# Macworld

APPLE PENCIL SUPPORT BRINGS THE TABLET TO A NEW LEVEL

# THE NEW iPAD

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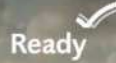
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# 13-inch MacBook Pro battery replacement program FAQ: What it is and how to use it

Here's how to get your battery replaced.

**BY MICHAEL SIMON**

t's been a rough year for Apple's batteries. After announcing a program to replace batteries in the iPhone 6 and 7 earlier this year (go.macworld.com/67bt), Apple has now launched a program to swap them out in the 13-inch non–Touch Bar MacBook Pro (go.macworld.com/ntbr; affectionately known as the "MacBook Pro ESC" due to the presence of actual function keys). So if you have a laptop that's been

dying out mid-way through your day or just noticed some performance oddities, you might be able to get your battery replaced with a new one. Here's everything you need to know about the new program:

## WHAT'S THE REASON FOR THE PROGRAM?

Apple has said that a component inside "a limited number" of 13-inch MacBook Pro (go.macworld.com/13mp) units could fail, "causing the built-in battery to expand." Apple did not specify which component was faulty or how it affects the battery.

## THAT SOUNDS BAD. IS MY LAPTOP AT RISK?

Nope. While expanding batteries generally pose of risk of fire or explosion, Apple assures that this isn't a safety issue.

## WHAT MODELS ARE INCLUDED?

A pretty small amount actually. First, only non–Touch Bar models manufactured between October 2016 and October 2017 are affected. And among that group, only some of the units manufactured during that time are affected by the issue.

## HOW DO I KNOW IF MY MACBOOK IS ELIGIBLE?

You can check your serial number on Apple's site at go.macworld.com/ntbr.

## HOW DO I FIND MY SERIAL NUMBER?

Click on the Apple logo at the top left of your laptop's menu bar and go to About This Mac. You'll see your serial number in the window that appears. From there, you can copy it and paste it into the search bar on the support page.

## OK, MY MACBOOK IS ONE OF THE AFFECTED UNITS. NOW WHAT?

You'll need to take it in for repair in one of three ways:

> Make an appointment at an Apple Store.



**You can find your MacBook Pro's serial number in the About This Mac dialog box. Don't worry, yours will be legible.**

> Make an appointment at an Apple Authorized Service Provider. You can find a list of service providers in your area on Apple's support site (go. macworld.com/ctap).

> Mail your MacBook to the Apple Repair Center.

As always, make sure to back up your data (go.macworld.com/gdbu) before sending your MacBook in for repairs.

## HOW LONG WILL IT TAKE?

Since the program is limited, wait times shouldn't be nearly as long as they are with some iPhone 6 models. Apple estimates service time is 3 to 5 days, though it could be longer depending on the availability of batteries.

## HOW MUCH WILL IT COST?

Nothing. However, Apple notes that if there is prior damage to your MacBook that "impairs the replacement of the battery," the service technician may need to fix that problem first, resulting in a possible charge.

## WILL MY WARRANTY BE EXTENDED?

Unfortunately, no.

## HOW MUCH TIME DO I HAVE TO GET IT FIXED?

Apple hasn't put a specific expiration date on the program, but it does say that the program covers affected MacBook Pro models for five years after the first retail sale of the unit. So that means Apple will replace batteries until sometime in 2022. ∎

# Yes, eGPUs boost Mac game performance, but limitations abound

Limitations and over-specific requirements keep Mac external GPU support from greatness.

BY LEIF JOHNSON

Folks with more coding knowledge than I have (and a greater willingness to potentially brick a $2,400 machine) have been hooking up external graphics cards to Macs for years, but the support now comes bundled into macOS 10.13.4 High Sierra. In layman's terms, Apple officially supports some graphics cards that you'd normally only find in a bulky PC tower—so long as you have a separate external chassis to stick them in and a Mac with Thunderbolt 3.

I hoped eGPU support would be

revolutionary. Beyond that, I hoped it'd allow me to break with PCs entirely, as I really only use them for gaming these days. Anyone who watches Apple Arcade (go. macworld.com/apac) knows I've been a little frustrated with the current state of Mac gaming, and an external graphics card struck me as an easy way to circumvent the limitations of Apple's built-in processors.



**Honestly, putting the graphics card in the chassis was the most difficult part of the process, and that took maybe three minutes.**

In some ways, it is. On the last show (go.macworld.com/aep6) I took an AMD Radeon RX 580 graphics card and slipped it in a spare eGPU chassis loaned from the folks at *PCWorld,* and I watched in awe as the recently released port of *Rise of the Tomb Raider* suddenly looked the way it was supposed to on my 2017 15-inch MacBook Pro. Once everything was on the

**VIDEO: EXTERNAL GPU GAMING ON MAC**
Visit go.macworld.com/egp to see how to hook up an eGPU.

table, setup only took around five minutes.

That's the abridged version. Yes, it works. Though in practice, eGPU support is currently little more than an expensive novelty.

## STAY WITHIN THE LINES

Let's focus on the best part first. Once I slipped my Radeon RX 580 into an Akitio Node Pro (go.macworld.com/amnp) chassis and tightened the screws, all I really needed to do was plug the Thunderbolt 3 cable into my MacBook Pro. Within seconds, an icon resembling a processor popped up on the Mac's top menu bar, showing that the Radeon RX 580 was, in fact, working. (Getting it to work with games takes a few more steps,

**It's no different from disconnecting a drive.**

but more on that later.) Even better, I didn't even have to restart. Apple prides itself on elegant simplicity, and in this case Steve Jobs's favorite old saying remains true: It just works.

It works, that is, so long as you have the right materials. You can only pull this off without any technical trickery so long as you're using a MacBook or iMac with Thunderbolt 3 support, which means you're limited to using laptops dating from 2016 and iMacs dating from mid-2017. This is a bit of a bummer, but Thunderbolt 3 supports data transfers of up to 40Gbps, while Thunderbolt 2 supports 20Gbps.

Unfortunately, that limitation likely knocks a lot of users out of the game right there. For those of you who can play with that kind of

power, though, let's move on to the supported cards. Here you'll find your gaming ambitions further thwarted by Apple's lack of direct support for Nvidia cards. It makes some sense considering that AMD makes most of the graphics cards found in contemporary Macs, but it's another low blow in a gaming environment where Nvidia cards win mountains of accolades.

If you're wondering, I tried using Nvidia cards, but there's no built-in driver support. I plopped an Nvidia GeForce GTX 1060 into the eGPU chassis, connected it, booted, and nada. The little processor icon didn't show up. It just didn't work. I also tried using Nvidia's web driver (go. macworld.com/nvwd) that's partially designed with macOS in mind, thinking I'd hit on a way to make it work. But nope. The Nvidia toolbar icon showed up, but the card itself never worked. Perhaps a different chassis would have helped.

In fact, Apple specifically outlines which chassis you'll need for each card, so be sure to look over the associated support page (go.macworld.com/egmc). The Cupertino company is especially fond of the $449 650W Sonnet eGFX Breakaway Box (go.macworld.com/snbb), which works for every available card ranging from comparatively weak Radeon RX 470 to the blazingly fast Radeon Pro WX 9100. (You can also buy a 350w Sonnet box that's bundled with a version of the RX 580 [go.

] I used.)

There's apparently some wiggle room with the chassis. Apple doesn't officially recommend the Akitio Node Pro chassis I used, but it worked beautifully for our purposes. For safety, though, I'd recommend sticking with what Apple tells you to stick with.

## POETRY IN MOTION

All this effort feels kind of worth it once you see the results in motion. Hooked up to the Radeon RX 580 in its chassis, *Rise of the Tomb Raider* soared from the 24 frames per second it struggled to reach on the MacBook Pro's built-in graphics to a far more satisfying 57 frames or more.

This wowed me in our benchmarking tests we ran using *RotTR*'s built-in tool, but the differences were stark and unmissable in action. Granted, it wasn't always perfect: I'd sometimes see brief freezes in the action, which I interpreted as the inevitable delay involved in getting signals from a remote GPU rather than one that's jacked straight into the motherboard.

But watching Lara Croft jump from snowy ledges and sneak through desert passages felt natural and fluid with the better graphics card (and better frame rates). And this was only with the Radeon RX 580, a $401 card (go.macworld.com/axrx) we had on hand here. I'm almost certain I'd be blown away with the results on a $950 Radeon RX Vega 64 (go.macworld.com/rdrx), but we currently don't have one.

Yet here's *another* caveat. Shortly after this article went live on our website, Feral Interactive contacted me to let me know it doesn't support eGPUs in any of its games at the moment, although the studio is currently testing combinations of cards and



**Benchmarks from a 15-inch 2017 MacBook Pro using Unigine's Benchmark Valley on Ultra (fullscreen), both with the eGPU and without.**

GPUs. Eventually Feral will make an announcement regarding official support. I've asked for further clarification, but Feral's statement must refer to optimized support, as the benchmark tests and general gameplay showed clear improvements when using the eGPU. The warning fascinates me. It suggests you may still have trouble with certain made-for-Mac applications even though Apple appears to have designed eGPU support in such a way that official support shouldn't matter.

I ran benchmarks using both Unigine and Cinebench with the settings cranked to Ultra, and as you can see on the previous page, Unigine saw a massive improvement with the OpenGL API. The new card still wasn't strong enough to push me past 60 frames per second, though, and the Cinebench results reveal why: In some respects, the Radeon RX 580 is only a tad more powerful than my built-in Radeon Pro 555 (see below).

Sometimes, in fact, benchmarks would produce almost identical results for some tests and then the RX 580 would soar far ahead with others. When I tested Apple's own Metal API with GFXBench, for instance, both versions of the T-Rex test produced frame rates of 59 fps. With

GFXBench's Manhattan 3.1 test, though, the RX 580's 60fps soundly trounced the 555's 33.8.

In the games themselves, that extra oomph was more than enough to see some clear improvements. I also tried our eGPU setup with *World of Warcraft* and *Elder Scrolls Online* and was happy to find myself safely pushing the graphics quality to heights I'd never been able to reach on my MacBook Pro's discrete card. I've also seen reports of eGPUs causing some crashes in some games, but I was fortunate to never see one myself. Even with these issues, though, it occasionally made my MacBook Pro feel like a new machine.

## THE VALUE OF AN EGPU

Again, though, it's only *kind* of worth it. I'm not really convinced it's worth around $700 to pick up the chassis and the card we used, but that assessment could change with better (and more expensive) equipment.

For that matter, the potential costs don't end there. External GPUs usually don't actually power the native displays unless a developer specifically allows it, meaning you can't expect to jack one into your MacBook Pro and see the magic happen right there on the Retina screen. Instead, you'll have to

| | |
|---|---|
| 4C/8T @ 2.80 GHz, AMD Radeon RX 580 OpenGL Engine | 75.45 |
| 4C/8T @ 2.80 GHz, AMD Radeon Pro 555 OpenGL Engine | 73.83 |

**In some ways, the Radeon RX 580 is only slightly more powerful than my built-in Radeon Pro 555.**

**And don't forget: You'll probably need an external hard drive, too.**

want to arrive at, you'd probably just be better off slapping down the cash for an iMac Pro or at least a 5K iMac. (And for what it's worth, *Macworld* staff writer Jason Cross reported that he was getting better than 60 fps when he ran *Rise of the Tomb Raider* on his machine without any eGPU magic.)

hook up an external display, so that's another $160 or so you're probably looking at. We got the best performance out of our eGPU when we closed the lid on my MacBook Pro, which means you'll likely need another keyboard to interact with your game if you're on a laptop. There goes another $50 or so. And since MacBooks typically don't have a ton of storage space, you may even need a 1TB external hard drive to even host the games. Conservatively, that's another $55. And heck, if you don't have a $60 gamepad, toss one of those in there as well.

So congratulations, yes, your MacBook can run games better now, but you've potentially spent around $1,000 to get it to that point. Not only that, but you've had to sacrifice your (ideally) Zen-like Mac setup for a desk where wires snake across the now-cluttered surface. If this is the point you

## WHO WOULD DO THIS TO THEMSELVES?

I've spent all my time discussing eGPUs in the context of games. But that isn't what Apple originally had in mind. Instead, eGPUs are a way for developers to harness more power across multiple displays with rapid refresh rates while using graphically demanding apps like Blender (go.macworld.com/bldr; which was clearly compatible with our eGPU). In addition, the extra power makes it easier to edit 360-degree virtual reality projects, as it's possible to do the coding on the Mac proper and see the results with an HTC Vive on an external monitor. Apple even lets you hook up multiple eGPUs if you wish.

Weirdly, Final Cut Pro X apparently doesn't use external cards to help with rendering, but there's a clear advantage to

using an eGPU for anyone working in 3D modeling. Beyond that, eGPUs provide a way to keep the powerful iMac Pro comparatively up-to-date once it gets past its prime since its parts can't be switched out as they can with a PC tower.

But what about folks who just want to play games? I could still see this being an attractive option for someone who does almost all of his or her other work on a MacBook but still likes to play the occasional high-budget game. For most of the day, our hypothetical GPU enthusiast could tote their MacBook to the coffee shop or whatever, where it would do almost all of the tasks it needs to do with competence and style. But when they want to lose themselves in a graphically intensive game for a while, this setup allows them to take that same laptop and briefly transform it into something even more powerful. I admit even I find the idea attractive on some level.

For that matter, for those of you who are still interested in virtual reality, it finally makes the HTC Vive a workable option on less expensive Mac products.

But for everyone else, it's a hassle, and the feature sometimes feels as though it's still in beta. You can't use eGPUs in Windows through Boot Camp, for instance, which means that taking advantage of an Nvidia card through that means is still out of the question. (This feels like a

particularly low blow.) Again, you have to hook up an external monitor to even see the effects from the new card. And even if you're okay with all that, you're still stuck with the same relatively small library of Mac games, many of which weren't graphically demanding enough to warrant attaching an eGPU in the first place.

I'm hoping eGPU support is but a work in progress, and that Apple can smooth out the issues in future updates. (Judging by how Apple has been dragging its feet with what seems like relatively simple HomePod patches, I wouldn't count on them coming soon. On the other hand, official eGPU support came out exactly when Apple said it would.) Right now, the service is but a strong foundation of what it could be, and during this week's (go.macworld.com/apns) podcast we speculated that Apple's experiments here may be related to the supposed modular upgrades in the upcoming new Mac Pro. Indeed, the more I think about it, the more I believe eGPU support would be perfect for a new Mac mini, but who knows when we'll see one of those.

If you're willing to deal with some limitations and potentially high costs, eGPUs do enhance the Mac gaming experience. But you may find that working around those limitations is not worth the effort. ∎

# New alert in macOS 10.13.4 signals the upcoming end of 32-bit app support

What to do if you see an alert, and how to find out which of your apps will need updating.

**BY ROMAN LOYOLA**

Apple's transition from 32-bit to 64-bit technology on the Mac has been in the works for a while for the company and developers, but so far users haven't really been affected. That started to change beginning in mid-April.

## NEW 32-BIT ALERTS IN MACOS 10.13.4 HIGH SIERRA

If you're using an old 32-bit app on a Mac, macOS will display an alert to let you know that it may not run optimally and that you should check with the developer to see if
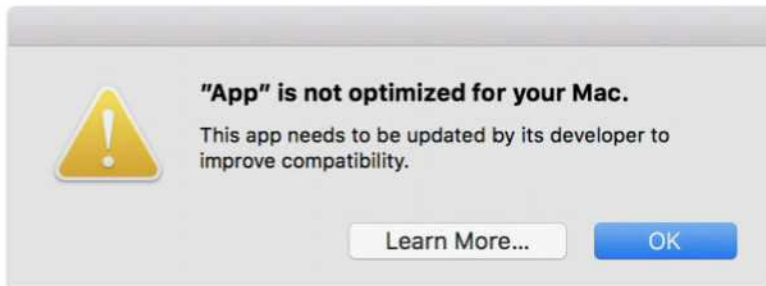
**32-bit app alerts are coming to macOS 10.13.4.**

an update is available. The alert is similar to the ones that appeared when Apple transitioned iOS from 32-bit to 64-bit (go. macworld.com/32b6).

The alerts appear only when a 32-bit app launches, and will have a Learn More button that takes users to an Apple Knowledge Base article that explains the 32-to-64-bit transition (go.macworld.com/apkb).

The alerts are part of the macOS 10.13.4 update and started to trigger at midnight on Thursday, April 12. If you do not have version 10.13.4 installed, you will not see the alerts, but they will appear once you update your Mac.

## WHAT TO DO IF YOU SEE AN ALERT

Your app will still work after the alert appears; the main purpose of the alert is to encourage users to update the app to a current 64-bit

version. If you don't update, the app will not run in a future version of macOS. Apple has said that macOS High Sierra (the current version) will be the last version that will "run 32-bit apps without compromise."

If you have a 32-bit app, check with the developer to see if an update is available. There could be an update on the developer's website, or in Apple's App Store. (The App Store stopped accepting new 32-bit apps back in January. This June, the App Store will stop accepting 32-bit software updates.)

Apple has not announced a timeline for the transition and when 32-bit apps will stop working on the Mac, but it's possible we could learn more at the company's Worldwide Developers Conference in June. Apple usually unveils the next major versions of its operating systems at that event, so it makes sense that Apple could

If you do not have version 10.13.4 installed, you will not see the alerts, but they will appear once you update your Mac.

provide more details then.

## HOW TO SEE IF AN APP IS 32-BIT

If you're interested in going through your Applications folder and checking each app to see if it's 32- or 64-bit, here's how.

