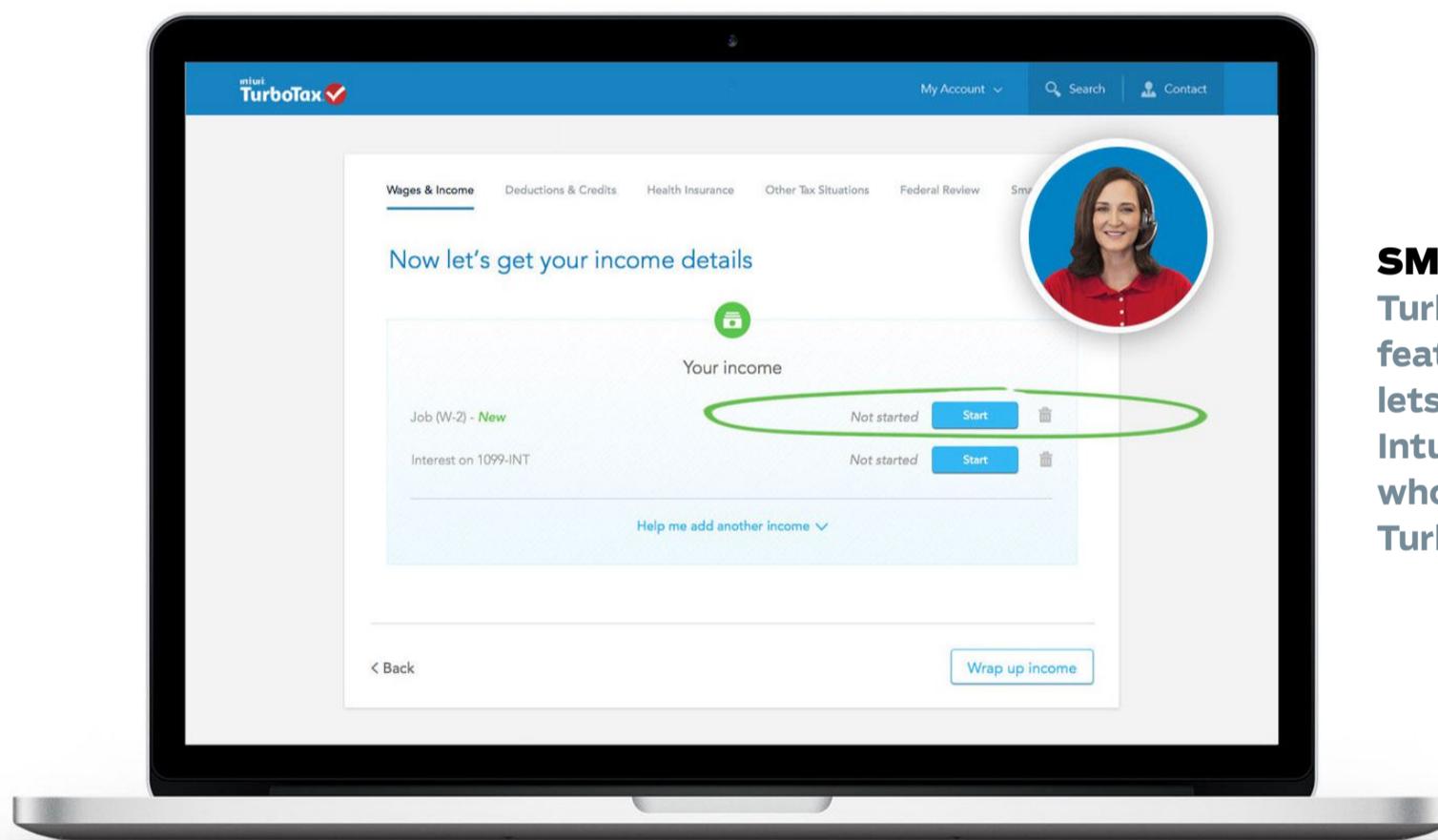
Without displaying a lot of extraneous information and links, TurboTax makes all of its help tools easily accessible. And they're more plentiful than what competitors offer. Say you're on the screen titled "Tell Us More About Your Loan from [Second Bank]." You're instructed to check a box in front of each entry in the list of statements that describes your situation, including "This is a new loan on which I paid points (origination fees) in 2015." When you click on the hyperlinked word "points," a small box opens displaying a simple, clear explanation. Another hyperlink at the bottom gives you the opportunity to "Learn more about refinanced loans."



If you need more help, you'd click on the Search button in the upper right. A vertical pane opens displaying links to several Recommended Answers, starting with those most relevant. Each identifies the writer, like TurboTax FAQ: TurboTax Employee. The design of these pages is consistent with the rest of the site, meaning it's clean, attractive, and easily readable, unlike the help screens found on some competing sites.

If you still don't have your answer, you could click the Contact Us Button and enter a question or phrase. TurboTax then displays a list of any similar questions that have been asked (with links to answers). You're also given the option to post your question in the online community or to call and speak to a tax professional (Monday-Sunday, 5 a.m. to 9 p.m. Pacific).

This year, the company introduced a new help tool called Smartlook. Once you're connected, you can see the face of the representative as you talk, and he or she is able to see only your TurboTax screen. This makes providing assistance much easier.



SMARTLOOK

TurboTax's built-in help feature, Smartlook, lets you get aid from an Intuit representative who can see only your TurboTax screen.

Another benefit of TurboTax is the strength of its final review of your return when you're finished with everything. All the products in the space offer this, but TurboTax is among the most accomplished. It displays a screen that tells you what your mistakes are and then either takes you to each relevant page or provides fields for your corrections. (Only TaxAct matches this functionality, but the quality of the rest of TurboTax Deluxe's help resources puts it ahead.)



THE TOP TAX SERVICE

All five of the tax preparation sites we looked at this year are capable of preparing your 1040 and some of its related forms and schedules for filing. Though they look different, they're all reasonably easy to use, and help is available—though its depth, accessibility, and clarity vary tremendously among these five. Overall, though, TurboTax is the one that really nailed it.

Its aesthetics and usability, as well as the accessibility and intelligibility of its guidance systems, are unmatched. As more people are doing their taxes in chunks—moving back and forth among desktop and mobile devices—the user experience is becoming more important than ever. And TurboTax Deluxe offers an exceptional experience across all platforms. You can do everything on your phone, and just as easily and effectively as you can on your PC.

We've bestowed our Editors' Choice award on TurboTax many times in the past, but we thought it fell short the last couple of years because Intuit moved support for some of its more complex tax topics into more expensive products. TaxAct replaced it as our top choice in 2014 and 2015, but now it's gone down the same road, and diluted the value of its basic product.