1. In the Finder, click on the Apple menu in the upper left and select About This Mac.
2. In the Overview section, click on the System Report button.
3. In the left column of the window that appears, scroll down until you see the Software section.
4. In the Software section, click on Applications. The window may take a moment or two to reveal in the section to the right.
5. The right section of the System Report window is split into two panes. The top pane is an alphabetical list of the apps on your Mac. Click an app and its details appear in the lower pane.
6. In the lower pane, you'll see some information about the app you selected. One of the items is 64-Bit (Intel). If this listing says Yes, then the app is a 64-bit app. If it says No, it's a 32-bit app and you should check with the developer to see if an update is available, if you think you want to continue using the app in the future. ∎
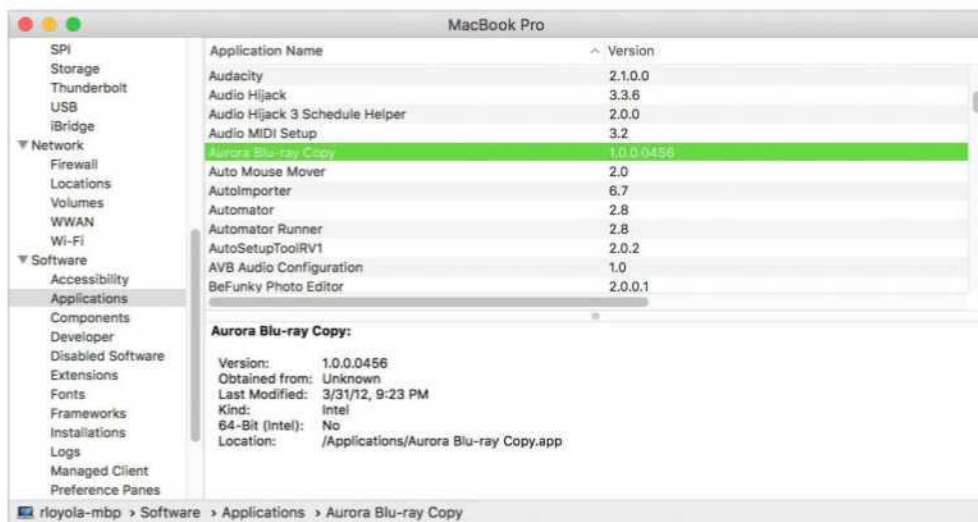


**System Report in macOS High Sierra.**

# QuickTime Player 7: Goodbye to Apple's brushed-metal dinosaur

The transition from 32- to 64-bit technology means the end to oldies but goodies like QuickTime Player 7.

**BY JASON SNELL**

There was some minor news recently: In another step along the transition to 64-bit apps, Apple began warning users of 32-bit apps (see the prior article) that these apps would need to be updated or they will stop running. The warning was news, but this is actually a story long in the making. Last year, Apple warned Mac developers that 32-bit apps would stop running "without compromise" this fall

with the release of the successor to macOS High Sierra.

The writing's been on the wall, more or less, since all the way back in 2009 when Apple began its 64-bit transition (go. macworld.com/64sl) with the release of Snow Leopard. But the move to 64-bit apps will have casualties, namely a whole generation of apps that are no longer being updated, but are still used every day by Mac users. No software is forever—who out

there is still writing with Microsoft Word 5.1?—but when you lose a whole generation of apps at once, it's a bit more noticeable.

Apple's warnings to users about 32-bit apps are also intended to get users to prod the developers of their favorite Mac apps to get going with their transitions to 64-bit versions. Ironically, the warnings don't appear for apps from one particular company: Apple itself. Hold-outs using Final Cut Pro 7 won't be warned that their app will cease to "function without compromise" with this fall's OS update and will probably stop running altogether in about 18 months.

7. In fact, Apple never really implemented large portions of QuickTime itself for 64-bit architectures; as a result, I suspect a lot of apps that rely on QuickTime for their functionality may die or need major overhauls once the 32-bit era officially ends.

There's no denying that QuickTime Player 7 is a fossil from an ancient era of

The writing's been on the wall, more or less, since all the way back in 2009 when Apple began its 64-bit transition with the release of Snow Leopard.

## QUICKTIME PLAYER 7

And then there's QuickTime Player 7, an app from 2009 that has somehow survived nine years beyond its expiration date. You may not remember, but when Mac OS X Snow Leopard was released in 2009, it introduced the new QuickTime X Player (go.macworld.com/qtxp), and QuickTime 7 Player became an optional installation that hid away in the Utilities folder. (QuickTime Player 7 is available for download from Apple [go.macworld.com/qtp7].)

Hmm, that's weird. Why would Apple keep an older version of an app around, side by side with the new version? The reason is that QuickTime X didn't offer many of the features of QuickTime Player

the Mac. As a player, it's largely unnecessary—if you hate QuickTime X, consider trying the open-source IINA video player (go.macworld.com/iina), written in Swift. But as a quick and dirty video clipping and editing tool, QuickTime Player 7 is hard to beat—and doesn't really have a replacement.

Who is still riding this brushed-metal dinosaur? Everyone from podcasters (go.macworld.com/mlmn) to, oh, Lucasfilm's Industrial Light and Magic (go.macworld.com/ilmg). What Apple has done with Preview app—namely, make it a Swiss Army knife of document processing—it did more than a decade ago for multimedia with QuickTime.

Personally, I use QuickTime to quickly cut out bits of video and paste them together, then export as a standard MPEG-4 file. I also use it to replace the audio from a video file with a different track. Could I just import source media into iMovie or Final Cut Pro and do the work there? Sure. I could also launch Photoshop in order to crop a JPEG and save it out, but Preview is so much easier and quicker.

In terms of file-saving options, QuickTime 7 is showing its age—but still, its advanced export options are something to behold. I can replace an MPEG-4 movie's audio track with my own, and then re-export the result without re-encoding the video track, by tweaking a few export settings. Yes, if all you want to do is convert or re-encode video, you'd be better off with HandBrake (go.macworld. com/hbrk). But there's something to be said for a simple app with a simple interface, provided by Apple, that will handle basic tasks like this.

Will I get by when QuickTime 7 dies? Sure, between HandBrake, alternate players, and dedicated audio- and video-

editing apps, I will still be able to do everything I do with that tool now. But in many cases it will be messier, take more time, and generate output of lower quality.

I wish I could hold out hope that someone at Apple really does care about basic tools like this—hey, wouldn't it be cool if you could easily do stuff like this on iOS, too?—but the reality is, not only is the Apple that built QuickTime long gone, the Apple that decided to abandon it for 64-bit processors is nine years in the rearview. It was a good run, using a completely deprecated (yet still useful!) tool for nearly a decade, but I guess it's finally time to move on. ∎

Will I get by when QuickTime 7 dies? Sure, between HandBrake, alternate players, and dedicated audio- and video-editing apps, I will still be able to do everything I do with that tool now.
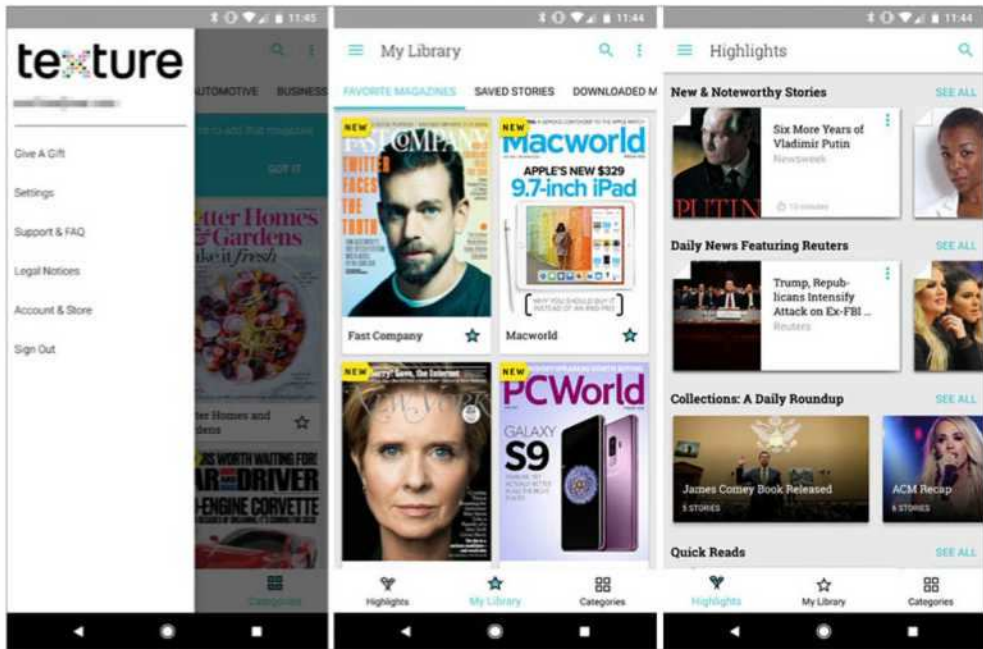
# Apple's new model: Please subscribe

Apple's Services division has become one of its more successful businesses.

**BY DAN MOREN**

Over the past year or so, Apple's spent a lot of time talking up its Services division—which includes not only Apple Music, but also the likes of iCloud, the iTunes Store, and Apple Pay— and for good reason. Analysts have been paying a lot of attention to Apple's

Services, not least of all because it's shown solid growth, even at times when other segments of Apple's financial results have been more lackluster.

So you can bet that Apple's not about to walk away from the services business anytime soon. In fact, if recent reports are any indication, the company is devoting

even more effort to the segment, with at least two brand-new services in development and the shifting of two of its biggest storefronts to a more subscription-focused angle.

This isn't the first time that Apple's tried to build a service for publications: the late, not terribly lamented Newsstand debuted in iOS 5 as an attempt to group together newspaper and magazine apps.

## DIGITAL NEWSSTAND

The most recent Apple subscription service to make the news is, well, the news. Back in March, the Cupertino-based company acquired Texture (go.macworld.com/bytx), a digital magazine subscription service. The suggestion at the time was that the company would fold it into Apple News, which has now been tacitly confirmed by Apple senior vice president Eddy Cue as well as other third-party reports.

As always with Apple, though, it's the details that matter. This isn't the first time that Apple's tried to build a service for publications: the late, not terribly lamented Newsstand debuted in iOS 5 as an attempt to group together newspaper and magazine apps. But it wasn't a big hit with users, and publications had issues with the subscription mechanism Apple provided, as it often ended up putting a barrier between them and their customers.

That's one problem Apple will have to overcome for any news subscription service. The second is figuring out what exactly consumers will pony up for. In the recent climate, news organizations have been pushing harder on paid subscription models, so finding some way to group several publications with paywalls into a single subscription fee could prove attractive to customers who don't want to shell out for each different news site.



**The Newsstand iOS app didn't last very long, replaced by the News app.**

**A video subscription service would help Apple compete with the likes of Amazon, Hulu, and Netflix.**

## LET'S GO TO THE VIDEO TAPE

Apple's video subscription service is a foregone conclusion at this point: it's an open secret that the company's spending $1 billion on original content. But beyond the broad slate of programming that has already come out, we know next to nothing about the subscription service itself: Will it feature content other than Apple originals? Will it be bundled alongside Apple Music? How will it play, if at all, with video content available via iTunes?

Having just passed the 40 million subscriptions mark on Apple Music, it seems like there's a decent chance that the big built-in base of subscribers there will also get access to Apple's video content. (Alternatively, there may be a bundle price for both services, just as Hulu and Spotify have recently teamed up to offer.)

With all the other video streaming services out there, it's pretty obvious why Apple wants a piece of the pie. Amazon, after all, just announced the first numbers for its Prime subscription service, which has cleared 100 million subscribers. So there's plenty of room for Apple to grow by adding value to its own subscription offerings.

(On a personal note, as someone who's wanted to see a full-blown Apple subscription TV service for more than a decade, I'm still hopeful that we might someday see such an option, though rights and negotiations make it tricky.)

## REJIGGERING PRIORITIES

On top of two brand-new services, Apple's also shunted a couple of its existing services toward the subscription model. Rumors of the iTunes Store going away are probably overblown, but the push for Apple Music shows that the company is clearly interested in emphasizing recurring
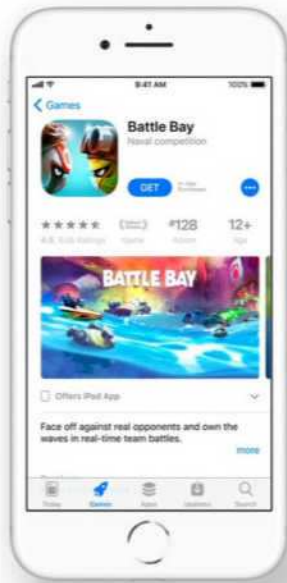
The App Store is more open to offering apps that work based on a subscription model.

subscription revenue in digital music over à la carte. And thanks to the rise of widespread connectivity and mobile devices over the last decade, the market has proved plenty ready for it.

Likewise, over in the App Store, Apple has started to encourage more developers to take up the subscription model for software as well. That option first debuted for certain types of apps, including publication-related ones, back in 2011. But in recent years, Apple has relaxed restrictions on what kind of apps can take advantage of subscription pricing; it's also sweetened the pot for developers, offering a better cut of revenue for the developer after the first

year of a user's subscription.

That helps both Apple, which makes a percentage on subscription revenue, and developers, who get recurring payments that help them fund updates (as opposed to the de facto "every update is free" model). Long term, benefits to developers do benefit users, because it helps keep apps alive and kicking, but the model's not without its hurdles.

## TOO MANY SUBSCRIPTIONS

The real challenge of the push toward subscription models is that there are simply too many of them. Paying $5 a month here and $10 a month there starts to add up, which can lead to each new subscription being increasingly tough to sell users on.

That said, the good news is that even if Apple is working hard to convince users that the subscription model is ultimately less confusing and more beneficial, for the moment, we have the best of both worlds. Video, apps, and music are all available either à la carte *or* as a subscription, each with their own benefits and caveats.

Might those options narrow some day? It's not out of the question. The subscription model certainly isn't going anywhere—not as long as Apple's Services division is trucking along, anyway. Expect to see more requests to "please subscribe" in your future. ∎

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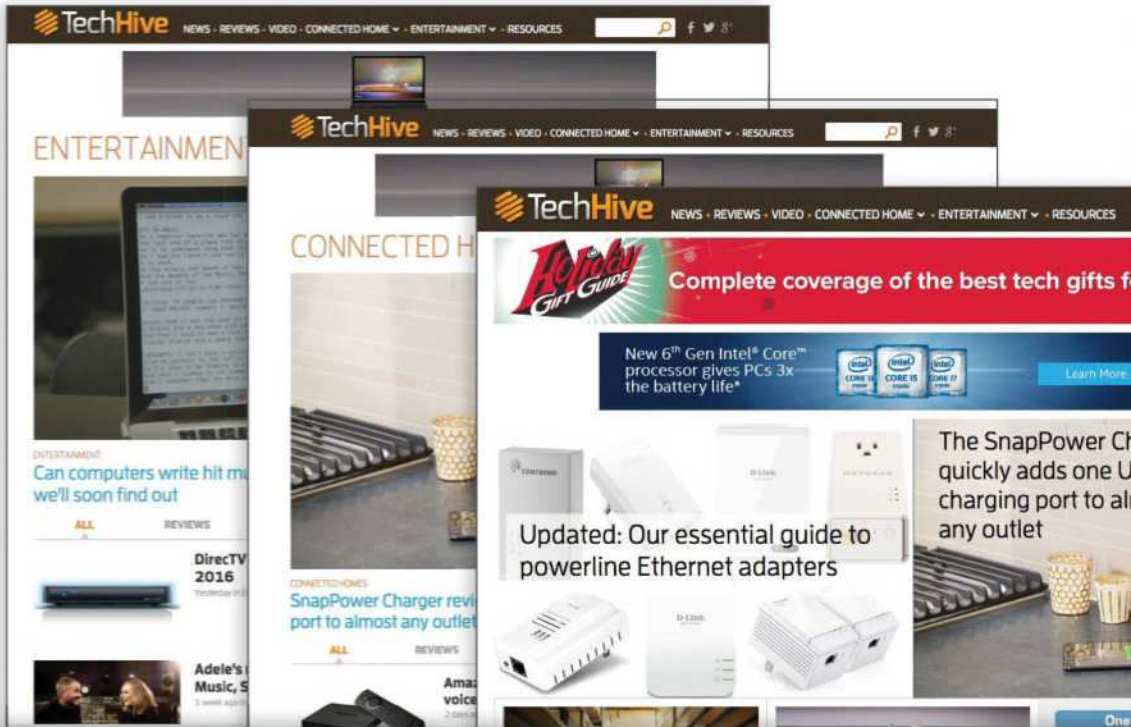
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# REVIEWS



WORD PROCESSING SOFTWARE

# PAGES 7 FOR MAC: BETTER WORKFLOW AND TOOLS FOR PRODUCING DIGITAL BOOKS

**BY GLENN FLEISHMAN**

Pages 7 (go.macworld.com/p74m) is the latest in a series of ongoing and gradual improvements to the 2013 "reboot" of Apple's iWork suite or productivity apps, which also includes Numbers and Keynote. That reboot rewrote the apps from the ground up, but also omitted features that users had relied upon for years.

Over time, many of these features were restored even as the apps expanded what they did in other areas. Pages 7 continues on this path. While it's numbered as a major release to keep it in harmony with Pages for iOS (go.macworld.com/p44i), the iOS release has a greater number of significant additions.

*IMAGE: APPLE*

## BOOK CREATION

The flagship change includes book templates for interactive EPUB ebooks, allowing an end-to-end workflow for creating rich digital documents without the compromise of starting with templates and pages designed for printer output, even after all these years.

Alongside this new book workflow are two relatively obvious improvements for managing and producing documents: side-by-side page viewing within Pages (a feature that's been missing for five years), and the ability to create two-page spreads (facing pages) when exporting layouts to PDF and EPUB.

The last time we reviewed Pages for macOS was version 5.6, which added significant typographic and other support, and should probably have been numbered version 6.0. In the actual 6.0 version, Apple mostly offered a beta release of real-time collaboration. Version 6.1, 6.2, and 6.3 refined and put into production better collaborative editing, while bringing back RTF (Rich Text Format) import and export, Touch Bar support, document-wide font replacement, internal bookmarks, PDF table of content export, and 500 additional shapes. (Version 7 adds more shapes, and they're editable, too.)
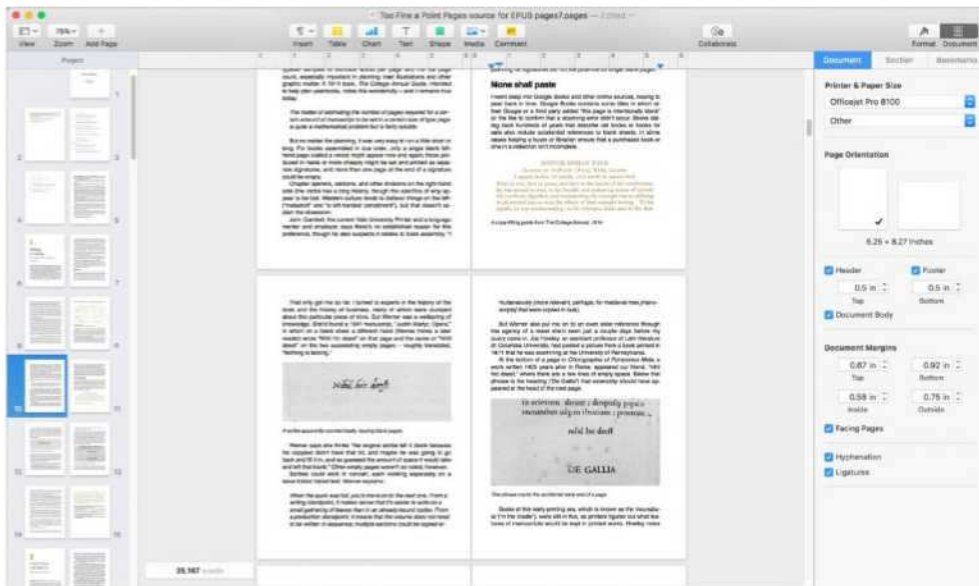


**With both facing-page layout and side-by-side views, you can better work with and design books and large documents.**

**Creating ebooks via Pages templates allows a streamlined and end-to-end workflow.**

Across those releases, Apple gradually improved support for the EPUB standard, including an upgrade to allow EPUB 3 exports, which allow interactive components and fixed layouts that resemble PDFs but work with standard ebook-reading software and hardware. (Amazon's Kindle is the exception, relying on both the old and simplified MOBI spec for older readers, and a modified version of EPUB called KF8 for its newer hardware.)

Pages 7 seems to bump that up a notch. I tested a flowing EPUB that had a number of typographic refinements, different typefaces, and inserted images created in Pages that I'd had to monkey with when using version 6.3 for export. With Pages 7, the export was nearly perfect. (You can crack open EPUB files, which are compressed with ZIP, and manipulate style sheets and underlying HTML-like document structures.)

You might be confused where iBooks Author fits into all this, and you're not alone. The difference between it and Pages is now quite thin. iBooks Author (go.macworld.com/ibka) offers a few kinds of additional interactive elements, like widgets, which offer animation and other touch-based responses. It also offers a live preview of

the resulting EPUB output; with Pages, you have to export. Because Pages is a general-purpose app, it seems like a better route for most people to work in to create EPUBs and PDFs with this new release. Neither Pages nor iBooks Author edits EPUB files directly; they're always exported from the app's source files.



**Reduce File Size can help compress files bloated due to multimedia that's larger or includes more detail than needed.**

Using the new ebook templates to create ebooks radically simplifies making books for people without design chops or the desire to start from scratch. The templates have buttons in the corners of images you click to drop in your own images, and placeholder text appears with a livid outline to make sure you don't forget and leave it in place. You can click in a thumbnails navigation sidebar to add additional pages with different layouts within the template package. (You can separately create page templates in any Pages page-layout document via a new master pages option.)

You can edit these Pages books (and any documents) with aplomb in iOS as well, although I prefer the mouse-based interface to a touch-based one for placing and positioning images. The macOS version of Pages also features a ruler from which you can drag in page guides. (Rulers are broken in the initial iOS release, and page guides are missing.)

## OTHER FEATURES

Media selection is extremely laggy, even on a 2017 iMac. While I have an iCloud Photo Library of over 37,000 images, they're stored at full resolution on this iMac, and it took minutes to bring up the initial selection view. If you switch away from Pages, load progress is apparently lost and it restarts whatever process it's engaged in. After an initial load, perhaps caching thumbnails, every subsequent action incurred delays of tens of seconds to minutes. The media selector is a systemwide function, but it's readily apparent how poorly optimized it is in a program designed to use images. (Pages also has

two different ways to select media, and neither seems to recall the last place from which you selected.)

Apple has gradually beefed up editing and collaboration features, including ever-better Track Changes and commenting options—they've been around for a while, but didn't work well until a few releases ago—and real-time simultaneous document editing.

Pages for iOS adds a beta of Smart Annotations in iOS, allowing graphical markup of a document with a Pencil or a finger. These appear in the Mac release, but they can only be viewed or deleted. Since it's a beta, it's possible that will change, and allow you to "draw" with a mouse or trackpad.

The Pages update includes a handful of miscellaneous additions, too. Including:

> You can enable an Autocorrect option and type fractions that have special drawn versions in the typeface you're using, and Pages automatically converts them.

> If you use charts and graphs in Pages, you can excitingly make use of donut charts, while tables have gained conditional highlighting based on values.

> Box document-sharing users don't have to rely on iCloud for collaboration, but

**Pages for iOS adds a beta of Smart Annotations in iOS, allowing graphical markup of a document with a Pencil or a finger.**

can work through Pages documents stored on that service as well.

> Apple offers a way to reduce storage consumed by audio, video, and images embedded in the document by opting to downsample or use more efficient formats (via File ➜ Reduce File Size).

Some features could use more explanation than that found in release notes and the functional-but-thin help files for Pages. For example, a new image gallery option makes little sense for page layout or word processing, and the how-to instructions give no insight on how you might use it. In fact, it's an interactive feature that only works in Pages and when exported to EPUB, where it's a useful addition.

## BOTTOM LINE

Pages 7 for macOS is a significant bump up for people who routinely produce documents shared digitally, whether as PDF or in EPUB ebook format. ∎

### Pages 7 for Mac

**PROS**

• End-to-end EPUB ebook production workflow.

• Better document and book editing, viewing, and management tools for digital output.

**CONS**

• Can only view and delete, but not add Smart Annotations.

• Media selection is clunky, and very slow with a large library.

**COMPANY**

Apple

# KEYNOTE 8 FOR MAC: NEW IMAGE GALLERY, BETTER INTERACTIVITY WITH OTHER IWORK APPS

**BY GLENN FLEISHMAN**

Keynote 8 (go.macworld.com/kymc) for Mac hasn't reached the apex of its perfection, but Apple clearly didn't have a wishlist of features to push it forward. The latest release for Mac brings it up to date with simultaneous releases of Keynote for iOS (go.macworld.com/kyio) and Pages (Mac [go.macworld.com/p74m] and iOS [go.macworld.com/p44i]) and Numbers (Mac [go.macworld.com/nm4m] and iOS [go.macworld.com/nios]).

## GETTING UP TO SPEED
We haven't reviewed Keynote since version 6.5.3 in 2015, so it's worth a look of what's changed since then. Apple

continued to push forward development through incremental releases from 7.0 to 7.3, which restored a number of features that we found lacking (go.macworld.com/ky65) in 6.5.3.

Version 7.0 added a beta of collaborative real-time editing. Version 7.1 offered up one of the most significant changes: an Object List that made creating complicated builds vastly easier, as selecting and ordering items in the build was a frustrating process that lead to literal head-to-desk slamming. It's still weaker than other presentation apps, and I've spent hours moving items around to create the right flow—but at least now, it's feasible. In version 7.2,

navigation and marking up a document in text (with replies and threaded comments) became far better.

## NEW FEATURES

In Keynote 8, Apple added a small list of features that make it easier to move presentations between iOS and macOS. Also, there's more consistency with tools and expectations across Keynote, Pages, and Numbers on both platforms. That should reduce any friction as you work among apps and across platforms, even if nothing else has changed.

Image galleries are the only new interactive feature, letting you insert and label images in a frame that can be paged
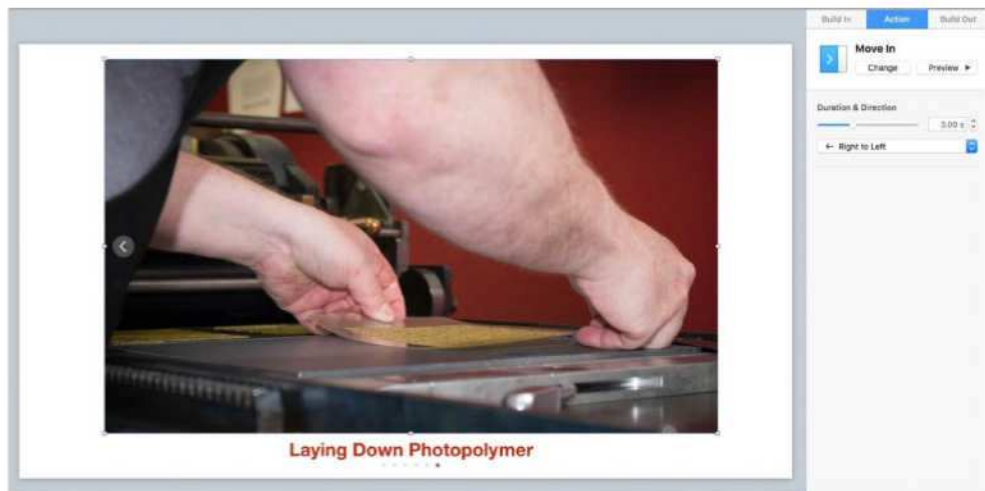


**The image gallery feature lets you create slideshows that you can either advance manually or set a timed, automatic advance.**

through manually or as an auto-advance slideshow. You can preview this while setting it up, and then advance through the images while presenting or set it to run. Creating a pseudo-slideshow through builds in version 7.3 was maddening; now, it's just a drag and drop process. For automatic or manual playback, you can set one of three kinds of builds through the images: Appear, Dissolve, and Move In. For automatic playback, you can set the duration between images. This is a very welcome addition.

Media selection remains extremely laggy, even on a 2017 iMac. While I have an iCloud Photo Library of over 37,000 images, they're stored at full resolution on this iMac, and it took minutes to bring up the initial selection view. If you switch away from Keynote, at least the load progress is not lost (as it is in Pages 7 for Mac). The media selector is a system-wide function, but it's readily apparent how poorly optimized it is in a program designed to use images.

Keynote now offers donut charts, a missing option despite the many other kinds of charts available in this and other Apple productivity apps. As with all the updates to apps, there are new shapes of all sorts you can insert and then

edit to customize. Support for real-time collaborative editing for Keynote files shared via the Box document service is now included here as in all the productivity apps on both platforms.

Apple also added a way to reduce the file size of presentations, something useful when you're dragging in full-resolution images or movies that you're using just a portion of. With File ➜ Reduce File Size, you can opt to downsample, using Apple's versions of more efficient HEIF image and HEVC video compression, and clip video and audio to store just the portions used in the file. Be wary, though, that you don't create a presentation that needs to run on an older Mac that can't display these file formats.

## BOTTOM LINE

Keynote 8 for macOS is not much more than a maintenance release, despite inserting the suite-wide image gallery feature as a slideshow option. Even though it's a mature app that's generally good to use, Apple should be considering a roadmap for improvement of its weakest elements, and pushing forward with new modes and better processes for building and revising interactions. ∎

### Keynote 8 for Mac

**PROS**
- Stability in a relatively mature program.
- Gallery option allows easy creation of timed slideshows.
- Better feature parity and compatibility across apps and platforms.

**CONS**
- No effort to move the app significantly forward.

**COMPANY**

Apple

# NUMBERS 5 FOR MAC: INCHING CLOSER TO BEING A MORE FULL-FEATURED SPREADSHEET APP

**BY GLENN FLEISHMAN**

Numbers for Mac (go.macworld.com/nm4m) has always occupied an awkward position. It's not powerful enough to replace Excel or Google Sheets for many business purposes, and it's designed partly to be an interaction, quantitative-information presentation tool. Numbers for iOS had even more of a bias towards presentation until the latest update brought it a little more power.

However, Apple keeps pushing forward, and Numbers 5 for Mac has only a single significant change that Apple mostly underplayed, as most of the

changes improve feature parity and seamless interchange between Numbers for Mac and iOS (go.macworld.com/nios), while also making the apps more consistent with Pages (Mac [go.macworld.com/p74m] and iOS [go.macworld.com/p44i]) and Keynote (Mac [go.macworld.com/kymc] and iOS [go.macworld.com/kyio]).

**The big macOS change is relatively boring but very practical: the ability to import field-based data exports from databases, apps, and web services.**

## NEW FEATURES

The big macOS change is relatively boring but very practical: the ability to import field-based data exports from databases, apps, and web services. Until now, Numbers lacked any useful way to control how it parses information that needs to be plopped into columns and rows. You relied on whatever defaults and assumptions Apple made. If your data didn't conform and you couldn't modify the output of whatever program app or service you used to meet it, you'd have to manipulate your exported data in yet another piece of software.
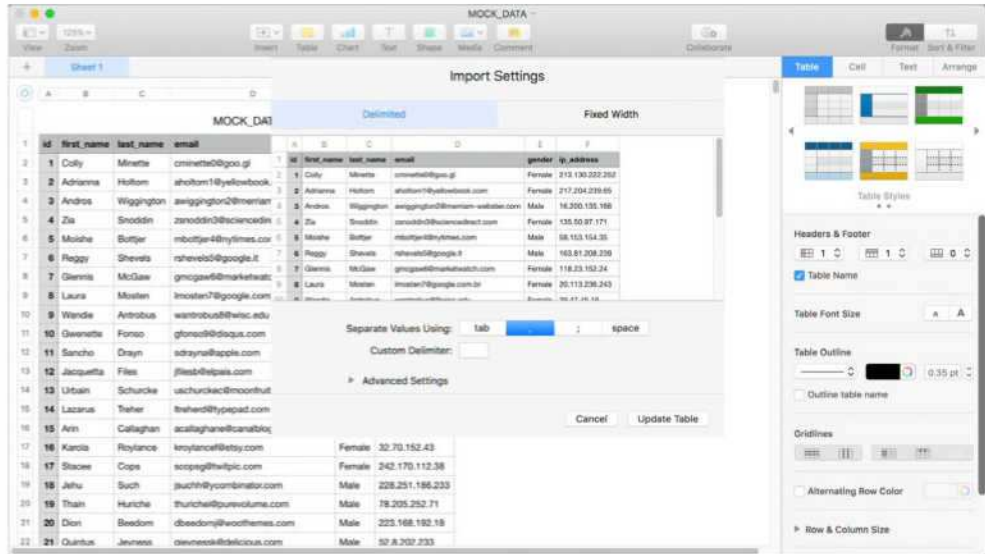


**New Import Settings ease the process of massaging data from disparate sources into Numbers.**

That's now in the past with Import Settings, an option that appears when you click Adjust Settings after you open a text file that has formatted data in it, whether it's in comma-separated values (CSV) format or a fixed-width text format. Technically, you don't even have to use CSV format any more, as you can adjust to use tabs, spaces, semicolons, or a custom delimiter.

The Adjust Settings button is a little bit irritating, as it appears very briefly. The moment you engage with the spreadsheet, it disappears, and you have to re-import the file to get the option back.

Import Settings also appears when you paste text into Numbers. Previously, you had to rely on Numbers automatically interpreting and massaging that import, although it tended to do better with pasted text than text in a formatted file. I tested copying a variety of tables from Web pages into Safari, and Import Settings definitely provided far better results. However, Numbers 5 no longer handles certain formatting and wrapping issues correctly when pasting that the previous release did. If you commonly copy and paste from a browser, you may find Numbers 5 adds a text-massaging intermediate stage, or at least until Apple

releases an update or adds additional formatting options.

As with updates to the other iWork apps, Numbers gets donut charts, new insertable shapes that can be edited, and support for collaborative editing via the third-party Box document-sharing service. And Apple offers a way to reduce storage consumed by audio, video, and images embedded in the document by opting to downsample or use more efficient formats (via *File ➤ Reduce File Size*).

Though seemingly a little out of place, you can also insert an image gallery into a Numbers sheet, just as in Pages, although you can only move through these images within a Numbers document. There's no way to export it for interactivity.

## BOTTOM LINE

Numbers 5 for Mac advances the app, making it more useful for more purposes with less effort, but it's still a shadow of full-feature business spreadsheet programs. Nonetheless, the set of improvements in the macOS and iOS versions make your work easier in shifting back and forth and getting the most out of the numeric and presentation sides of the software. ∎

**Numbers 5 for Mac**

**PROS**

• Import settings for data reduce the amount of extra work to massage data.

**CONS**

• Still relatively unsophisticated compared to more full-featured business spreadsheet apps.

**COMPANY**

Apple

# Hot Stuff

## AVANTREE TC418 BLUETOOTH TRANSMITTER

avantree.com

For gear manufactured before the age of Bluetooth, there's the Avantree TC418. Connect your non-Bluetooth device via USB, optical, AUX, or RCA, and then the TC418 can stream to your Bluetooth devices. For audio only, it streamed perfectly within about a 45-foot unobstructed radius. But due to the nature of Bluetooth, you'll notice latency issues with video soundtracks. Overall, the TC418 is affordable, easy to use, and small enough to tuck out of the way.—**JON L. JACOBI**

# EVOLUENT VERTICALMOUSE C RIGHT WIRELESS

evoluent.com

The Evoluent VerticalMouse C Right Wireless was designed combat  repetitive strain injury (RSI), at least for the right-hand dominant. The company claims the palm-down position used to operate conventional mice twists your forearm and puts you at risk of injury over time. The VerticalMouse C Right Wireless puts your arm in the more "neutral"—and presumably safer—handshake grip position. We did find the mouse more comfortable to use than either a laptop's trackpad or a conventional mouse.**—MICHAEL ANSALDO**

# Hot Stuff

## LIFX A19
lifx.com

—

Smart light bulb pioneer LIFX continues to innovate, with its Frankenstein's-head-shaped bulb continuing to lead the pack on everything from build quality to software features. These HomeKit-compatible bulbs appear in the iOS Home app but the LIFX app is more powerful, letting you adjust color tuning, and its Day & Dusk feature automates lights turning on to an energizing cold light in the morning and slowly fading to a relaxing warm light at night.**–MICHAEL ANSALDO**

# GrayKey: What you need to know about this iPhone hacker and how to protect yourself

A couple of tools on your device can give you piece of mind.

**BY GLENN FLEISHMANN**

Police and other law-enforcement agencies now have inexpensive access to a hacking device that can crack iPhone and iPad passwords in a matter of minutes. First reported in early March by Forbes (go.macworld.com/iful), GrayKey, from a company called Grayshift (go.macworld.

com/gshf), is designed for turn-key cracking of iOS passcodes.

In mid-March, Malwarebytes explored the device in greater depth (go.macworld.com/gkil), noting that a four-digit PIN could be cracked in a couple of hours and a six-digit PIN would require as many as a few days.

**GrayKey iPhone unlocker**

Motherboard extended this reporting recently (go.macworld.com/catc), with more details about how GrayKey has been used in the field. And security researcher Matthew Green posted a message on Twitter (go.macworld.com/twmg) showing the theoretically fastest cracking time possible given the parameters he knew, which brought the issue back to the fore given the potential for even quicker breaking of six-digit PINs.

GrayKey has two Lightning plugs, and requires iOS devices to be connected for about two minutes, after which the cracking starts on the device. It's not currently known what exploits the company uses to accomplish this on-device feat that also disables a number of passcode-retry and re-entry delay strategies Apple started building in years ago. You can expect Apple is working all its angles to discover the exploit and patch it, as it's done for any techniques for jailbreaking iOS or bypassing security in the past.

If you're not involved in criminal, civil, or political behavior that might subject you to law-enforcement action, you might think that GrayKey is of no importance to you, as your device would never be subject to it. And in many countries, including the U.S., courts can compel you to provide information to unlock a device, with penalties of imprisonment if you fail, too, which have been effective so far in cases in which this has emerged.