These changes in content, along with the increasing importance of mobile and the many new enhancements included in it, help ensure that TurboTax is the best choice for the broadest range of taxpayers. That's why TurboTax Deluxe 2016 is our Editors' Choice for preparing your 2015 taxes.

GET ORGANIZED

Wrangle Your Digital Photos

TIPS

Primo Tips for
Amazon Prime Video

HOW TO

Troubleshoot Your
Internet Connection

GAMING

Witness Protection Program

Digital

Life

Wrangle Your Digital Photos

BY JILL DUFFY



With the holidays just past and the prime vacation months coming up, you're already deluged with digital photos—and you're about to get more. Good luck trying to find what you want in all the clutter. We've all been there. You search your computer for that lovely shot of the family gathered around the Thanksgiving table from last year to send to your mom. You swipe through pages and pages of images on your phone, looking for that picture of you and your honey to have framed as a gift. You hunt all over Facebook for that amazing picture of your dog in a Santa hat—you're sure you shared it there at some point. But you can't find any of them!

Don't let this happen to you next time. These easy steps will help you organize all the photos you take, and save you the trouble of having to deal with a disorganized mess when you want to locate and share your precious memories.

DELETE THE WORST PHOTOS IMMEDIATELY

The sooner you delete bad photos, the more time you'll save down the road, and the more efficient your photo organizing will be. Delete photos that are out of focus, badly composed, or just plain ugly while they're still on your camera or smartphone. Sometimes you want to keep duplicates until you can view them on your computer screen in greater detail, so you'll know you're saving only the very best. When you do import your photos, delete any additional images that don't meet your standards. Don't keep garbage!

CONSOLIDATE YOUR PHOTOS

As soon as possible after taking photos (ideally within a week), get them off your camera or smartphone and move them to a safe place. Pick one location where you will keep all your photos. Don't worry about where your backlog of thousands of photos is stored. Just think about where you will put them now and going forward.

You might use an online storage service, Apple Photos, Flickr, a dedicated folder on your computer, or even an external hard drive.

Flickr comes with two big benefits: You get 1TB of space for free and it automatically sorts your photos chronologically, so you can look for images based on the month and year you took them. Personally, I find Flickr a little clunky and slow, especially when adding tags and descriptions.



Feeling indecisive? Try Box.com. You get 10GB of space for free; that isn't nearly as much as Flickr offers, but Box gives you the ability to easily invite other people to upload their photos to the same folder in which you've put yours, and still keep your images private. I'm not saying Box.com is the best service ever, but you get a lot of space and it takes very little time to set up.

If you're especially disorganized, the easiest way to upload and organize photos from your iPhone is to use a cloud-based file-syncing program that has an auto-upload or camera upload feature for mobile phones.

NAME YOUR ALBUMS OR FOLDERS

As you consolidate your images, create a few folders or albums for sorting purposes. It's usually best to name them according to the event or occasion, but you'll also want to include the year. Use the year as the first part of the name, such as "2015 Thanksgiving," but not "Thanksgiving 2015." Why? When you sort your folders by name, they will automatically appear in chronological order if the year comes first.

Do you need separate folders for similar occasions, like "2015 Christmas" and "2015 Christmas Eve"? Probably not. A year from now, will you be able to remember what happened on December 24 as opposed to December 25? Most likely you won't. So keep it simple and just use major events.

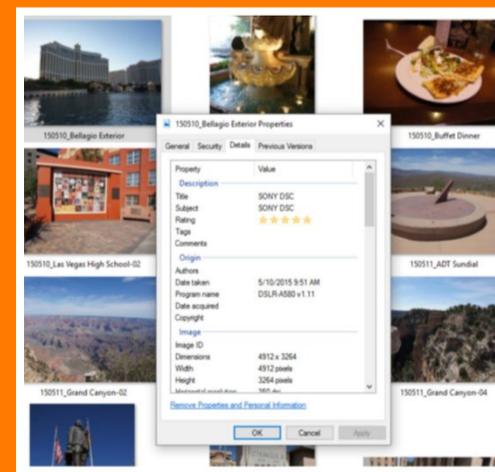
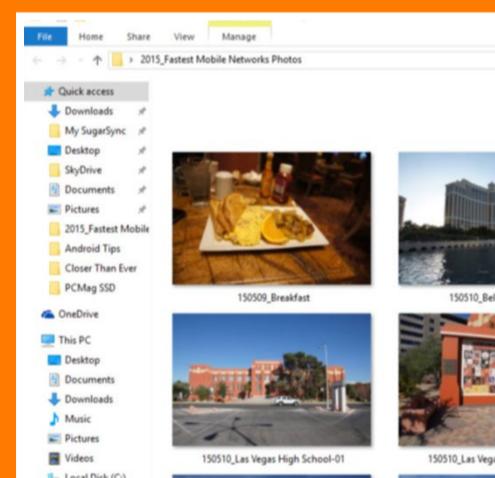
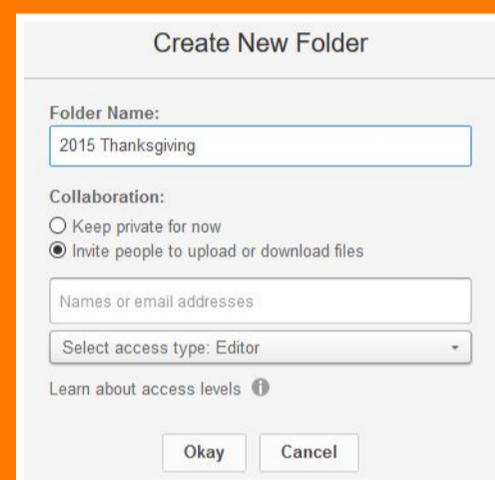
NAME YOUR IMAGES

Naming your image files makes them easier to find later. For files stored on my computer, I use a year-month-day system, so that a photo taken on December 20, 2015 will have 151220 at the start of the filename. Again, when sorted by name, these files will fall into chronological order.

If six-digit codes seem like overkill, just use the year at the start of your filenames. It will still help you find photos quickly later.

THREE EASY PHOTO TRICKS

Use Box.com (top) to keep your images private while you share them with others. Naming your files and folders (middle) with the year first aids in sorting them. And favorite photos (bottom) to help you always find your most important shots.



If you're saving images to Flickr, give every photo a clear and descriptive name. Don't try to be clever. Make the name match the search terms you might use in a year to look for the photo.

ADD STARS TO FAVORITES

Another way to make life easier for yourself later is to add stars to your favorite photos. Most photo and file hosting services give you some way of flagging your favorite pictures. When it comes time to share them or browse through them yourself, you'll be able to skip to all the winning images.

TAG YOUR PHOTOS, IF YOU HAVE TIME

How will you search for photos five years from now? If you've put six-digit date codes into the filenames or used keywords to name your pictures, that should be enough to help you find what you want. If you take a lot of photos, though, tags might be a good idea, too.