But the mere existence of GrayKey

means it's possible, even likely, that there are other people who have discovered similar paths, and that unless Apple patches this vector, less-polished devices will wind up in the hands of criminals, even organized syndicates, who can then make use of stolen phones in a way they haven't been able to before.

What can you do to better secure yourself, if you haven't taken these steps before? Switch to a longer PIN or a sufficiently long and complicated passcode and enable Find My iPhone/iPad. Here's how.

## PICK A STRONGER PASSCODE

Apple started pushing six-digit PINs with iOS 9, likely because it was aware of how rapidly the right hardware and phone-cracking software could pick a four-digit "lock." However, it didn't force owners with older devices to upgrade to six digits, and you can downgrade to four digits after setting up a longer PIN.

The ease with which GrayKey can crack a six-digit PIN means they're no longer secure enough. A seven-digit PIN would extend days to weeks of cracking, and an eight-digit PIN would extend that to several weeks or a few months.

Security researcher Green recommends an even longer numeric PIN, because, like a phone number, it can ultimately be memorized. (Please don't pick anything that looks like a phone number, however.) A 10-digit PIN would take over a decade on average to crack using an on-device tool, according to his calculations.

I recommend using Diceware (go. macworld.com/dcwr) or a similar approach, which involves rolling for or using a generator to create a set of words unlikely to appear together and that add up to enough length to defeat brute-force cracking, like this one I just generated: `departed-refute-armored-clock-stinky`. (The time to crack on the site linked for Diceware is for generic offline cracking of passwords, not the GrayKey on-device method, which is substantially slower.)

Many security experts recommend long passphrases comprising words because they're more likely to be memorized, and dictionary-based cracking tools—even ones that use frequency analysis and other predictors of words to occur together—

Apple started pushing six-digit PINs with iOS 9, likely because it was aware of how rapidly the right hardware and phone-cracking software could pick a four-digit "lock."

won't help for unlikely combinations.

These are more tedious to enter—mine is over 20 characters and has some punctuation separating the words—but they're easier to retain and can be very strong. I rely on 1Password's password generator feature to create these, but many password safes and other tools can create word-based long passwords. Do not use common phrases or common words with a few numbers or punctuation marks added.

Based on how GrayKey works, more sophisticated attacks that require massive dictionaries don't appear to be feasible, because of how the tool runs on the iOS device itself. That could change, of course.



**Change Passcode Options lets you pick a longer numeric code or switch to one with any characters in it.**

## HOW TO SET YOUR PASSCODE IN iOS

Here's how to set a longer passcode or one made of words and punctuation:

**1.** Launch Settings and tap Passcode or Touch ID & Passcode or Face ID & Passcode.
**2.** Enter your current passcode.
**3.** Tap Change Passcode.
**4.** Tap Passcode Options.
**5.** For a longer numeric passcode, tap Custom Numeric Code. For ones with more than just numbers, tap Custom Alphanumeric Code.
**6.** Enter the new code and verify it.

Apple instituted an additional Touch ID expiration period of six days (go.macworld.com/ntid) on top of existing passcode entry requirements more than two years ago. If you haven't entered your passcode for any reason, including restarting your device, for more than six days, you'll be prompted for it after eight hours of not unlocking your phone with a Touch ID. For many people, that will happen in the morning.

## ENABLE FIND MY iPHONE/iPAD

Apple added an activation lock in iOS 7 that connects Find My
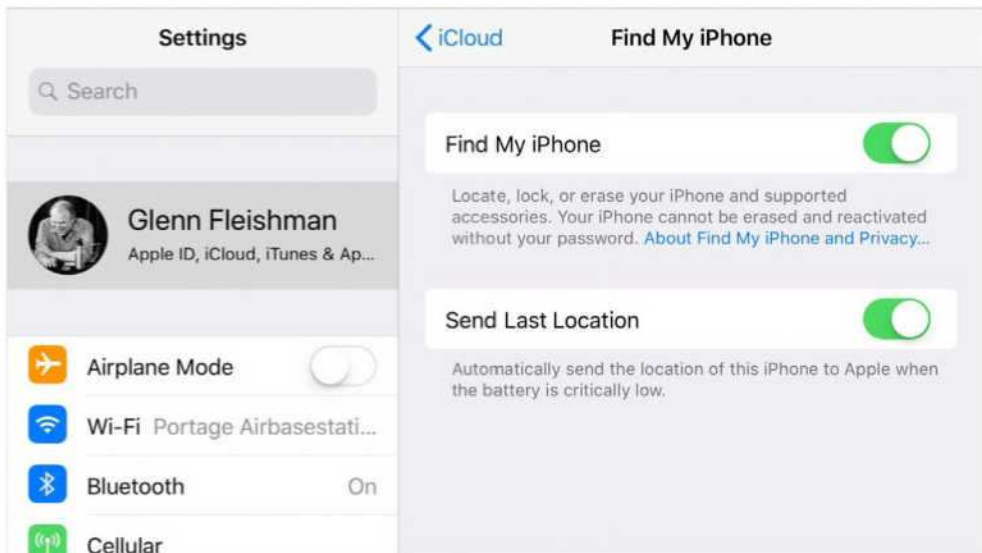
**Find My iPhone makes it possible to erase a device remotely and reduces the utility of resale, deterring criminals who might gain access to cracking hardware.**

iPhone (labeled Find My iPad on those devices) to your iCloud account. Even if an iOS device is erased, so long as Find My iPhone was active, it can't be used again without access to the iCloud account password.

While you might think that having your phone's passcode cracked would be enough harm, because someone could then obtain access to everything on your device, Find My iPhone can offer two bits of piece of mind.

First, you can use Find My iPhone to mark that you want your device erased. This will happen either immediately if the iOS device is connected to the internet, or

the next time it comes online. I assume GrayKey has methods to prevent the device from accessing the internet after being cracked, too, but that's not useful for those whose intent is reselling it. And they may make a mistake.

Second, the activation lock feature means that even if the phone or tablet is erased, it can't be reset and resold. This may seem like a false victory to you—your hardware is still in somebody else's hands. But it deters theft in general, and any criminal or gang that uses tools like those in the GrayKey to crack phones will be reminded quickly that there's little utility in it for extracting cash. ∎

# Apple is poised to take another swing at news subscriptions and this time it might work

If the price and content is right.

BY MICHAEL SIMON

Raise your hand if you remember The Daily (go.macworld.com/daly). Back when the iPad still had a 30-pin connection port, Apple teamed up with News Corp to bring a new type of publication to the burgeoning tablet market featuring exclusive, interactive content, rich animations, and touch-focused games. It cost a buck a week or $40 a year and was delivered to Apple's Newsstand app on the iPad each morning. It lasted less than

two years (go.macworld.com/dlsh).

The biggest problem with The Daily was that it was too middle-of-the-road. Even after the early bugs were squashed, The Daily's content was too generic to find a dedicated audience, a death knell in today's 24/7 news culture. But Apple hasn't given up on making subscription news a feature on iPhones and iPads. Just last month Apple announced it had acquired magazine delivery app Texture (go.macworld.com/dmss), and according to a new report from Mark Gurman at Bloomberg (go.macworld.com/mgbb), a "premium subscription" news service is on the way.

If you hadn't heard of Texture before Apple gobbled it up, the service offers all-you-can-read access to hundreds of magazines for $10 a month (*Macworld* among them). The service is one of the most popular apps in both the Google Play (go.macworld.com/txgp) and iOS App (go.macworld.com/txis) stores, with thousands of five-star ratings.

Gurman says Apple is working on integrating Texture technology into Apple News (go.macworld.com/anws), a free reader app that launched as part of iOS 9 in 2015. According to his sources, an upgraded News app will debut within the next year with a new subscription component, with a slice of the revenue going to publishers. If it all sounds

familiar to Apple's Newsstand app, that's because it kind of is. Apple has already tried to offer subscriptions to newspapers and magazines through iOS, but this new approach has a whole lot more going for it.

## ALL THE NEWS THAT'S FIT FOR PIXELS

If Apple follows the Texture model for the new Apple News, it could be a groundbreaking initiative for publications. While Texture is a popular service, building a subscription model for news into every iPhone and iPad would give publishers tremendous visibility, and pairing it with the excellent (and free) News app would let users get a taste of what their $10 will buy.

Unlike the Newsstand delivery method, readers wouldn't have to buy magazines piecemeal, so an Apple news service would expose users to a whole library of content they might not normally read. Also, since Texture is largely a glorified PDF reader, magazines need to be downloaded before they can be read, and there's no real interactivity within them. If Apple incorporates its new service into the News platform, articles would be rich and animated, and like Apple Music, Apple could suggest articles and publications based on your reading habits, spotlight trending stories, and create "playlists" of

like-minded articles.

Beyond Texture, there isn't a subscription news service that does for articles what Netflix and Hulu do for movies and TV shows. With exclusive content, engaging design, and a simple interface, Apple could simultaneously create and own a digital news service that combines Texture's interface with Apple's smart layout design (go. macworld.com/smld) and focus on breaking news. It would be like Google Reader on steroids. Rather than targeting single users, Apple could create a service that appeals to a wide variety of readers, no matter what kind of content they crave.

But the killer feature would be cross-platform compatibility. While Apple doesn't yet offer an Android version of its News app, Texture is available in the Google Play Store, much like Beats Music was when Apple bought the company (go.macworld.com/bybt) back in 2014. Even when it shuttered Beats Music to launch Apple Music a year later, it made a version for the Play Store that's just as good as the iOS one. I suspect an all-you-can-read Apple service would be just as popular on Android as iOS, especially as publishers look for an alternative to Facebook.

The Daily was a good concept that was poorly executed and too limited in scope and audience to succeed. With a new subscription service, Apple has a chance to make things right. And it just might work. ∎

News Corp shut down The Daily after less than two years.

# Apple innovations that you can't live without

Dan Moren has a few examples of Apple features and capabilities that make life much easier.

**BY DAN MOREN**

As a technology columnist, it's tempting to spend a lot of time noting the places where Apple can improve its products. There are always glitches, bugs, and design trade-offs to pick on.

But, on the flip side, it's worth calling out the places where Apple has made

great strides, not just in terms of introducing new features, but also for those capabilities that actually improve our everyday lives, or even just refining the technology that already exists to make it that extra little bit better.

So to shift gears a bit in this week's column, I'd like to mention a handful of

Apple innovations that I'm pretty thankful for—even if they could occasionally still use a tweak here and there.

## APPLE PAY IS DARING

Apple Pay (go.macworld.com/aply) is one of those technologies that it seems everybody should be using. To my mind, it might be one of the single best innovations to come out of Apple in the last few years, but it also has one of the most challenging uphill climbs ahead of it: the way people pay for things is deeply entrenched.

But my Apple Pay experiences have, by far, been a delight. The simplicity of using my iPhone or my Apple Watch to pay at the grocery store has elicited more than one impressed "ooh" from an employee.

This is Apple at its best, because not only is Apple Pay a pretty seamless experience, but it improves upon the convenience and security of our current payment systems—the latter of which, let's all agree, has a pretty spotty record in recent times.

If I'm not yet quite to the point where I'm ready to ditch the physical cards in my wallet in favor of my phone and watch, that's largely due to the slow adoption on the retail side. It's certainly gotten much better over the past couple years, but I still encounter a decent number of places that don't support contactless payments at all. But I imagine that adoption will only continue to increase as retailers upgrade their equipment over time. And hopefully that will encourage more and more people to ditch the old way of paying as well.
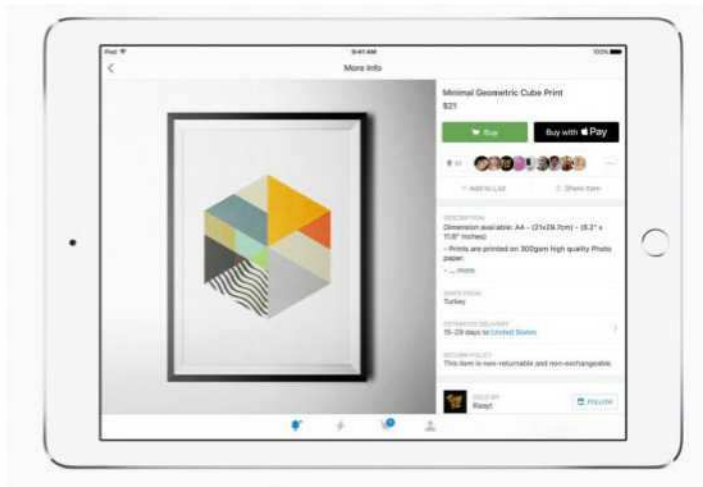


**Apple Pay could be one of Apple's best innovations in recent history.**

## AIRDROP HAS BECOME UNERRING

When Apple debuted (go.macworld.com/dbad) its AirDrop system back in 2011, it was a bit of an anticlimax: most significantly, the initial version didn't work between iOS and Mac devices, arguably the place

**AirDrop has come a long way since its introduction in 2011.**

that it was needed the most. It was also cumbersome on the Mac side, requiring you to specifically activate it before somebody could send you a file. When it did work, it could be very slow, and sometimes it failed altogether.

But AirDrop has been refined over the past few years and Apple has turned it into an indispensable tool. I use it to quickly transfer screenshots and other photos to my Mac. I once used it to transfer a PDF I downloaded to my girlfriend's phone, which didn't have cell service while we were on the subway. During a recent trip to Iceland, the tour guide from our glacier hike used AirDrop to send us all the photos she took.

Yes, you could do some of these tasks with other features, like iMessage, but

AirDrop's seamless nature, ability to easily send files to people whose contact information you may not have, and flexibility makes it a real winner.

## LIGHTNING FOR CHARGING AND PAIRING

This one might seem a bit minor, but it's a lifesaver. The other day, the Mac mini connected to my TV wasn't booting. Upon further investigation, I determined that I needed to start in macOS's Recovery Mode and reinstall the operating system. However, I was having trouble with the mini recognizing my Logitech Bluetooth keyboard. I could have dug out a USB keyboard from somewhere, but I wasn't sure where I might find one in the mess of my office.

**The wireless Magic Keyboard uses a Lightning connector to charge.**

So I grabbed the Magic Keyboard from my iMac and a Lightning cable and plugged it directly into the Mac—voilà, instant connection, and no worrying about pairing. When I was done, I just took it back over to the iMac again, plugged it in once again, and it was re-paired. No muss, no fuss.

I know it's a little ironic to be praising a wired connection in this era of wireless, but sometimes there's no replacement for just plugging something in. And it's not only for keyboards, mice, and trackpads—the Apple Pencil uses a similar feature when you want to pair it with an iPad. Plus,

in each of those cases it doubles as a way to charge the peripheral, so it's kind of killing two birds with one stone.

## WI-FI PASSWORD SHARING IS CARING

A last, short one: The best part of iOS 11 is unquestionably the feature that lets you quickly share a Wi-Fi password with another device, whether it be one of your own or one belonging to someone in your contacts. Heck, this has saved me so much time and so many headaches that I might nominate it for Apple feature of the decade. ∎

# Learning to code with Swift Playgrounds as an adult

Apple's Everyone Can Code initiative is laudable but has a big gap to fill.

BY JASON CROSS

Apple thinks it is critically important that everyone learn how to code. It may not help you in your job directly, but it teaches useful skills and creates a basic knowledge of the fundamental workings of the products and tools we all use every day. It's not just something kids should do at school, but an important part of an ongoing education for adults.

So, the company created an initiative called Everyone Can Code (go.macworld. com/evcn) that aims to make it easy for anyone, from kids to adults, to learn the basics of writing code. Naturally, it's centered around Apple's Swift programming language rather than, say, C++ or JavaScript. And it all starts with Swift

Playgrounds, a cute iPad app that teaches the fundamentals of coding in a way so simple even young kids can grasp it.

I am *not* a young kid. I'm 43, and I have been glued to computers since my first Apple II. I decided to run through the Swift Playgrounds activities to see if it can teach an old dog new tricks.

## STARTING FROM SCRATCH(-ISH)

I'm not a total stranger to programming, but it would be a big understatement to say, "it's been awhile." I grew up writing simple BASIC programs on an Apple II in middle school, but it's been more than 20 years since I wrote even a few lines of code. (That was C++ class back in college.)

I went into this exercise with no clue what it's like to use real modern development environments or what a modern language like Swift is like.

I'm not exactly a total newbie, but I feel most comfortable starting from the very beginning. Time to load up Swift Playgrounds (go.macworld.com/splg) on the 'ol iPad…

…And wow, it's cute! And easy! So, so easy. This is clearly made for young children to grok. I have no problem guiding around Byte, my little animated character, to understand the basic concepts of what a program is, but I can't help but be turned off by how utterly simplistic Swift Playgrounds is. If I were eight, this would have been a delight. At 43, it's a little like curling up to read a good novel and it turns out to be Goodnight Moon.

While the juvenile appearance never fades, the mind-numbing simplicity doesn't last long at all. Most adults will quickly power through the first few lessons. By the time you've moved on from Nested Functions to For Loops and then
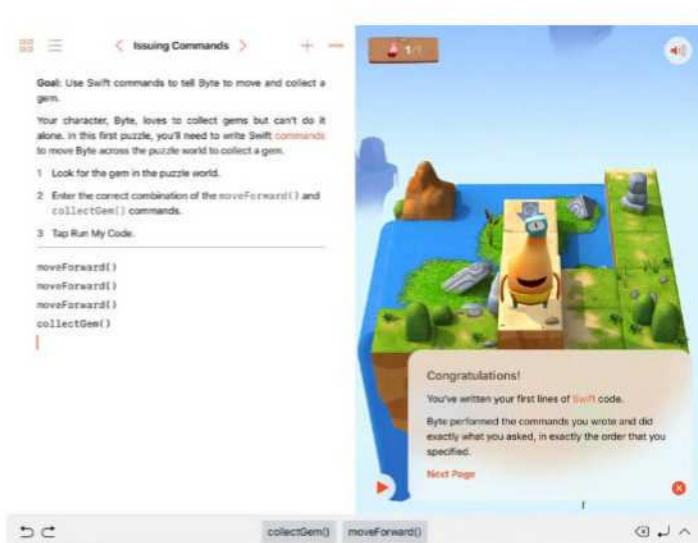


**Swift Playgrounds starts off mind-numbingly basic, but stick with it!**

Conditional Code, you'll be solving some real logic puzzles. (And if those terms confused you, take heart: The whole point of Swift Playgrounds is to introduce you to them.) The challenges are not terribly difficult—the app accepts any solution that works and you can endlessly tweak yours to fix problems—but you have to actually exercise your noggin.

Simply put, after about an hour, even grown adults should be fully engaged by Swift Playgrounds' playful coding puzzles. That's a big win. Parents and children can go through these activities together, and they can both really get something out of it.