Think broadly, not narrowly, when choosing tags. Facial recognition tags help tremendously as well. Add them early in your organizing process, while the details are still fresh in your mind. Of course, if you're short on time, skip tagging. It's not the most important part of organizing your photos.

BACK UP!

Back up your photos. (Well, back up your most important data—all of it.) There are numerous online backup services that keep an extra copy of your files safe for you without asking you to do much at all—our favorites are IDrive, SOS Online Backup, and CrashPlan. You can also back up to an old computer, an external hard drive, and for photos, even SD cards will do.



Primo Tips for Amazon Prime Video

BY EVAN DASHEVSKY



Amazon Prime Video is not like other streaming video services. Whereas Netflix and Hulu exist as self-contained platforms, Amazon's content is a benefit that the company extends to Prime subscribers to help justify the \$99 yearly fee. But although it may have started as a perk, Prime Video is now becoming a true Netflix competitor. It's available through a variety of platforms (Web, mobile apps, smart TVs, gaming consoles, set-top devices), and it offers top-notch original programming, such as the

PRIME PRIMER

There's no need to get lost among Amazon's extensive video streaming offerings.

Emmy-winning dramedy *Transparent*, the Spike Lee original film *Chi-Raq*, and some surprisingly high-quality children's programming (the beautifully surreal stop-action series *Tumble Leaf* is big in our household). The service has even drawn big names like Woody Allen, who will deliver a six-episode series before the end of the year. And of course, Prime Video has an impressive library of films and series that are free to subscribers (as well as the aforementioned offerings that exist behind a paywall).

If you're already a Prime subscriber—or if you're looking to take the plunge—these nine cool tricks will help you make the most of the service.

DOWNLOAD FOR VIEWING ON THE GO

A child's brain experiences time differently than an adult's. A simple car ride is perceived as a years-long prison sentence—and don't even mention plane trips. If only your kids' favorite TV shows could travel outside your home Wi-Fi bubble and take their minds away from their wrongful incarceration. That's where Amazon can help.

One of Prime Video's main advantages over its à la carte streaming video rivals is the ability to download videos inside the app for offline viewing. And keep in mind that Amazon's download feature doesn't just include movies and episodes you've purchased, but anything you have the ability to stream as a Prime subscriber. Just hit the download button next to thing you'd like to download. You can even put your device down, walk away, and receive an alert when the episode or movie has finished downloading in the background.

Keep in mind that there are some limitations with this feature: According to Amazon, not all of their titles are downloadable, as "availability depends on [their] agreements with content owners." Furthermore, "the time period you

≡ 3. Beat of the Drumsticks; Springy Surprise

≡ 4. On a Roll!; Popcorn Picture Show

≡ 5. Fig Blends In!; Twirling Top

≡ 6. Bucket of Mud; The Swimming Hole

≡ 7. Loopy Straw; Tumble Leaf Parade

DOWNSTREAM CULTURE

Don't have an Internet connection everywhere you may want to watch Amazon content? Click the download button next to its title and catch up on it whenever (and wherever) you happen to be.



have to view a downloaded video while your device is offline varies by title.” On-screen notifications will let you know when the viewing period is almost over, or if you’ve downloaded the maximum number of titles across all devices on your account.

SHARE YOUR PRIME MEMBERSHIP

Recently, Amazon has begun cracking down on how generous Prime members can be with sharing their membership benefits; they can now share with one “adult,” as opposed to the previously allowed four (though four “kids” can still be included). But Prime subscribers do still have the ability to share access to Prime Video features, which can be used across multiple devices (Netflix, on the other hand, requires an additional fee for two screens, and Hulu only allows single-viewer accounts).

“Prime subscribers do still have the ability to share access to Prime Video features, which can be used across multiple devices.”



To share your Amazon Prime benefits, including Prime Video access, set up a “Household” and then select “Add an Adult” under “Setup your Household now.” That’s all there is to it.

SHARE TACTIC
Unlike most other streaming services, Amazon Prime makes it easy to share content with multiple people (and multiple devices) in your household.

SET PARENTAL CONTROLS

Don't want the little people in your house watching big people do bad make-believe things? You can set parental controls that will stop anyone without a special five-digit PIN from accessing content in certain ratings categories. As an added bonus, you can also stop any PIN-less people from making any unauthorized Amazon purchases.

You can only set up this feature online (as opposed to in-app), by going to Video Settings, creating an Amazon Video PIN number under "Parental Controls," and then altering the Purchase and Viewing restrictions.

X-RAY

Did you know that Amazon owns IMDb? It's true! I only found that out while researching this article. I'm not sure how much business Amazon has been able to squeeze out of people researching the filmographies of their favorite character actors, but the company has found one centralized hub of synergy: X-Ray.

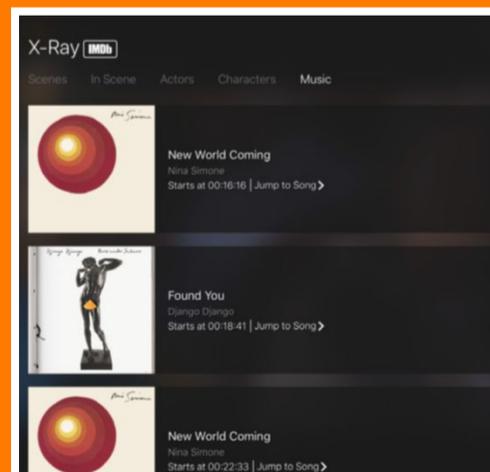
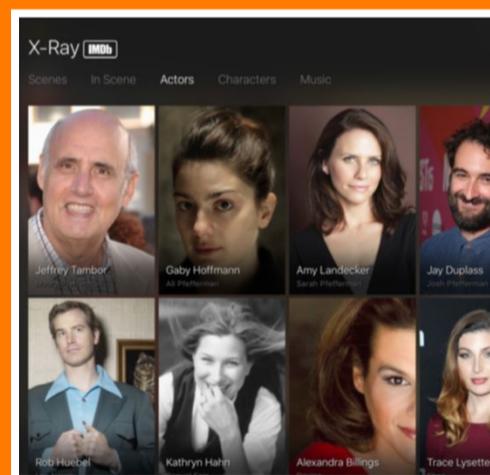
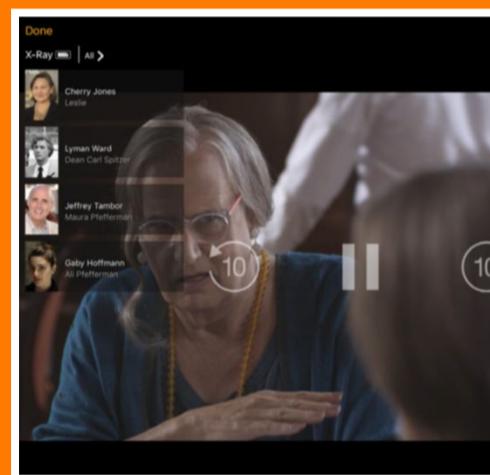
X-Ray is the Prime Video feature that feeds viewers a steady stream of information about the actors, filmmakers, music, and assorted trivia in each scene. It's a sort of live-running commentary of behind-the-scenes factoids. In most cases you can open an X-Ray window by tapping on your device's screen during video playback. With Amazon Fire TV devices, press Up or Pause on your remote. If you're using a Wii U, select the X-Ray menu on your gamepad for information about the current scene, or view full details from the Cast menu on your TV display.

PERSONALIZED CLOSED CAPTIONING

Closed captioning offers a number of advantages. It makes it possible for viewers who are deaf or hard of hearing to enjoy programs. It lets viewers (even among the able-eared) to follow a show with the volume turned down (maybe you need to keep your ears out for

X-RAY VISION

If you're like most of us, you spend about half your time watching some movies wondering, "Wasn't he in...?" Now you can pay attention to the plot again. Amazon Prime's extensive X-Ray feature lets you dig deep into the credits, facts, and trivia about your favorite movies and TV shows.





- That's right!
- Kenilworth, Wilmette,
Highland Park.

**CAPTION
COURAGEOUS**
Whether you're hard
of hearing or just
want to watch a
video without
disturbing yourself,
Amazon Prime's
closed captioning
feature can help you
out. And it's fully
customizable, too.

something, maybe your headphones are broken—it's actually not a terrible viewing experience). And it can translate content to viewers who are more comfortable with a different language (it even comes in handy when accents are especially thick).

To enable this feature (at least on the mobile apps), tap the closed captioning icon at the bottom of the page and toggle captions on. Here, you will also have the ability to choose various languages based on those that are available for that program.

Furthermore, Amazon gives viewers the ability to customize how the captions look on the Amazon Video Settings page—you can change the text's font, color, and size, as well as change the caption background's color and opacity. For now, this personalization function is only available on certain platforms, such as Fire tablets, PlayStation, and certain smart TVs, though Amazon says more will be supported soon.

AUTO PLAY

One of Prime Video's chief annoyances is "Next Up." If you're watching an episode in a series, the entire screen gets draped in a gray shroud near the end of an episode and a little box will come up at the bottom corner highlighting the next episode along with a countdown clock of the seconds until it begins.

Unfortunately, there is no way to turn off this bothersome feature. You can, however, turn off the Auto Play function so the next episode won't automatically begin—this may be a good or bad thing depending on your particular lifestyle. If you do decide you want to turn off Auto Play, you can do so online by going to Video Settings > Player Preferences.

KEEP UP ON WHAT'S NEW

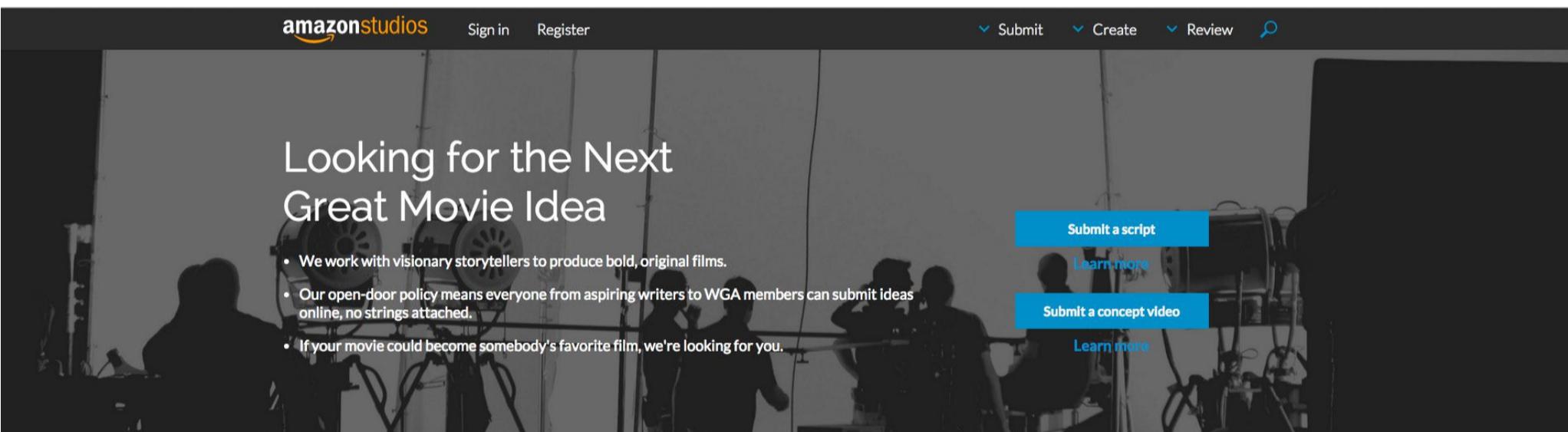
Prime Video's status as a side business is on display in the fact that it lacks a central communication hub, such as an official blog, to let Prime subscribers

know what new content is available. If you want to keep up with everything that's new (though not necessarily gratis) on Prime Video, you can follow either the official @AmazonVideo Twitter account or its original production arm, @Amazon_Studios.

SUBMIT YOUR OWN SCRIPT

Don't like the stuff you see on Amazon Prime? Well, then go and create your own! You can actually do that by submitting your original series or movie idea to Amazon Studios. According to the studio's FAQ section, you don't even have to be a Writers' Guild member to submit your idea—complete amateurs are welcome!

The process is notably transparent (get it?) in that participating audiences are given a behind-the-scenes look into the development process and their feedback can help decide if a project gets rejected or gets the green light. The company aims to send back a response in about 45 days—something Netflix and Hulu don't even attempt.



GET SOME ADD-ONS

The hot new feature for streaming services that aren't Netflix? Add-ons. Sling TV got HBO Now, Hulu got Showtime, and Amazon Prime has... well, Showtime, but a lot more, too!

For additional subscription fees, Prime Video users can have access to on-demand content from services like the aforementioned Showtime (an additional \$9 per month, which is cheaper than the \$11-per-month fee if you just got streaming access to Showtime by itself), Starz (\$9 per month), Comedy Central Stand-up (\$4 per month), or other niche services that offer things like horror series, documentaries, or foreign content.