## WHERE IT ALL BREAKS DOWN

It turns out that, after a rather boring first few lessons, Swift Playgrounds becomes thoughtful and engaging enough to capture the attention of adults. Your average middle-aged person who doesn't know the first thing about programming can spend an hour with the app every night, and in just a couple weeks they will probably finish all the lessons in Learn to Code 1 and Learn to Code 2.

That's enough to learn a lot. Getting that far, a person would really understand what it *means* to code. They'll understand how complex tasks are broken down into really simple tasks that are repeated and looped as needed, and how programs say "if this, do that, otherwise do this other
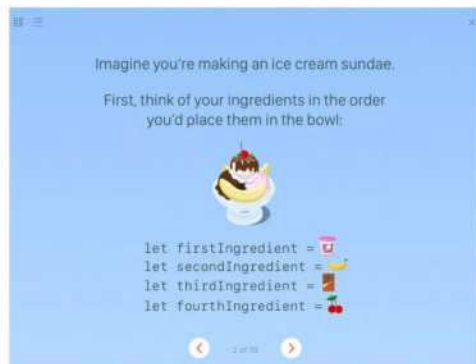


**Go far enough in Swift Playgrounds and you'll learn sophisticated concepts like arrays.**

thing." Making use of these tasks to solve little logic puzzles, guiding Byte around his little 3D world, is charming and really makes the concepts stick.

Eventually you'll go beyond just trying to guide Byte along a path, and start modifying and creating his little 3D world. If you go through Learn to Code 3, you'll learn stuff that looks like real app development: coordinates and placing graphics and touch events!

But *then* what? Swift Playgrounds teaches concepts and uses real Swift structure, but it's not real code. It doesn't make an app, it just guides Byte around and solves puzzles. Swift doesn't have a real command called **collectGem()** after all.

Swift Playgrounds can satisfy your curiosity about what coding is and how it works, but it doesn't really let you write apps. Not even a super-simple basic one.

The code you write can't leave the app; it can't even leave that particular puzzle page! If you want to actually make an app, Apple has a whole other curriculum.

## BRIDGING THE GAP

So you want to take your newfound knowledge of loops, if-else statements, and functions and write an app. Just bust out your iPad and...open the Apple Store app to purchase a Mac.

That's right, Apple's actual real-code-writing program, Xcode, is only available for the Mac. It's free, you just download it from the Mac App Store (go.macworld.com/xcde). Then you'll want to go to the iBooks store and grab Intro to App Development with Swift (go.macworld.com/iads). When you start reading that eBook, it'll prompt you to download some project files you'll use as you progress through the book.

This is traditional programming instruction, and it sucks. Reading along in a book, loading up sample code and making a few changes, taking little quizzes to make sure you understand the concepts...this is what learn-to-program-at-home courses have looked like for ages. Apple does a great job making the book and the

project files clear and interactive, but it's a boring, businesslike slog compared to Swift Playgrounds.

If Apple wants to really inspire people—both kids and adults—to *write code* instead of just learning *what code is*, it needs to bridge the gap between the colorful puzzle-solving of Swift Playgrounds and Xcode's developer-centric environment. Give us a transition phase that jettisons Byte in favor of a virtual iPhone screen. Walk us through the creation of a very simple app: something like a tip calculator, where the user inputs a dollar amount and presses one of two buttons (15 or 20 percent) to calculate the tip. That's not exactly going to become your first App Store submission, but it's the kind of thing a Swift Playgrounds graduate
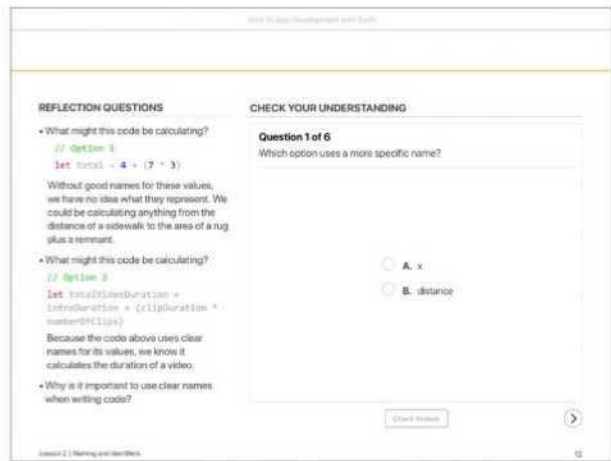


**If you want to write real apps, you have to hop on a Mac and go through a traditional, boring, course.**

**You know, Apple. A computer is a thing you use to write apps.**

could understand, and it performs a real-world task instead of navigating a cartoon character through a self-contained puzzle.

Did I mention you need to buy a Mac? It makes no sense that Swift Playgrounds is exclusively available on the iPad, and Xcode is available exclusively on the Mac. What a huge barrier to learning it is to lock it behind yet another expensive purchase. This, from the company that just ran a prominent TV commercial where a precocious bright young girl uses her iPad for everything and asks, "What's a computer?"

If you're an adult who wants to learn to code, don't let the kid-friendly nature of Swift Playgrounds dissuade you. It quickly becomes

sophisticated enough to make it a worthwhile and satisfying way to learn about core programming concepts.

But if you want to actually write usable code, you're going to have to do some real work. You need to use a Mac and Xcode to use the Swift knowledge you've learned, or else try to translate the concepts to a more portable language like JavaScript. Either way, you'll be stuck with the ol' "book and sample code" lessons that have plagued programming education forever, making you feel like you're back in high school. ◼

Did I mention you need to buy a Mac? It makes no sense that Swift Playgrounds is exclusively available on the iPad, and Xcode is available exclusively on the Mac.
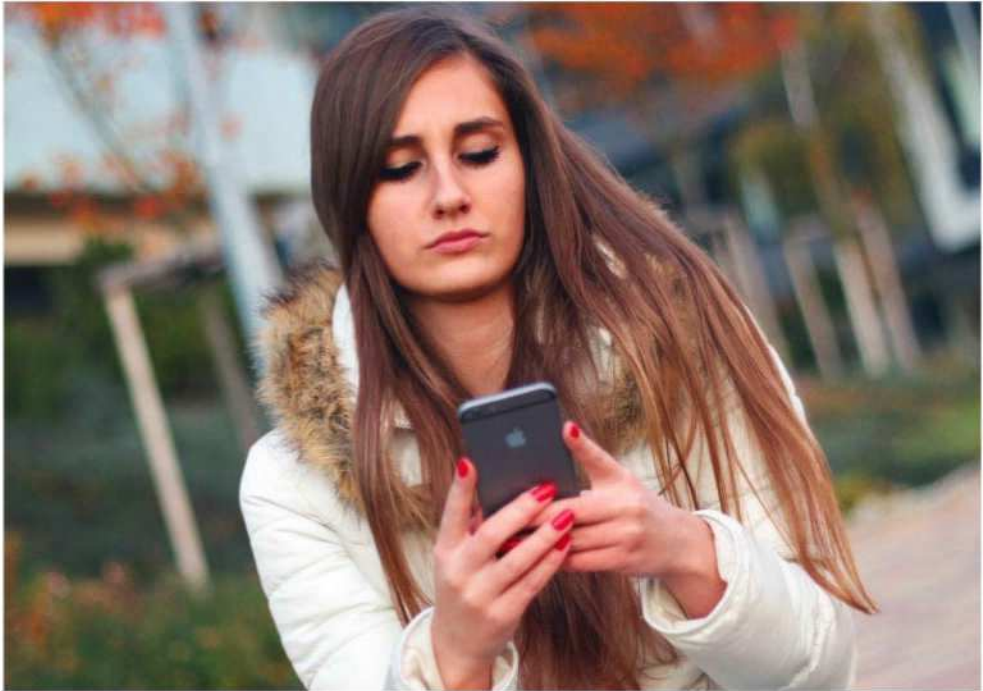
# How to fix autocorrect in iOS

What to do when you get inappropriate suggestions from the iOS autocorrect feature.

BY GLENN FLEISHMANN

You're tapping along on your iPhone or iPad, and suddenly an ordinary letter or word gets replaced by something bizarre. We're all used to autocorrect picking up weird expansions, which happens partly because Apple has introduced machine learning (go. macworld.com/inml) into how it predicts

what you might intend to type.

However, you might also be the victim of a prank, and if you have children or people with child-like humor around you, you probably know who did it, too. A *Macworld* reader whose identity I shall wisely keep secret in order to spare them further embarrassment, wrote in with this question:

*IMAGE: PEXELS*

*When I type in the letter I, I get the following "i see dem jeanzzz," and when I type in the word "hi," I get "You a big green stankie bugger." How do i stop this from happening?*



**Autocorrect is usually helpful, suggesting a sensible replacement.**

While it's possible iOS's autocorrect learned this from repeated entries, it's more likely that someone gained access to your device and set a shortcut. While I don't want to impugn young people, a young friend admitted this when I mentioned prank autocorrect substitutions:

*Once, I made "Hello" autocorrect to "Salutations" on my mom's phone.*

You can check one method for this kind of substitution through these steps:

**1.** Open Settings ➔ General ➔ Keyboards ➔ Text Replacements.
**2.** Review the list of items.
**3.** If you see something that looks ridiculous, swipe left on it, and then swipe Delete.

That takes care of obvious things. It's possible to retrain autocorrect to substitute words automatically, too. Sometimes on my iOS device, it will try to replace an ordinary word, like *and*, with something seeming off-base and

disturbing, like "Ahahahahahahah". I must have typed that in once and it decided it's what I meant all the time. This seems kind of sinister.

Typically, when autocorrect wants to drop a replacement in without enough confidence it's what you mean, you'll have a pop-over menu appear with suggestions that you can tap before you tap space or return, which accepts the word that's been dropped in. Tapping that pop-over helps retrain autocorrect, and you may only need to type the word a few times and pick your preferred replacement (which might be the actual word typed!) before it's back to normal. You can also double-tap a word, select Replace, and the pop-over menu with suggestions should appear.

If this is all too much, you can reset the dictionary, which drops all the words and replacements learned (just go to Settings ➔ General ➔ Reset and choose Reset Keyboard Dictionary), or disable autocorrect (go to Settings ➔ General ➔ Keyboards and toggle the Auto-Correction option off). ∎
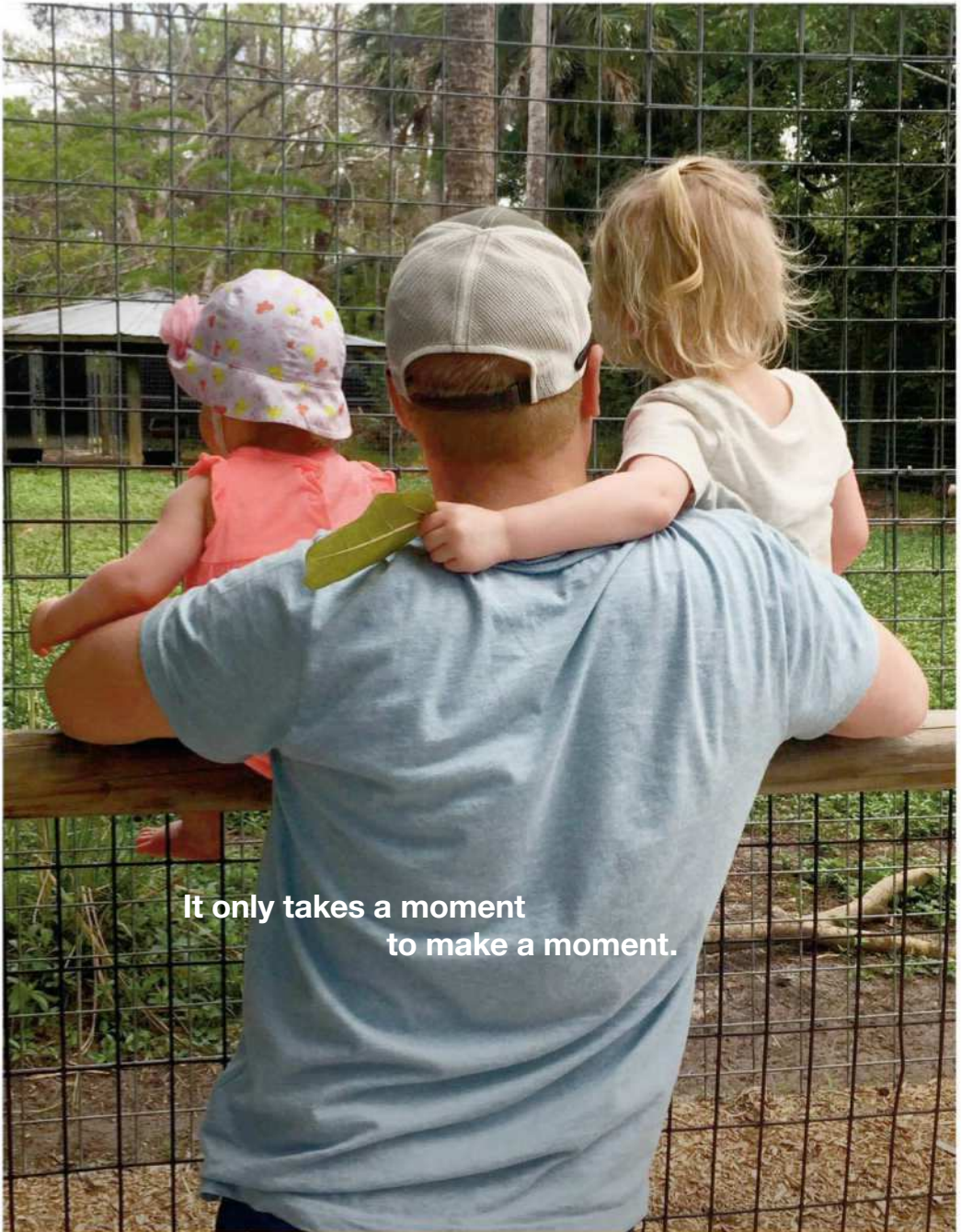
It only takes a moment
to make a moment.

WORD PROCESSING APP

# PAGES 4 FOR iOS: UPDATE ADDS POWERFUL SUPPORT FOR BOOK AND COMPLEX DOCUMENT CREATION

**BY GLENN FLEISHMAN**

With Pages 4 for iOS (go.macworld.com/p44i), Apple shifts the app's focus from being a fancy word processor with modest page-layout tools, to something that's substantially more. Even as the app broadens its range of tasks, Apple also improved existing ones that lagged or were incomplete. As a result, Pages is a stronger overall app, and it also offers greater coordination and parity with the new Pages for macOS.

## BOOK CREATION

Pages 4 now comes with book templates for creating interactive ebooks, providing an end-to-end workflow instead of just an export option. These books can be nearly

as richly capable and interactive (with a few exceptions) as those produced by iBooks Author (go.macworld.com/ibat). You can also now create drawings and use the Smart Annotation beta for graphical markup and highlighting with either an Apple Pencil or your finger.

Additional document help comes from several directions. Pages allows a side-by-side page view, once present in the Mac



**Pages for iOS now supports side-by-side page views as well as designed two-page spreads.**

version years ago (and now restored in the latest release), as well as two-page spread layouts, a useful element for book and booklet design. You can create and modify master pages used as templates for an entire document, and style sheets for paragraphs and characters can now be edited and created directly in the iOS version—previously, you had to manage those only in Pages for macOS. And you can switch pages from landscape to portrait and vice versa—yes, that was missing before.

While not every document you create in Pages needs book-like properties, the fact that everything is present gives you the flexibility to create any kind of document in one place, as well as edit any Pages-for-macOS-created document. I tested Pages for iOS with an iPad Pro using a keyboard cover, and it felt much more like a first-class

While not every document you create in Pages needs book-like properties, the fact that everything is present gives you the flexibility to create any kind of document in one place, as well as edit any Pages-for-macOS-created document.
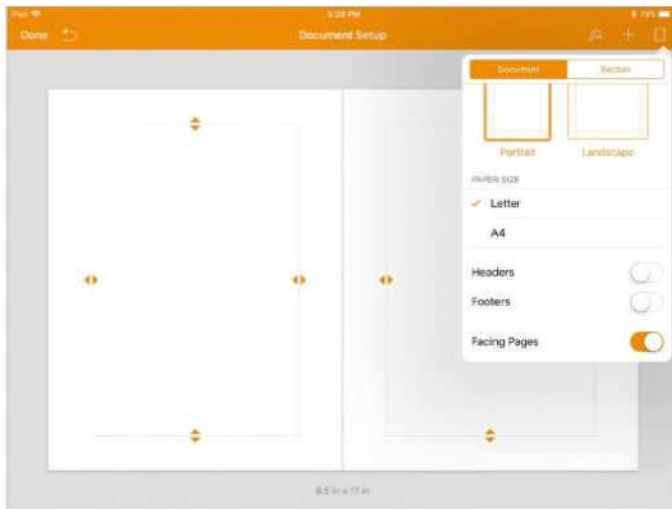
A new master page mode lets you create unique page templates within a document with recurring items and page formatting.

citizen and full-fledged app than any previous version—by far.

That said, I'm not sure iOS is an ideal place to create and edit anything more than basic layouts, because the touch-based interface makes it very easy to move elements around by accident and hard to position them precisely, even with the many kinds of snap-to guides Pages offers. I found myself constantly tapping the undo button. It may be heresy, but a mouse is an easier way to position objects than your finger.

A Ruler option in Pages for iOS doesn't actually display rulers in my testing, nor can you set columns or guides on a document's master pages. In the Mac version, rulers display as expected and

you can drag page guides out of them to aid with positioning elements. This may be an iOS bug or intended future improvement, and if available would improve the touch-based approach when making books and other layouts.

## APPLE PENCIL SUPPORT

Apple played up the new option to add drawings to a Pages document, whether via an Apple Pencil or with a finger. It's definitely a benefit to add sketches and drawings to a Pages document directly, whether you're a stick-figure constructor or have illustration skills. But Apple peculiarly relies on a subset of standard markup toolkit, which feels inadequate relative to even some of the simpler stand-alone drawing apps. It's not that Apple should have put a full sketching environment into Pages, but I'm not sure this is robust enough to let people add additional value into their documents.