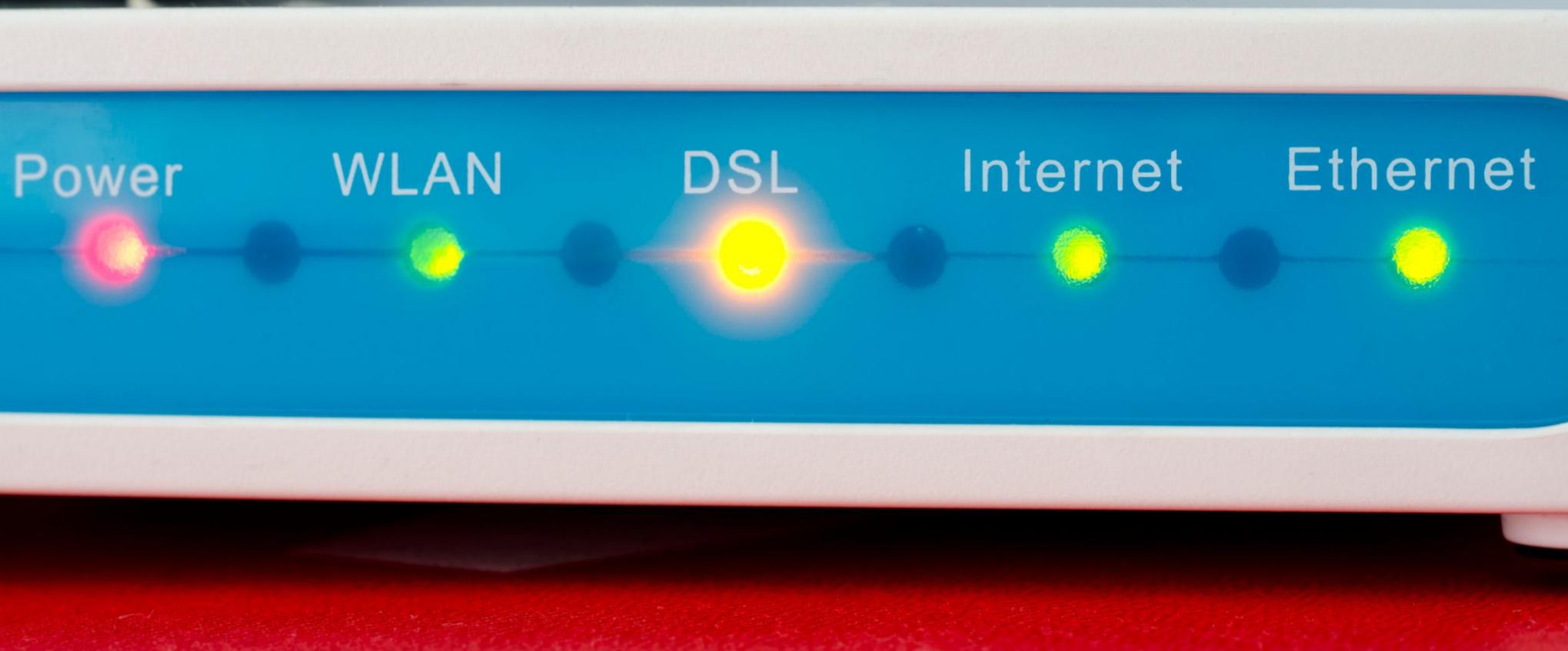
Troubleshoot Your Internet Connection

BY JOHN R. DELANEY

With the proliferation of smart devices, online gaming platforms, and streaming video services, maintaining a strong Internet connection at home is more important than ever. If you're experiencing lag while playing League of Legends, or if it takes forever to download music, there's good chance that the problem is on your end and not an issue with your Internet Service Provider (ISP). Before you schedule a service call with your cable company, run through these steps to see if it's something you can fix yourself.

IS YOUR ROUTER GETTING POWER?

If you can't connect to the Internet at all, the first thing you should do is take a look at your router's LED status indicators. If there are no lights at all, the router is probably unplugged or powered down. Disconnect the power cord and reconnect it after a minute or two. Make sure that the Power switch is in the On position. If the router still isn't powering up, you may have a failed power adapter, a faulty power strip, or a fried router.



CHECK YOUR STATUS

If the Power LED is lit, take a look at the Internet or WAN indicator. On most routers, this should be green and may be flashing. If your router doesn't have status indicators, look around back to see if the Ethernet port lights are flashing. If there is no activity, turn the router off. Unplug and reconnect the cables, making sure each is seated correctly in the appropriate port. Wait a few minutes before rebooting the router. If you still can't connect to the Internet, try the next step.

VERIFY THE CABLE CONNECTION

Before you start thinking about resetting or replacing your router, inspect the cable connection coming into your home. This is usually located on the side of your house and may or may not be housed in an enclosure. Look to verify that the main cable hasn't been chewed up by a squirrel or knocked loose by debris from a storm. If a cable splitter is being used, each connection should be tight and the connectors properly crimped. If the splitter looks rusty, dirty, or in any other way suspect, try replacing it.

START FRESH

If rebooting your router doesn't do the trick, try resetting it to its factory defaults and performing a fresh install. On most routers, the tiny Reset button is located on the rear panel. Hold it down for about 10 seconds (you may need to use a paper clip or other thin device if the button is recessed), until the LED lights begin flashing. Once the router has been reset, use the accompanying disc or Web-based setup utility to reinstall the router.

UPDATE YOUR FIRMWARE

Firmware is embedded software, installed at the factory on a read-only memory (ROM) chip, which makes it possible for the router hardware to implement network and security protocols. Most vendors provide downloadable firmware updates that resolve performance issues, add new features, and increase throughput. Look for an update tool in the System section of your router's management console and follow the instructions to ensure that you are installing the correct firmware version. Do not download firmware from a third-party site.

CONSIDER AN EXTENDER

If you can wirelessly connect to the Internet in one room but not another, check your router's Wi-Fi signal strength. Look at the network connection icon on your PC or mobile device to see how many bars are showing. If you're only seeing one or two bars, your Wi-Fi signal may be too weak to maintain a strong Internet connection. Try connecting to another band if you have a dual-band router.

Readjusting the router's antennas or changing the location of your router (if possible) can help improve range as well. If relocating the router is out of the question, a range extender may be required to boost the router's Wi-Fi signal. Our current Editors' Choice range extender is the \$99.95 TP-Link AC1750 RE450 (reviewed in this issue).

IS YOUR DEVICE CONFIGURED CORRECTLY?

If you can browse the Web with your laptop but you can't connect with your smartphone or another PC, open up the problem device's network settings. For smartphones, Wi-Fi needs to be enabled and you must be connected to the proper SSID using the correct security password. Make sure that Airplane Mode is disabled and that your time and date are correct. For Windows clients, check that the Wi-Fi switch is turned on, and that the device is not in Airplane Mode. Right-click on the network icon in your system tray and select Troubleshoot Problems to run the Windows Network Diagnostic routine. This will often



correct common issues by resetting the adapter. Also, look in your network adapter settings to ensure that the adapter is functioning properly and using the latest driver.