The company also opted to not support pressure sensitivity with the Pencil, which feels like an odd choice. Instead, you have to double-tap a drawing tool to select thickness. This seems to disable one of
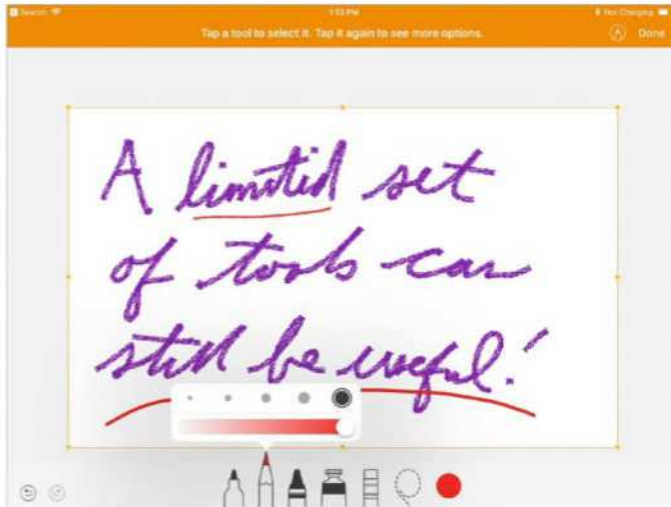
**While you can't use pressure sensitivity with the Pencil, you can get good results from the restricted set of tools with some effort.**

the Pencil and iPad Pro's combined flagship features without offering a benefit.

Smart Annotations are listed as in beta, and likewise rely on drawing, although here it's an overlay on your document, where any graphical items you add by Pencil or finger stay fixed to the point you marked and move with them. They also sync perfectly to Pages for macOS, although you can't create new Smart Annotations there (at least not yet). And similarly strangely, using the Pencil with Smart Annotations does allow a modest degree of pressure response—not

nearly as much as in a drawing program, but it's present.

## PRESENTER MODE AND MORE

The Pages update includes a handful of miscellaneous additions, too. Anyone who has used their iPhone or iPad to offer up the text for a verbatim speech they're delivering, or notes they need to consult while speaking, will appreciate a new Presenter Mode. It turns Pages into a scrolling, high-contrast text-only display that you can set to move automatically from slow to fast and tap to pause and resume.

You can enable an Autocorrect option and type fractions that have special drawn versions in the typeface you're using, and Pages automatically converts them. If you use charts and graphs in Pages, you can excitingly make use of donut charts, while tables have

Anyone who has used their iPhone or iPad to offer up the text for a verbatim speech they're delivering, or notes they need to consult while speaking, will appreciate a new Presenter Mode.

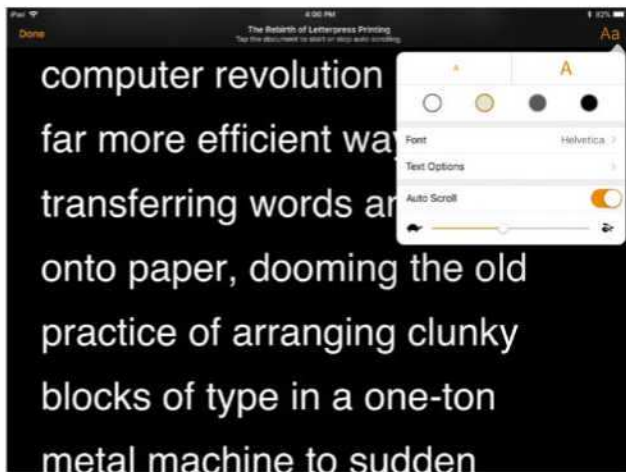**Presenter Mode in Pages offers a manually or automatically advancing prompter.**

gained conditional highlighting based on values. And Box document-sharing users don't have to rely on iCloud for collaboration, but can work through Pages documents stored on that service as well. Finally, Apple stuck in hundreds of shapes, from microscopes to dinosaurs, all of which are editable.

Some features could use more explanation than that found in release notes and the functional-but-thin help files for Pages. For example, a new image gallery option makes little sense for page layout or word processing, and the how-to instructions give no insight on how you might use it. In fact, it's

an interactive feature that only works in Pages and when exported to EPUB.

And I found one consistent showstopper: whenever I attempted to use the All Photos album to add media, Pages froze and eventually crashed. I use iCloud Photo Library and have over 37,000 pieces of media in it. Whatever the quantity, this kind of flaw shouldn't happen with released software from Apple. Worse, intermediate changes made several steps before the crash are lost, instead of autosaved locally or to iCloud.

## BOTTOM LINE

Welcome additions and some long-overdue ones combine to make Pages 4 for iOS a major upgrade, with document and book workflow, editing, and management features that push it far beyond the previous release, making it a much more viable alternative to other apps and the desktop version of Pages for macOS. But keep an eye on what's the best use of a touch-based interaction and editing to make the best use of this app. ∎

♦♦♦♦

**Pages 4 for iOS**

**PROS**
- End-to-end EPUB ebook creation, from template to output.
- Improved tools for viewing, working, and managing larger documents.

**CONS**
- Consistently freezes when attempting to load All Photos album, then crashes and loses recent changes.
- Lack of pressure sensitivity for Apple Pencil in drawing mode.

**COMPANY**

Apple

# KEYNOTE 4 FOR iOS: MODEST UPGRADE FEATURES APPLE PENCIL SUPPORT, NEW IMAGE GALLERY

### BY GLENN FLEISHMAN

Keynote for iOS (go.macworld.com/kyio) has always been designed around interaction more than its macOS counterpart, partly because it's more likely you'll be using a single screen to present than multiple monitors. That shows clearly in this minor update. And many of the new features bring Keynote for iOS into feature parity with its macOS counterpart, as well as a consistent interface and set of options alongside Pages and Numbers on both platforms.

## APPLE PENCIL SUPPORT

Just as you can in the other iWork iOS apps (Pages and Numbers), the Apple Pencil (go.

macworld.com/amap) or your finger can be used to create drawings on iPads with Pencil support. This a useful improvement for Keynote—making as much sense here as in Pages—with the added benefit that Keynote for iOS can animate the drawings you create by effectively replaying them.

The animated drawing feature is, unfortunately, rudimentary and needs more development. It shows stroke by stroke the gestures you



You can both draw in Keynote and animate the drawing, using a special build that replays your work stroke by stroke.

made, and you can play back those gestures by creating a build for the drawing and then selecting the Line Draw option. You can set an overall duration for the drawing to occur, but you can't remove strokes, control the speed of a stroke, rearrange them, or modify them. If you use the eraser to remove part of a drawing, that piece is removed from all the frames, making initial drawing stages look peculiar. You have to be perfect in your original drawing for this feature to work, which is asking a lot.

As in Pages and Numbers, Apple peculiarly relies on a subset of standard markup toolkit for creating drawings, which feels inadequate relative to even some of the simpler stand-alone drawing apps. Apple shouldn't put a full sketching

environment into these apps, but I'm not sure this is robust enough to let people add additional value into their presentations.

The company also opted to not support pressure sensitivity with the Pencil, which feels like an odd choice. Instead, you have to double-tap a drawing tool to select thickness. This seems to disable one of the Pencil and iPad Pro's combined flagship features without offering a benefit.

## NEW IMAGE GALLERY, BOX SUPPORT, AND MORE

Keynote's other main new feature is an image gallery, which functions as a reasonably useful slideshow. You add the image gallery, select images, and then, if you want to, add captions (or use a single

**The image gallery feature lets you create a slideshow, but the iOS release of Keynote can't automatically advance it.**

caption for the entire show). The slideshow can have one of three transitions: Appears, Dissolve, or Move In. However, unlike the new Keynote for macOS, it doesn't appear as though you can set a duration between slides for automatic playback, making the feature slightly pointless.

For feature parity, Apple now lets you change themes in Keynote for iOS, and adjust the slide size and aspect ratio of presentations. Previously, you would have had to roundtrip the presentation to a Mac and back to iOS to make those modifications.

Keynote now offers donut charts, which may make your stomach rumble, but apparently were one of the few common chart options missing. As with all the updates to apps, there are

new shapes of all sorts you can insert and then edit to customize.

Support for real-time collaborative editing for Keynote files shared via the Box document service is now included here as in all the productivity apps on both platforms.

And I found one consistent show-stopper, just as with Pages for iOS: whenever I attempted to use the All Photos album to add media, Keynote froze and eventually crashed. I use iCloud Photo Library and have over 37,000 media types in it. Whatever the quantity, this kind of flaw shouldn't happen with released software from Apple. Unlike the similar Pages flaw, changes made up to the moment of using the image selector were retained.

## BOTTOM LINE

Keynote 4 for iOS lacks the polish I'd expect from a release version, especially with no changes unique to the app, but all incorporating options are available across apps and between platforms. Apple needs to give more attention to Keynote, fix the missing image gallery features that it already added to the Mac version, and provide more general polish. It also needs to push Keynote forward with better and richer interactivity, something that should be expected this many years into its development. ■

### Keynote 4 for iOS

**PROS**

• Can draw directly in app using Apple Pencil or finger (on select iPads).

• Gallery option allows easy creation of manually advanced slideshows.

**CONS**

• Image gallery can't be set to play automatically.

• No significant changes over the years.

**COMPANY**

Apple

# NUMBERS 4 FOR iOS: BETTER TOOLS FOR IMPORTING, SORTING, AND VIEWING ORGANIZED DATA

BY GLENN FLEISHMAN

Apple views Numbers for iOS (go.macworld.com/nios) as a tool for visualizing and presenting data, rather than as a workhorse spreadsheet app. But the latest update offers improvements on both sides of that equation. While not piling on features, Apple has brought the iOS version more in line with the Mac version (go.macworld.com/nm4m), as well as harmonizing features with Pages (Mac [go.macworld.com/p74m] and iOS [go.macworld.com/p44i]) and Keynote (Mac [go.macworld.com/kymc] and iOS [go.macworld.com/kyio]) for consistency. This kind of parity and consistency means less frustration when moving among apps and between platforms.

## WHAT'S NEW

Numbers 4 for iOS adds only two real flagship changes, although the importance of one of them is buried. The company promotes the addition for drawing using an Apple Pencil or your finger on iPads that have Pencil support. Because Numbers sheets can be quite elaborate and used for presentation purposes, I can understand adding drawing options, which are now found in all the iOS productivity apps—though they make more sense in



**Numbers handles imports of large amounts of data and ably works with large spreadsheets.**

Pages and Keynote.

But the second flagship addition is in a short bullet point in the What's New list: "Improved, customizable import of CSV and text data, with support for custom delimiters and fixed width files." For people trying to use Numbers in more powerful and sophisticated ways, despite the many ways in which it falls short of Microsoft Excel and Google Sheets, this is a big one.

When exporting data from a database or a website, you often have the option to have it dumped in a field-based format, so you can import it into another database, into another service's API, or use it with a spreadsheet app. CSV (comma-separated values) and text formats are common, but have a lot of variations. Until now, if what you were trying to import into Numbers didn't fit Apple's notions of parsing that data, you had to use another piece of software—like BBEdit or a script—to preprocess your export and massage it to Numbers' needs.

Instead, you can now select a CSV-formatted or fixed-width text file by browsing to it via the Spreadsheets view, and then tap an Adjust Settings button that appears at upper right. This opens an Import Settings sheet that gives you a fair amount of control to customize the CSV or text details. (This button appears very briefly: the

An new Import Settings option lets you customize and massage imports, requiring less preprocessing and other work.

filters to create a kind of summary report of data instead of viewing everything in a sheet.

As with updates to the other Mac and iOS apps, Numbers gets donut charts, new insertable shapes that can be edited, and support for collaborative editing via the third-party Box document-sharing service.

Though seemingly a little out of place, you can also insert an image gallery into a Numbers sheet, just as in Pages or Keynote, although you can only move through these images within a Numbers document; there's no way to export it for interactivity.

moment you engage with the spreadsheet on any other behavior, it autosaves as a Numbers file, and the only way to get Adjust Settings back is to reopen the original text file.)

For parity with previous versions of Numbers for Mac, Apple now offers conditional cell formatting, which lets you create style rules (like italic, a background fill, or type color) based on evaluating the values in a cell. It also brings in sorting and filtering options previously in the Mac version, allowing you to chain together a series of sorts to produce a more sophisticated ordered results, and add multiple

## Numbers 4 for iOS

**PROS**
• Better feature parity with Numbers for Mac.
• Import settings add hidden power for massaging formatted data from other sources.
• Integrated drawing tools.

**CONS**
• Still relatively unsophisticated compared to more full-featured business spreadsheet apps.

**COMPANY**
Apple

## BOTTOM LINE

Numbers for iOS now matches the macOS version in the most important ways, making it a much better complement and stand-alone app. It still has a long way to go to meet features in competing iOS and Web app spreadsheets, but as a baseline for most people, Numbers now encompasses more people's needs for importing, sorting, and viewing organized data. ■

# family is why.

As a mom, we know your family is why. Why you work so hard to make healthy choices every day so you can experience more of life's precious moments together. We've got your back; to make sure more of those moments happen. But we can't do it without you. While you're serving more fruits and veggies at home, we're impacting laws that help shape healthier communities — and it doesn't stop there. You see, together we can make an extraordinary impact. Because when moms unite, real change happens.

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Unite for change at **LifeIsWhy.org/Moms**

#familyiswhy

American Heart Association | American Stroke Association.

**life** is why™

# WHAT'S NEW AT THE
# APP STORE

## HARRY POTTER: HOGWARTS MYSTERY

No, it's not Niantic's location-based Harry Potter game—that's still coming in the future. Still, fans of the massively popular movie and book franchise might want to try Harry Potter: Hogwarts Mystery (go.macworld.com/hphm), a new game that lets you create your own character and attend Hogwarts to train as a wizard or witch.

## Oddmar

Here's a stunning 2D platform-action affair that looks and plays like a full-blooded console game. Oddmar (go.macworld.com/odm) hails from the team behind the excellent Leo's Fortune, and it's similarly lush and inviting. This time around, you'll command the titular Viking, an outcast who stumbles upon an opportunity to redeem himself by embarking on a grand quest.

## Trick Shot 2

The original Trick Shot was a delightfully low-key, obsession-worthy gem from a couple years back, and now Trick Shot 2 (go.macworld.com/ts2) has dribbled onto the court with some ball-bouncing challenges of its own. The core objective remains the same: You'll need to fling a ball into a box, with bonus points for a swish. Sounds easy enough, right? Of course, it rarely ever is.

## Brew Town

Got a thing for craft beer? If you love the idea of brewing your own special suds and building a craft empire, then you might get a kick out of Brew Town (go.macworld.com/brto). This lightweight simulator and management game lets you start small with an up-and-coming brewery and gradually grow it into an empire, all while getting hands-on in various ways.

# 6 iOS GAMES YOU MUST PLAY NOW

There's always something new to play on your iPhone or iPad, but with loads and loads of games pouring into the App Store every week, it can be tough to find the real gems in the pile. Luckily, our monthly iOS games roundup is designed to alleviate that hassle, as we've browsed the listings, followed the buzz, and found the 6 most compelling new games from the last month. **By Andrew Heyward**
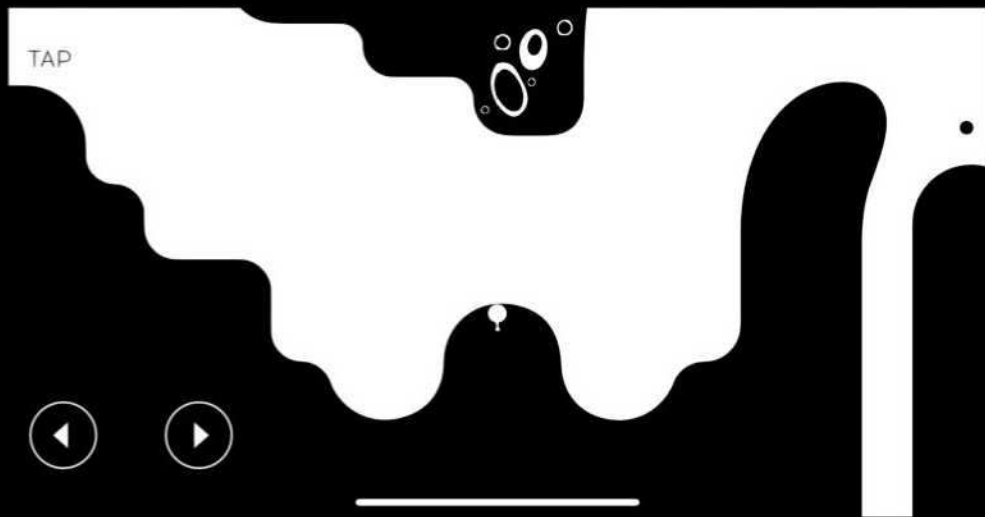
## OVIVO
go.macworld.com/ovi

Ovivo is an inventive little platform game that has drawn raves since hitting iOS. What makes it so distinctive? Aside from the minimal, monochromatic aesthetic, Ovivo's biggest hook is the ability to shift a little orb between the white and black areas of each level while gravity flows downwards in white and upwards in black. The point of all this is to make your way across uneven and often oddly-shaped terrain, and you can only do so by swapping the ball between the black and white areas. And there's more to it than that: You may also need to use these shifts to build momentum for overcoming larger gaps or obstacles, and some levels even find you escaping large pursuers. It's pretty mesmerizing stuff.
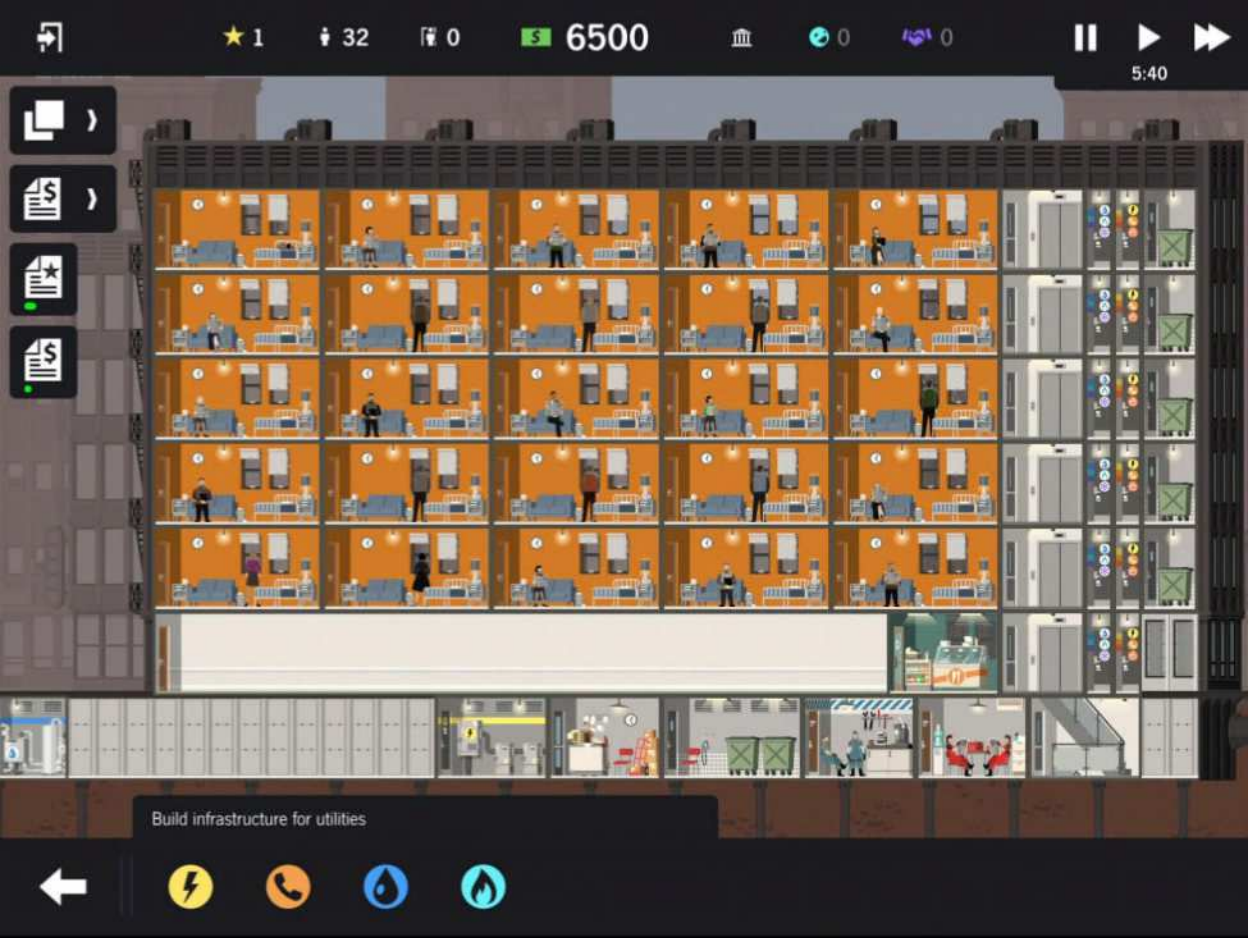
# PROJECT HIGHRISE

go.macworld.com/phr

If you have fond memories of SimTower from the early '90s or like the idea of a much meatier take on Tiny Tower, then Project Highrise might be right up your alley—at least if you have an iPad. Brought over from Mac and PC, Project Highrise is a spiritual successor to SimTower, and it puts you in charge of nearly every aspect of a skyscraper and its inhabitants. What's your dream building? Do you want to pack it with rental units and penthouses, or build the world's tallest stack of offices? You'll handle construction, rentals, and try to keep tenants happy, and you'll delve into the nitty-gritty management of electricity, water, and more. It's a deep, computer-style simulation that still works well on a tablet screen.

# TOUCHGRIND BMX 2

go.macworld.com/thb

——

It's been seven years since the original iOS game, but Illusion Labs is finally back with Touchgrind BMX 2, an updated version of the handlebars-spinning, big air-grabbing bike game. Can't stomach the idea of barreling downhill, vaulting up a ramp, and pulling off gnarly stunts on your real bike? Well, here's the next best thing. You'll see only the bike on the screen, but you can maneuver it over various tracks with two fingers and then swipe when you want to spin and flip when airborne. It looks great, feels responsive, and even lets you customize your own bike in various ways. It's like an amped-up version of those finger-driven Tech Deck BMX toys, but thankfully a lot easier to command.

# THE PILLARS OF THE EARTH

go.macworld.com/pote

▬

Based on the massively popular novel by Ken Follett, The Pillars of the Earth is a narrative adventure game with a beautiful hand-drawn look and an engrossing narrative. The Pillars of the Earth takes place in 12th-century England, where you'll follow the village of Kingsbridge for 30 years after its inhabitants start building a cathedral. It's a tale of war, struggle, and romance, and you'll see it through the eyes of three different characters whose stories intertwine throughout the years. Only the first of three "books" of chapters is included so far, with more to come, and reviews suggest that the quest thus far is slow-paced but ultimately compelling.

# VANDALS

go.macworld.com/vdl

━

If you dug games like Square Enix's Lara Croft Go and Hitman Go, then you'll almost certainly dig Vandals as well. In both visuals and gameplay, it's a pretty clear homage to the whole Go franchise in that it involves stealthily navigating fixed pathways while completing objectives and evading capture. The theme, though, is much different. Vandals is all about street art and self-expression, with your hooded artist attempting to tag the world with his/her messages and designs without being scooped up by the police. From what we've played, Vandals doesn't make any huge tweaks to the Go formula, but it's a well-executed tribute nonetheless.

# PALADINS STRIKE

go.macworld.com/pst

—

Hi-Rez Studios' Paladins: Champions of the Realm is one of the most popular free-to-play Mac and PC shooters right now, with an Overwatch-like pairing of objective-based gameplay and bold, highly diverse heroes to chose from. And now it's on iOS devices with Paladins Strike, but this is a very different take on the franchise. Paladins Strike keeps the colorful look and hero roster, but instead of a first-person shooter, it's more of a Vainglory-esque MOBA (multiplayer online battle arena) game with a bigger focus on action. You'll join up in five-player teams to complete objectives—such as escorting a payload across the map—and as with the computer version, Hi-Rez apparently plans to build an esports scene around this version as well.
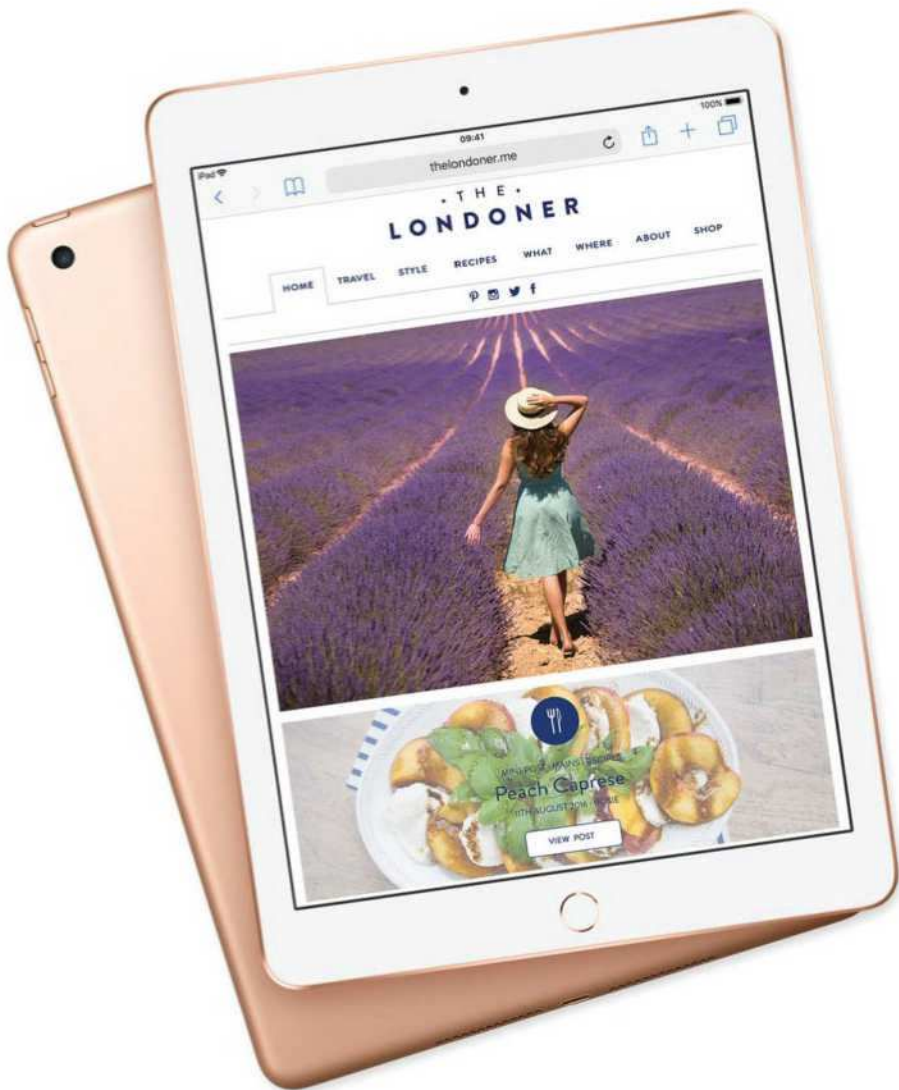
# 9.7-INCH iPAD (2018):

## APPLE'S TABLET IS 'PRO' ENOUGH FOR MANY OF US

**With Apple Pencil support, you may be fine leaving the iPad Pro behind.**

**By Leif Johnson**

Pull it off the shelf at the Apple Store, and you'd be hard-pressed by sight alone to distinguish the new sixth-generation 9.7-inch iPad (go.macworld.com/6x97) from last year's model (go.macworld.com/lsyr). And under the hood, it's not much different, where there's simply a speedier A10 processor. The new iPad is, well, an iPad.

What's truly new is support for the Apple Pencil, the sleek stylus that formerly only played nice with the iPad Pro. But never doubt that the Pencil support marks a bold move on Apple's part. Combined with the new chip, the formerly capable iPad is transformed into something that's now a serviceable substitute for an iPad Pro—for a mere $329 ($299 if you're shopping for a school; $309 if you're a student, teacher, or faculty shopping on Apple's Education Store [go.macworld.com/aped]).

Some will find Apple Pencil support a transformative experience, and if you've been looking to upgrade from an iPad that predates the iPad Air 2, this is a device that will make you glad you waited.

## THE MORE THINGS CHANGE

In light of Apple's marketing of the new iPad to schools, the design feels like an exhortation not to judge a book (or a tablet) by its cover. It reminds us that some things can change for the better despite outward appearances. In some regards, much of what we said about last year's iPad applies here as well, whether it's the way the buttons ranging from the volume controls to Touch ID sit in the same spots or the way it offers much the same Wi-Fi and LTE connectivity.

The new iPad weighs about the same as its predecessor, and the same protective cases will fit. It still only has two speakers, compared to the four you get on the iPad Pro. It even sports the same serviceable 8-megapixel 1080p rear camera and the puny 1.2-megapixel 720p front camera, the latter of which seemingly exists only for occasional Skype and FaceTime chats. Were the

**Can you tell which is this year's model and which is last year's?**

new iPad judged solely on specs, it'd hardly warrant much attention over last year's model at all.

## PENCIL PUSHER

But you *shouldn't* judge the new iPad based on its specs. Tim Cook and friends decided to let this scrappy device support the Apple Pencil, although you'll have to buy it separately. (That also means an extra $100 to the total cost, bringing the 2018's iPad's "true" price up to $429.) It may seem like a simple thing, but the magic of the Apple Pencil is that it lets you share much the same experience of using a pricey iPad Pro, but on a lower-priced tablet.

Never mind for a moment that the new iPad doesn't have some of the best technical goodies found on the iPad Pro, whether it's the TrueTone technology that adjusts the display to match the light in the room or the iPad Pro's 4GB of memory.



**The Apple Pencil has been around for a few years now, so there are many Pencil-compatible notetaking apps on the App Store.**

(The 2018 iPad makes do with 2GB.) It even lacks the iPad Pro's ProMotion tech, which boosts the display refresh rate up from the roughly 60Hz found on a device like this to an impressive 120Hz. That's important, as it means the newer iPad Pros can better catch the slightest movements of your hands, which makes them more ideal for professional artists.

However, you're likely not going to notice the difference in everyday use. I've been using an Apple Pencil as a writing tool since 2016 on my first-generation 12.9-inch iPad Pro (which also lacked ProMotion), and I almost never felt the Pencil was doing anything but laying down

> It may seem like a simple thing, but the magic of the Apple Pencil is that it lets you share much the same experience of using a pricey iPad Pro, but on a lower-priced tablet.

**The Apple Pencil support on the new iPad makes creating digital art more accessible for budget-challenged artists**

that it barely affects the "feel" of writing, although the extra space makes the sound of the Pencil hitting the glass a bit louder than what you'll hear on a Pro.

I love the Pencil for the way it lets me scribble out ideas in apps like Notability (go. macworld.com/ nbap) or MyScript Nebo (go.macworld. com/msap) without having to waste a forests' worth of paper, and it's incredible for marking up PDFs with highlights and marginal notes. It's also fantastic for students in that they can use Split View multitasking to open a PDF or other document on one side of the screen and scribble out notes in an app on the right. And, naturally, the Pencil remains a stellar tool for artists, who can use it with fully featured apps like Procreate (go.

precisely the lines I wanted to see. Thanks to the pressure sensitivity, the way it interprets tilts and angles, and, yes, the overall low latency, the Apple Pencil is the closest you get on a tablet to mimicking the experience of writing with a pencil or pen on a spiral notebook, which is part of the reason Apple wants to see it catch on in schools.

The only real drawback to the new 9.7-inch iPad is that it doesn't have a laminated display like the iPad Pro, and so you'll see a visible gap between the display and the glass above it. I found, though,

Last year's iPad had an impressive A9 chip packed in its casing, but the new version has the A10 Fusion chip we've previously seen in the iPhone 7 and 7 Plus.

**Fortnite on the 2017 9.7-inch iPad (left) and the 2018 iPad. Notice the greater pixelation on the older device.**

macworld.com/prap).

Earlier this year, you'd have to shell out $599 for an iPad Pro at the minimum to get that kind of experience. With the new iPad, though, you get that kind of power for about half the price. For a lot of people, that's enough to make it a better buy than the Pro. Heck, even I've found myself leaving my 12.9-inch iPad Pro behind in favor of this device, and I'm tempted to switch over to it entirely.

## PERFORMANCE

The new iPad is still a good buy even if you're not into the whole "writing with pencils in 2018" bit. That's because the new iPad is also fast.

Last year's iPad had an impressive A9 chip packed in its casing, but the new version has the A10 Fusion chip we've previously seen in the iPhone 7 and 7 Plus.

The improvements show up in Geekbench results, with the new iPad scoring 3463 on the single-core CPU test and 5845 on the multi-core test. (That's about the same score you'll get with an iPhone 7 Plus.) Last year's 9.7-inch iPad, however, scored only 2384 on single-core and 4372 on multi-core. That's not too shabby, especially considering that the new 10.5-inch iPad Pro scores 3908 on single-core and 9305 on multi-core.

In the most casual cases you'll find this only means that apps open ever-so-slightly faster, but I find it sometimes greatly affects game performance. (Let's admit it: A lot of kids in classrooms are going to be playing games on these things rather than listening to teachers.)

On the new iPad, the popular battle royale shooter Fortnite ran beautifully, complete with the shadows and richly-

detailed textures you'd find while playing on a Mac. Playing on last year's iPad, though, I found the characters and buildings to be pixelated and rough, and the shadows and other details were gone. The differences aren't so jarring on PUBG Mobile, but it's worth noting that the popular game recommends the "high" settings on the new iPad and only the "medium" on last year's. If you're looking for performance, in other words, you'll want to pick up the new one.

From there on out, it's basically the same device as last year's iPad. The screen once again has no anti-glare coating, which means you can basically use your iPad as a mirror when you're in sunlight. The battery life easily meets the 10 hours Apple claims it reaches, even

after I played graphically intensive games and watched a whole movie with the brightness cranked up.

## WHAT ABOUT THE CHILDREN?

Apple sees this iPad as its champion in the fight against Chromebooks in classrooms, and there's no doubt that it's an impressive device for the price. I don't think it's much of an exaggeration to claim that it's the only tablet that truly matters in the low-end price range, regardless of whether we're talking about classrooms or playing Candy Crush Saga on the bus.

Sure, on its own, the iPad manages well, and I was even impressed by the display keyboard in landscape mode. But the fact remains that getting the most out of an iPad in the classroom requires making certain potentially expensive adjustments. Want a physical keyboard? You'll have to shell



**Watch out for that glare, though.**

**Jot it down.**

out some additional dough for a keyboard case, and then you'll have to pair it through Bluetooth since the new iPad doesn't have a Smart Connector for connecting Apple's Smart Keyboard. Logitech announced a rugged case for students, but it costs $100. For that matter, the budget Logitech Crayon stylus for the iPad that's also only available to students costs $49.

Once you're done, you're looking at around $448 total with school pricing. You can get a Chromebook for around half that, and they almost always come with attached tactile keyboards, mouse supports, ports for attaching peripheral devices, and Google's educational G Suite that's based entirely online.

**Apple 9.7-inch iPad**

**PROS**
• Apple Pencil adds versatility.
• A10 chip brings better performance.
• iPad Pro 'feel' for low price.

**CONS**
• No Smart Connector.

**PRICE**
$329

Apple's approach with its Classroom and Schoolwork apps, though, requires a full commitment to the Apple ecosystem. We've already said that we're optimistic about seeing it in classrooms () on account of its emphasis on privacy and quality, but everyday schools might find iPads a tough sell when looking solely at immediate pricing. All the same, keep in mind that iPads will likely hold up better than dirt-cheap Chromebooks over time, which could save school districts a lot of money in the long run.

## BOTTOM LINE

In our review of last year's 9.7-inch iPad, we said it was a "better choice than the iPad Pro for a lot of users," and the addition of Apple Pencil support and a faster processor makes that especially true for this year's model. For $329, you're getting a stellar tablet that feels as though it's very capable, although without some quality-of-life features. For a general-purpose tablet for school, business, or pleasure, it currently doesn't get any better than this. ■

# THE BEST
# iPHONE CAMERA APPS

TAKE YOUR PHOTOS AND
VIDEOS TO THE NEXT LEVEL.

**BY JASON CROSS**

ILLUSTRATION BY JOHN UELAND

Apple's Camera app is just fine. It's fast, and simple, and offers a few nifty features like panorama shots and slow-motion video. But if you really want to make the most out of your iPhone photo and video experience—if you want more than "just fine"—you're going to want a third-party camera app. From precise expert controls to top-notch filters and the ability to save RAW images, there are lots of great reasons to keep a couple of camera apps on your home screen.

A lot of these apps cost a few bucks, and even the free ones usually have paid add-ons. Don't let that scare you off! Snapping photos is one of the most important features of our iPhones, and the ability to do it better is worth a few bucks. We tested over a dozen popular camera apps, and while many of them are great, we feel these are at the top of the pack.

## IDEAL FOR PROS: PROCAM 5

If you know your way around a DSLR, you'll really appreciate ProCam 5 (go.macworld.com/prc5; $5.99, in-app purchases). There are lots of camera apps that aim to replicate the features of high-end cameras, but ProCam 5 edges them out with an intuitive and fluid interface.

You get all the features and modes you'd expect, like exposure adjustment and locking, ISO priority, shutter priority, HDR, several long exposure modes, shutter timers, anti-shake shutter, and, of course, RAW and RAW+JPEG formats. But where other apps tend to hide some of these things deep in an options menu, most of ProCam 5's features are quickly accessible in the main interface.

I really appreciate the zebra striping and focus peaking features (two advanced features I use often on my interchangeable lens camera). I also love the way you can adjust the colors of interface elements and time stamps.