GIVE YOUR PC A CHECKUP

Scan your PC for spyware, viruses, and other types of malware. These programs are easily downloaded and installed, without your knowledge, while you're surfing the Web. They can run undetected and have a significant impact on your Web surfing speed and overall system performance. Our top free choices for malware-fighting utilities are Avast Free Antivirus, AVG AntiVirus Free, and Panda Free Antivirus. For more powerful paid tools, we recommend Bitdefender Antivirus Plus 2016, Kaspersky Anti-Virus, or McAfee AntiVirus Plus.

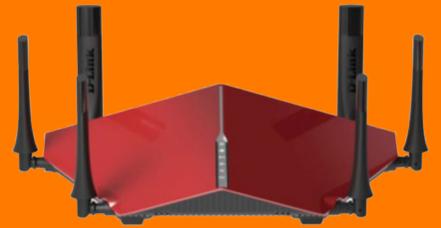
REPLACE YOUR ROUTER

If you're using an older router that limits support to 802.11b or g, you may want to consider upgrading to a newer, more powerful model, especially if you have multiple client devices vying for bandwidth. A dual-band router gives you two radio bands to choose from so you can dedicate a band to clients that require lots of bandwidth, such as streaming video devices and gaming consoles. Moreover, newer routers employ the latest technologies to deliver better throughput and range. (See our router suggestions in the sidebar on this page.)

CONTACT YOUR ISP

If you've tried everything and are still experiencing Internet connection woes, it's time to call your service provider. The problem could be on its end, and may require a new connection at the pole coming into your house or new equipment (such as a cable modem or amplifier). If you're experiencing slowdowns at certain times of the day, your ISP may simply be unable to handle the increased user load, in which case you may want to find a new service provider if one is available in your area.

OUR FAVORITE ROUTERS



D-Link AC3200 Ultra Wi-Fi Router (DIR-890L/R)

EC ●●●●●○ \$309.99

It may be big and expensive, but D-Link's stylish tri-band 802.11ac router delivers blazing throughput speeds over long ranges, is loaded with forward-thinking features, and has an intuitive, user-friendly Web interface.

Asus RT-AC68U Dual-band Wireless-AC1900 Gigabit Router

EC ●●●●●○ \$199.99

If you don't need a third band, you can save more than \$100 by going with Asus' dual-band RT-AC68U, which offers high speeds, a simple setup process, and an excellent interface.



D-Link WiFi AC750 Portable Wireless Router and Charger (DIR-510L)

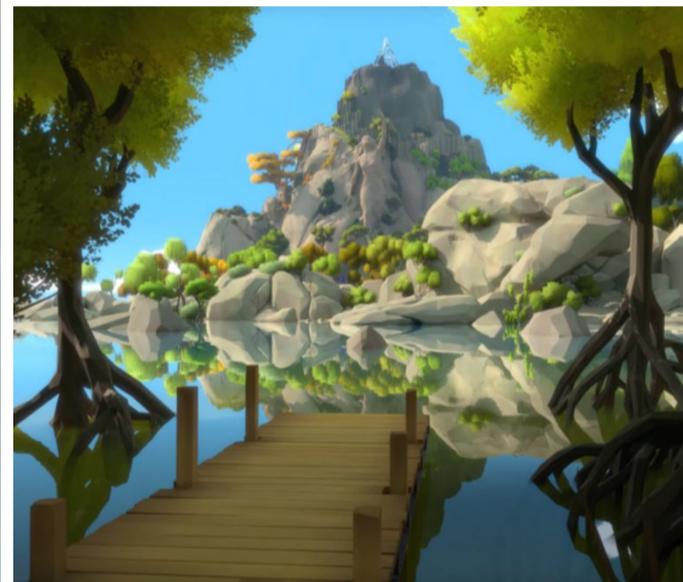
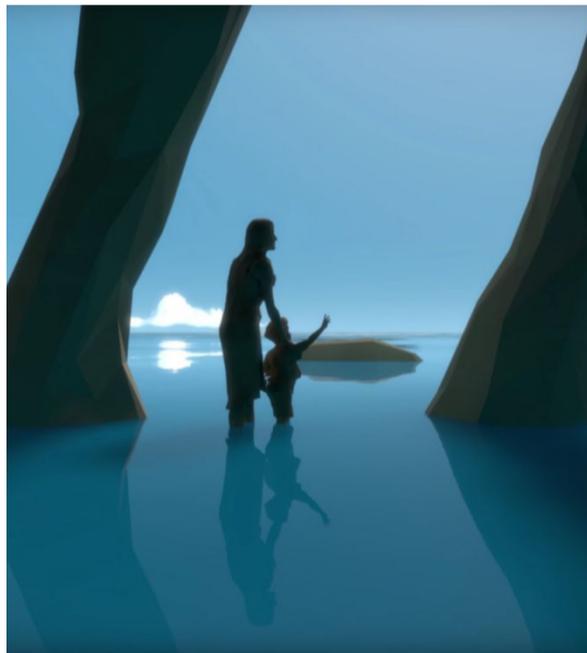
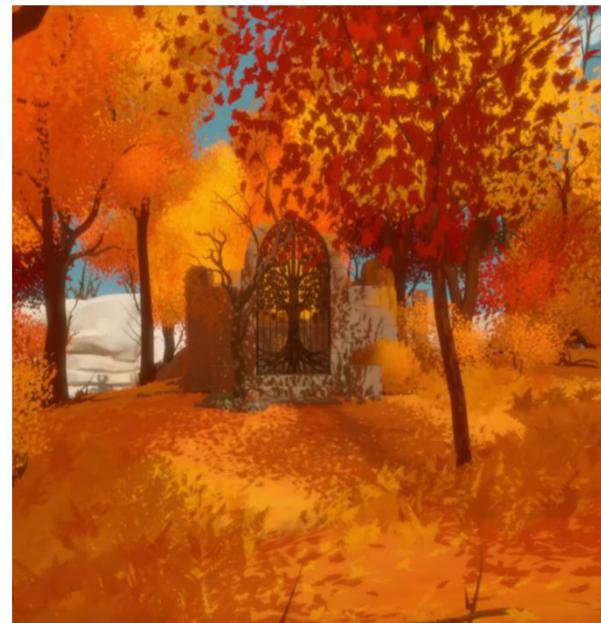
EC ●●●●●○ \$119.99

The DIR-510L lets you create an instant 802.11ac wireless network anywhere, complete with hotspots, wired Internet, and 3G and 4G connections. And it will charge your mobile devices.



Witness Protection Program

BY MATTHEW MURRAY

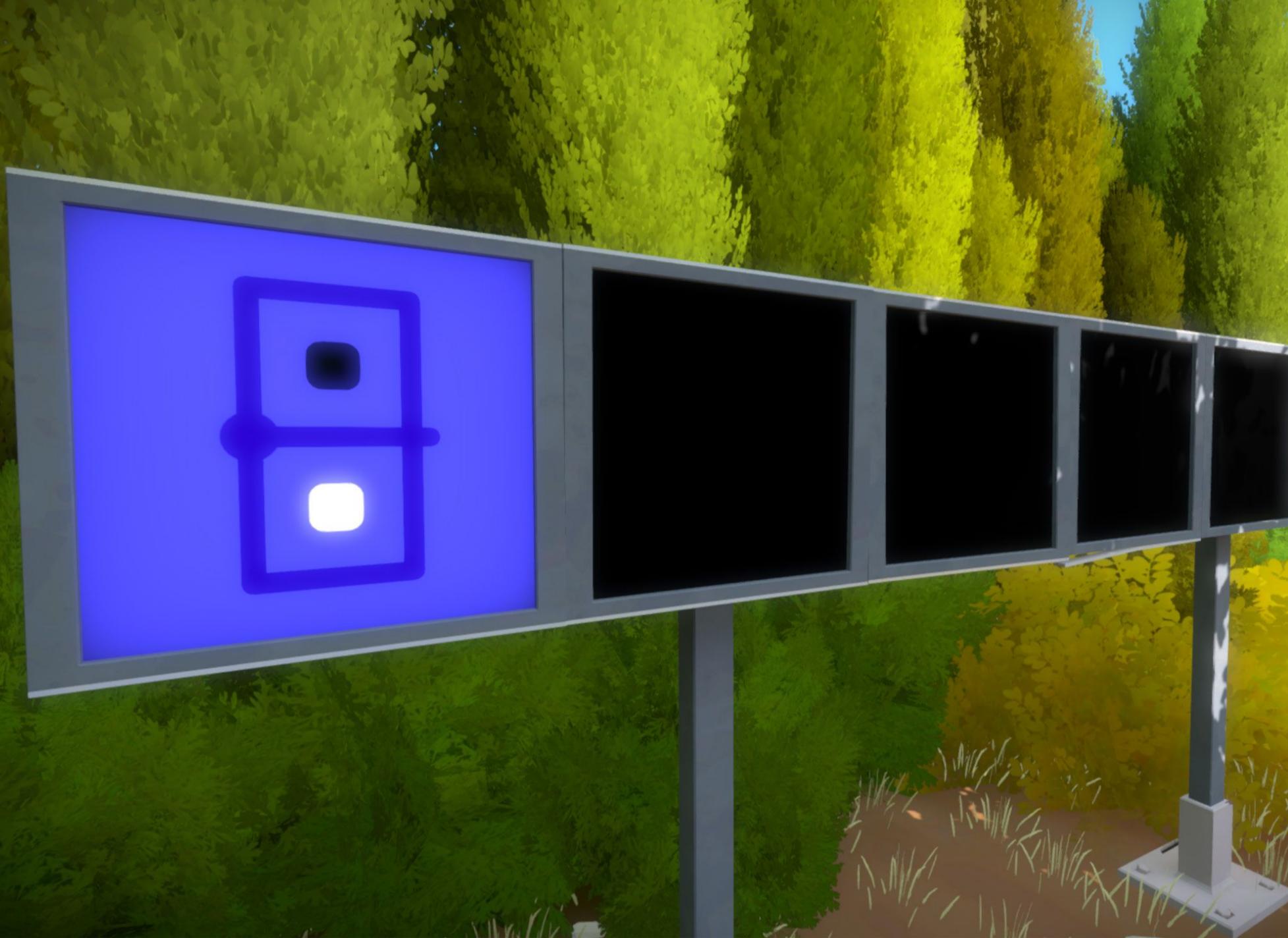


No one shoots at you. You're not being chased. Most of the time, you're not even racing the clock. But none of these simple facts stops *The Witness* from being one of the tensest, most brain-wracking games of all time. In following up his 2008 time- and mind-warping platformer *Braid*, Jonathan Blow has delivered an über-*Myst* for the 21st century that will have you tearing out your hair and wailing your vocal cords raw until the 22nd century is at your doorstep. As you pad about a lush deserted island that's as brimming with questions as it is with beauty, you'll face off against hundreds of puzzles designed to test not only how well you think, but how well you pay attention—and the extent of your tolerance level for logic in many diverse forms. But with great challenge comes great reward, and *The Witness* offers an immensely satisfying experience to those dedicated enough to stick with it. Here are some tips for making it to the end with your sanity (mostly) intact.



Learn to Love the Line

It's no accident that your first encounter, mere seconds after starting the game, is with the figure that will be your greatest nemesis for your days (weeks? months?) on the island: a line with a circle on one end. Dealing with it is easy; point at the circle with your input device, push the appropriate button to activate a highlight, follow the line to the curved exit point, and release to... well, make *something* happen. (Naturally, exactly what that something is varies considerably from puzzle to puzzle.) This is, essentially, the entire game, though because just about everything else you'll stumble upon is more daunting than that first straight, uninterrupted line, incorporating new kinds of obstacles, misdirection, or requirements, you're best off making your peace with it now. If you hate it too much when it's easy, just wait until the endgame. So practice tolerance, and happily let the line lead you where it will. You (probably) won't be disappointed. (There's another benefit to this, too. Once you love the line, you'll start seeing it everywhere. And we mean *everywhere*. And when you do, what should you do with it? Let your heart and your fingers guide you.)



Build on What You Learn

Frustrating though *The Witness* may be, it's constructed to give you plenty of help along the way. After you leave the opening tunnel, for example, the first puzzles you discover are all minor, mazelike variations on what you already know about moving a line from one obvious start point to one obvious endpoint. But you'll be able to solve them without breaking a sweat, because you still know the rules. And once you move on past the castle where you begin, new concepts are introduced gradually, through screens displaying puzzles of incremental complexity. You may not realize you're learning the basics of color separation, symmetry, or shape subtraction, but you are, and those new skills will, in turn, give you a real leg up when things get tougher later. The same is true between puzzle types, too: A new rule doesn't invalidate any of the old ones, so your goal isn't to reinvent the square, but rather to figure how to make everything you know jibe with everything else. This is easier said than done, admittedly, but if you remember where you've been, you'll have little trouble (relatively speaking) getting where you want to be.



Take a Deep Breath (and a Step Back)

The big question with *The Witness* isn't whether you'll go nuts trying to complete a puzzle, but how early you'll find yourself reaching that point. But take heart: Most of those woes, at least early on, are purely psychological, due mostly to a combination of the free-form landscape and the arrangements of the boards on it. (Should you really be in the boathouse yet? Because you encounter the windmill before you do the desert excavation site, does that mean something?) So relax. If a puzzle seems too hard, you may be overthinking it. Look back at an earlier puzzle of the same type (this is particularly easy if you're trying to solve a series) and see what it taught you that you might be forgetting. For the record, this taking a step back can (and, in a number of circumstances, should) be taken literally, too. The environment can often give you vital clues you need to proceed. If you're not sure what a line should look like, something in the background may tell you, or a secret hint could be located just above or below your field of vision. Heck, even moving around and viewing the puzzle from a different angle may give you the insight you need to succeed.



Look and Listen

Okay, okay, not all of the information you need to solve any given puzzle is found in the puzzle itself. Sometimes a key clue needs to be pulled from elsewhere; it may be something you need to look at in the general vicinity, or even (in some of the most dastardly offerings) something you need to listen to. So take in everything around you, and see how conditions change between areas and between puzzles—you may find hints in the strangest of places. Blow does give you some additional help, too. Though many of them are well hidden, media samples located around the island can also nudge you in the proper direction. Although the audio recordings (shaped like USB keys) and videos (I'll let you uncover these for yourself) you may discover are outwardly philosophical, scientific, or religious musings that tie to the island's foundational themes (and outlining the broad details of the game's "story"), they can also put you in a frame of mind that may make it possible for you to tackle new, seemingly unsolvable problems. So if you come across one, fire it up. You may be surprised and enlightened by what you find, just as much as if you close your eyes and listen to the birds tweeting.



Stop and Smell the Roses

The Witness is already renowned (cursed?) for its puzzles, and they'll probably be your biggest takeaways. But, like *Myst* once upon a time, this is also an intelligently, colorfully designed game you'll want to see every nook and cranny of just so you can say you did. So walk around. Explore. Breathe in the landscape. Study the designs of the buildings (a real architect was brought in to help ensure authenticity). Spend more time in places you've already been, looking for new entrances or exits. Look left, right, up, down, and in any other direction when you're stuck. You might find something you didn't expect, but you may just be entranced by the world around you, which is delightfully cohesive and marvelously mysterious on its own terms. The golden leaves in the forest, the stunning statuary protruding from the mountain, the visual wonders of the greenhouse, and many other sumptuous sights are not to be missed, even if you still have puzzles to solve. So be on the lookout for them—they're well worth your time.



Don't Waste Time

One of Blow's cruelest tricks is putting late-game puzzles next to basic ones, leading you to perhaps believe they're equivalent in difficulty. (This is particularly true in the town, one of the earliest areas you'll wander into.) Not so. You may fritter away minutes—or even hours—trying to unravel conundrums you don't yet have the proper language for, and enduring that for long periods is more likely to aggravate you than entice you. Here's the dirty little secret about this: When you're ready to solve a puzzle, you'll know it instinctively. No one will need to tell you, and you won't need to guess. So if you come across anything you don't recognize, and it's clearly not the first entry in a step-by-step "tutorial" of that idea, pass it by and come back to it later. You'll feel much better about yourself and the game this way.



Strive for Perfection

If a puzzle is driving you so crazy that you want to throw your computer or console out of the window and then drop a refrigerator on top of it (I felt this way—more than once—with boards making extensive use of the Tetris-like shapes), you have the option of walking away from it. You don't need to solve every single puzzle in *The Witness*; you can actually get by solving about half (or even fewer). But you'll miss out on some synapse-twisting fun and gorgeous scenery if you don't commit yourself fully—there are a couple of areas full of unique boards that you won't find unless you're looking for everything, and you can't get a perfect score unless you do them, too. There are nearly 700 individual puzzles in the game, so make it a goal to see and sample them all. Your conscience—as well as your computer and refrigerator—will thank you.



Endure to the End

They say that nothing worth having is ever easy, and that's definitely true of *The Witness*. Give up on it early and you'll miss some of its most dynamic and unusual puzzles, which throw everything you've learned right back in your face—along with new twists on perspective and mechanics that will make even the most familiar conundrums feel fresh again. Plus, you'll also miss the beautiful, fascinating, and provocative endgame that makes you see everything you've done in a new light, and gives you the opportunity to investigate it all anew. And once you bring your accumulated knowledge and wisdom to the opening stages, you'll find a lot more in them than you realized was there the first time, and the game becomes very different—and more urgent—than you ever knew it to be. *The Witness* is all about keeping your eyes and mind open to new possibilities, but in order to fully understand how and why, you have to make the complete trip. You'll be skirting with madness, sure, but few games in the modern era have made the danger more worth the risk than this one.



When PCs Become Appliances

With Intel rolling out its new Skylake chip, there has been a lot written about flagging PC sales and the idea that Skylake could resuscitate the PC market. As if that's going to happen—2015 saw the largest decline in PC shipments in history.

The market for PCs, especially the desktop market, is never going to bounce back. The world is saturated with PCs, and any emerging markets are choosing laptops, tablets, and smartphones for 90 percent of their computing needs.

The leftover market of users who actually need a desktop computer now appears to be a niche; much of the PC's "power" is functionally on the cloud, while the PC is something of a terminal. Thus the PC industry predictions of the mid 1990s are coming true: It's now a replacement market, much like automobiles.

Part of the overlooked benefit of Moore's Law and the progress of the CMOS process and the chip business itself is improved reliability. PCs pretty much last a decade, maybe longer. When something fails, it is usually a piece of mechanical hardware like the hard drive.

In the 1980s, we were required to buy a new machine every 18 to 24 months. That helped boost the business for sure. Even during the 1990s—when the industry first decided that eventually the user base would stop growing—the predicted replacement market assumed the 18- to 24-month period would be stable.

Now it's 2016. We are indeed in a replacement market, but it turns out the 18- to 24-month

standard is bogus. It's more like 36 to 60 months. There are some technologies that come along that tempt users to upgrade. DisplayPort, for example—but that showed up in 2008, or more than 90 months ago! USB 3.0 is another one that came out around the same time, but thanks to USB 3.1 it's already obsolete. I'd hope people are not still using 2005 machines, although I'm sure many are doing just that.

Of course, if the old machine can run Windows 8 (and thus probably Windows 10) you can always add one PCI Express video card to gain DisplayPort capability and another to get access to USB 3.1 (or even 3.0). Why buy a whole new computer? Imagine someone with a 2005 PC with absolutely no reason to upgrade or replace it. That is how reliable these PCs have become.

Pundits in the 1980s and early 1990s predicted that PCs were going to become “appliances”—as ubiquitous and as easy to use as refrigerators. This was wishful thinking. The appliance analogy is not about usability, it's about reliability and replacement. I have a refrigerator that has lasted 13 years and counting. Some appliances I expect to buy only once in a lifetime.

So why does this flat market for PCs surprise anyone? It has been predicted for two decades that computers would become appliances—it's just that now they finally have.

A handwritten signature in black ink that reads "John Dvorak". The signature is fluid and cursive, with a large loop at the end of the last name.

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