ProCam 5 has plenty of great video modes too, from slo-mo to time-lapse. Battery and storage space indicators on the main interface are the kind of



**ProCam offers fine-grained control and features typically found in DSLRs, but the interface never gets out of hand.**

thoughtful touches that you'll really appreciate if you use your camera a lot.

The price is reasonable, too. Although $5.99 may seem a little steep, many competing camera apps require in-app purchases for a lot of their core



**Among Halide's many slick features is a cool portrait mode that shows depth like radar waves spreading forward from your iPhone.**

features, while ProCam 5's in-app purchases feel truly optional: a couple of filter packs for the image editor, and a pair of super-high-quality 4K video recording modes (regular 4K recording is included in the base price).

## A STEP UP FROM THE DEFAULT APP: HALIDE CAMERA

If you don't really know your way around a big interchangeable-lens camera, but you're ready for something with more options and features than Apple's default Camera app, I recommend Halide Camera (go.macworld.com/halc; $5.99).

It's not nearly as feature-rich (or

daunting) as the apps that aim to simulate the DSLR experience on your phone, but it's super-slick interface gives you plenty to work with. There's a killer portrait mode camera (that supports the TrueDepth camera on iPhone X for selfies), and even a nifty AR mode to see those images stretched out into 3D space.

You can capture RAW, TIFF, HEIC, or JPG images. Dial in the manual focus with a helpful focus peaking mode. The grid view has a nice built-in level, and you can manually control shutter speed, white balance, and ISO if you want. Turn on the subtle histogram to get a feel for your shot's exposure.

The whole thing is designed to give you more options while remaining simple enough to use with one hand. It's the perfect app for those who are only used to taking photos with their phone and just want to take a nice step

Halide is all about photos, though. If you want to step up your video game, you'll need to look elsewhere.

up from Apple's default camera app.

Halide is all about photos, though. If you want to step up your video game, you'll need to look elsewhere. That might make the $5.99 price feel a little high, but there are no in-app purchases, and the speedy and slick Halide interface makes taking photos with it a delight. That's got to be worth the price of a latte.

## CREATIVE FILTERS FOR SOCIAL SHARERS: VSCO

VSCO (go.macworld.com/vsco) has a lot of devotees, and with good reason: Its combination of filters, effects, and editing tools makes it easy and fun to get really creative with your photos. If you can't

stand the #nofilter life, VSCO is for you.

You get an absolutely crazy variety of image manipulation tools here. Exposure, contrast, clarity, skewing and straightening, temperature, skin tones, vignette, and a whole lot more. While VSCO focuses on the post-shot editing experience, its built-in camera is plenty capable. If you want, you can adjust focus, white balance, ISO, shutter speed, and exposure. Newer iPhones can shoot in RAW, too.

There's one big catch: VSCO is a free download, but you only get a handful of filters in the free version. Because VSCO is trying to build a photo-sharing community, you have to sign up for a (free) account before you can even use the app. And then, if you want to

unlock its real power, you have to subscribe to VSCO X, a $19.99 annual service that gives you access to all of VSCO's filters and tools. There's a ton of stuff there and it's updated quite often, so the price isn't crazy if you're the kind of person who endlessly fiddles with your photos.

You can spend a few bucks at a time
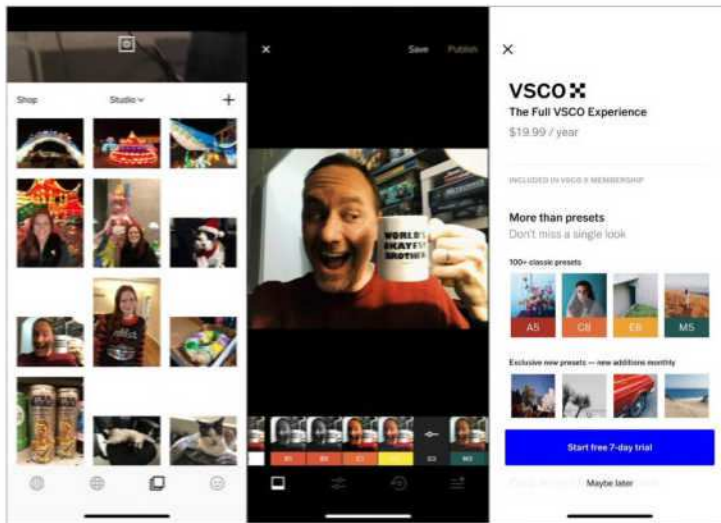


**VSCO is a cornucopia of filters and editing features, but you need a yearly subscription to unlock it all.**

**Filmic Pro is the go-to app for professional video shot on iPhone.**

to buy packs of filters individually if you don't want to subscribe, but $2.99 here and $3.99 there will add up quickly. If you can get past the sticker shock, VSCO can take your Instagram feed to the next level.

## PRO TOOLS FOR VIDEOGRAPHERS: FILMIC PRO

When Sean Baker shot *Tangerine* (go. macworld.com/tang) and Steven Soderbergh shot *Unsane* (go.macworld. com/unsn) on iPhones, what app did they use? Filmic Pro (go.macworld.com/flmp; $14.99, in-app purchases).

There's a reason that video intended for the big screen seems to always be shot with Filmic Pro: this app gives you more control over your video recording process than just about anything else out there. It delivers truly

professional tools for those that really know their way around a video camera.

I'm talking about zebra stripes, false color, and focus peaking. Waveform monitoring. True LOG gamma color. Variable speed zoom. Cinematic aspect ratios like 17:9 and 2.39:1. Multiple frame rate options. You can even pick which of your iPhone's microphones you want to record from (or use a Bluetooth mic) and choose from several different audio codecs.

If you're not really into shooting video, you're going to find Filmic Pro pretty daunting. But those are the sort of hardcore features that make the app stand out. If you need to shoot professional video that you're going to take into Final Cut or Premiere, you can get real work done with this.

Turning your iPhone into a pro video

camera isn't cheap. At $14.99, it's one of the pricier options on the App Store. And if you want live adjustments for gamma curve controls, shadows and highlights, hue and saturation, and the like, you need to shell out another $9.99 for the Cinematographer Kit in-app purchase (which only works on iPhone 7 or later phones). It's a small price to pay for getting the kind of footage you can turn into a truly professional finished product.

## OTHER CAMERA APPS TO CONSIDER

There are plenty of great camera apps for the iPhone. These didn't make our short list of the very best, but they're worth checking out:

**Camera+:** $2.99, in-app purchases from go.macworld.com/cmra

**ProCamera:** $5.99, in-app purchases from go.macworld.com/proc

**Hydra:** $4.99 from go.macworld.com/hydr

**Slow Shutter Cam:** $1.99 from go.macworld.com/slow

**Cortex Camera:** $2.99 from go.macworld.com/cort

**ProShot:** $3.99 from go.macworld.com/psht

**Moment:** Free from go.macworld.com/momn

**Hipstamatic:** $2.99, in-app purchases from go.macworld.com/hips ■
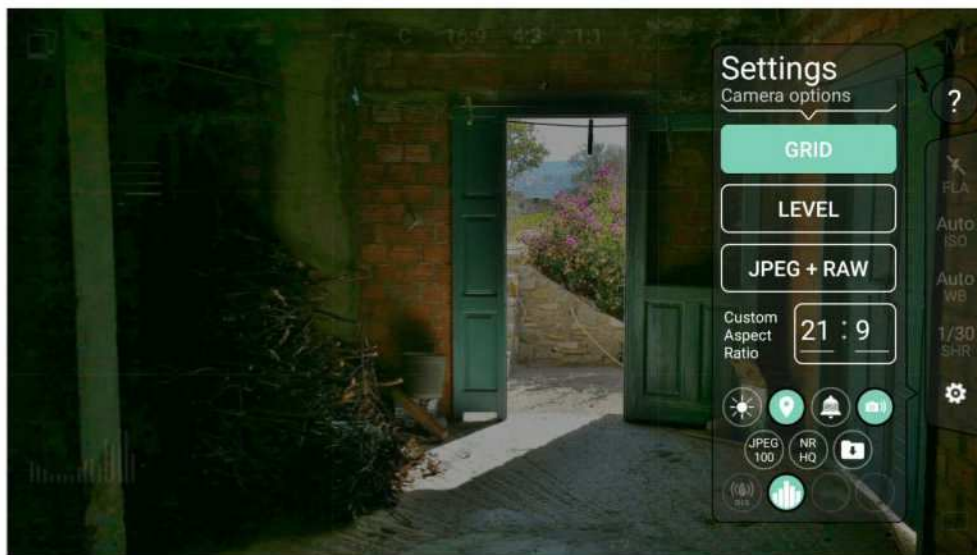


**ProShot is one of the many alternatives worth checking out.**

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# Apple's new Mac Pro is expected to launch in 2019

A new report gives us an updated time frame for Apple's all-new desktop Mac.

**BY JASON CROSS**

We've known for awhile that Apple is going back to the drawing board with the Mac Pro. Apple signaled as much a year ago (go.macworld.com/gnbn), while making sure everyone understood that the newly revamped model wouldn't come that year.

In speaking with TechCrunch Editor-in-Chief Matthew Panzarino (go.macworld.com/tced), Apple straight-out confirmed that the new Mac Pro will be a 2019 product.

Apple was keen to clarify the date (an unusual move for the company) because it doesn't want customers who are currently considering the iMac Pro (go.macworld.

com/byim) to hold off, anticipating a Mac Pro launch later in the year.

The TechCrunch feature doesn't give us much in the way of hard information about the Mac Pro revamp, but it's still a fascinating read. The focus is on Apple's new product development methodology for pro users. It all starts with the "Pro Workflow Team," a new unit within Apple that examines and determines real workflows for real pro users. The focus, at first, is on visual effects, video editing, 3D animation, and music production.

The Pro Workflow Team, comprised of real pros in these fields (some full-time, some on contract), find the bottlenecks, pain points, and inefficiencies and then take that information to the engineering teams. Maybe it's a hardware performance limitation, maybe it's drivers, maybe it's software design or a bug...but Apple is using that information to design its new Pro products from the ground up.

It's also good news for Mac Pro users, who have been frustrated by some of Apple's design choices around ports, keyboards, and the like. Hardware Engineering VP John Ternus is quoted as saying, "I want to be clear that the work that we're doing as

a part of the workflow team is across everything. It's super relevant for MacBook Pros, it's super relevant for iMacs and iMac Pros and in the end I think it helps us in dialogue with customers to figure out what are the right systems for you."

The article confirmed again that Apple still is viewing the upcoming Mac Pro as a very modular system. Tom Boger, Senior Director of Mac Hardware Product Marketing: "As we said a year ago working on modular was inherently a modular system and in looking at our customers and their workflows obviously that's a real need for our customers and that's the direction we're going."

**The impact on you at home:** If you're itching for a Pro desktop Mac, you might as well grab the iMac Pro, because the new Mac Pro isn't landing anytime soon. However, if you're willing to wait, it sounds like Apple is bending over backwards to make sure that its new desktop is going to satisfy the needs of the kinds of creative professionals who have gravitated toward Mac Pro hardware. ■

The Pro Workflow Team, comprised of real pros in these fields (some full-time, some on contract), find the bottlenecks, pain points, and inefficiencies and then take that information to the engineering teams.

# The new Mac Pro: What can we expect from Apple in 2019?

To see what the future holds, just look at the present.

BY DAN MOREN

Exactly a year after Apple called a bunch of reporters to its headquarters to talk about the future of its professional-level Macs (go.macworld.com/tmpl), the company is once again putting its stake in the ground. In an interview with TechCrunch's Matthew Panzarino (go.macworld.com/tced), several Apple executives have laid out the thinking behind the as-yet-unannounced Mac Pro, which is expected to debut in 2019.

What's more interesting than the Mac Pro's existence, however, is the approach

Apple is taking to building it: bringing in actual pro users to see their workflows and figure out how to best accommodate them. It's a side of Apple that, publicly anyway, we've rarely seen.

But, as you might expect from Apple, details on this new Mac Pro are still being kept tightly under wraps. But there are some tea leaves we can read based on Apple's previous and current forays into the pro-level Mac market.

## GOING PRO

The Mac Pro wasn't the only product whose existence was revealed by that meeting a year ago: Apple executives also confirmed that souped-up iMacs and the iMac Pro (go.macworld.com/byim) were on their way, and they both arrived in due course last year.

But by looking at the decisions Apple made with those machines, we can start to read between the lines about what the eventual Mac Pro might look like. With high-end iMacs and the iMac Pro, for example, we can extrapolate that the Mac Pro won't just be better hardware in an all-in-one chassis: that slot is already filled by the iMac Pro. (That jibes with the company's statements that the Mac Pro is intended to be modular and will at least support a separate display.)

Likewise, we can cast our eyes back at the Mac Pros that have come before: the

long-running "cheesegrater" tower that Apple sold from 2006 to 2012 and the second-generation "trash can" model that succeeded it in 2013. Apple's not the type to backtrack much, so we can likely eliminate anything that hews too closely to the overly clever design of the second-generation Mac Pro. (Moreover, Apple can't have been too thrilled about having one of its products colloquially described as a garbage receptacle.)

It is, of course, possible that the company will produce something closer to the popular tower form factor. But that was in turn based on the Power Mac G5, which dated from 2003, and I think it's safe to say that the company would not be eager to return to a design that will be some 16 years old by the time the new model debuts. It'd be like releasing a new iMac based on the iMac G4 (go.macworld.com/img4). There may be some broad thematic similarities, but don't expect them to simply dust off the old design.

## A TRUE HIGH-END MACHINE

Though I've owned a few professional-level Macs over the years, I don't know that I would consider myself a true "pro" user these days. My main work machine is a 2017 Retina 5K iMac, and while I mainly use it for staples like writing and web browsing, I do occasionally take advantage of its horsepower while editing

**The ability to add parts and upgrade components contributed to the tower Mac Pro's popularity.**

one of several of the podcasts I produce in Logic Pro.

That said, most of even my heaviest usage would likely fall into the "prosumer" category. The 5K iMac has proved more than sufficient for my needs, and the iMac Pro would likely be comical overkill, given how much more power it brings to bear. And yet, it seems likely that the Mac Pro will be even a cut above that. TechCrunch's story says the company is focusing on things like video editing, 3D animation, and music production, all notoriously horsepower-intensive tasks.

All of which is to say that this can rightfully be expected to be a machine that is *incredibly* powerful. Way, way above the needs of most users. After all, Apple has to leave some room below it for both the iMac Pro and the 5K iMac to exist.

Extrapolating based on Apple's current pro-level offerings suggests that we would likely see something built on Intel's line of Xeon processors, perhaps even the recently announced Xeon Scalable chips. (This is despite the rumor that Apple will transition the Macs to ARM-based processors (go.macworld.com/apch) in the next few years—if that does happen, high performance machines like the Mac Pro would likely be the last to make the jump.) Fast RAM, fast SSD storage, and a full array of ports seem like shoo-ins as well.

But modularity is still a key element of the new Mac Pro's story, not only so that Apple makes it easy for pros to continuously upgrade their experience but because it takes some of the pressure off for Apple to itself release regular updates. Perhaps the most frustrating aspect of the previous generation Mac Pro was that Apple let it lie fallow for so many years and that third-party upgrade paths for users were limited. Commitment to the Mac Pro doesn't necessarily mean that Apple binds itself to regular updates of the product—though transparency on that front would be advisable—but it does mean acknowledging that these are machines that customers will use heavily and for a long time to come and planning accordingly. ■

# Wi-Fi gets quicker with 802.11ax, but buying early might offer few advantages

The latest Wi-Fi standard makes home networks faster, especially for video streaming.

**BY GLENN FLEISHMAN**

Wi-Fi networking is poised for a major update: The transition from 802.11ac to 802.11ax promises a modern networking hub that can cope with the burgeoning number and diversity of wireless devices that need access to your broadband connection.

At the dawn of the modern smartphone era in 2007, even a highly unplugged home might have only a handful of hardware connecting to its wireless router.

Now—if you use tablets, smart-home devices, media streamers, smart TVs, gaming gear and security cameras—you could have 20, 30, or many more. And that number won't get smaller in the future.

With 802.11ax, the IEEE engineering group that drives standards like wireless local area networking (WLAN)



**802.11ax enables large numbers of clients on a home Wi-Fi network to operate simultaneously without degrading video-streaming and other devices that require lots of bandwidth.**

has pushed hard in several directions to make these complicated environments work. There are a lot of benefits for dense corporate networks that need massive throughput and could have tens of thousands of roaming and fixed Wi-Fi clients, but there's no shortage of upsides for home users or small offices, especially when it comes to video streaming and file transfers.

Corporations also control the wireless networks in their buildings and throughout their campuses, while home users and small businesses can face several to dozens of networks within radio earshot. Several techniques in 802.11ax will reduce the effects of interference and increase throughput in crowded urban and suburban

environments, reducing typical frustrations that are hard to troubleshoot or fix.

The standard hasn't been completed yet, but manufacturers are jumping the gun as they have with every new flavor of Wi-Fi for more 15 years. As a result, some equipment could be on the market as early as June, and more is coming later in the year. But the advantages of being an early adopter might pale in favor of waiting for a fully baked version that's stable and is supported by the client adapters onboard phones, laptops, and other gear.

## HOW 802.11AX MAKES GAINS

To explain the advantages of 802.11ax, we must drill down briefly to review how Wi-Fi

**D-Link's AX6000 will be one of the first 802.11ax routers to hit the market.**

works. The airwaves are regulated nearly everywhere in the world, and in the U.S. and in most countries, two chunks of frequencies are allotted to uses compatible with Wi-Fi: the 2.4 gigahertz (GHz) band and the 5GHz band. These bands are further divided into channels that have a set starting and ending frequency.

Senders and receivers, like a Wi-Fi router and laptop, agree to use the same channel to communicate back and forth, and dozens (or even hundreds) of devices can use the same channel at the same time to relay data via an access point. In cities and suburbs, dozens to hundreds of networks might also be contending for the same channel in relatively close proximity.

Way back in 1999, the 802.11a standard for 5GHz and 802.11b for 2.4GHz started the WLAN revolution, offering data rates of 54- and 11Mbps, respectively. These rates were always the maximum possible and included network overhead, so devices saw often 40- to 90-percent less throughput.

Wi-Fi advanced through 802.11g (2.4GHz), 802.11n (2.4GHz and 5GHz), and two releases of 802.11ac (5GHz) Wave 1 and Wave 2. The 802.11ax standard improves performance in both spectrum bands, and will deliver potentially several *gigabits* per second of throughput to dozens of devices at once on a single channel. That's incredibly helpful if you're streaming compressed HD and 4K HDR video or transferring multi-gigabyte files around a network. An increasing number of people worldwide have 100Mbps to 1Gbps broadband connections, which can be constrained by slower Wi-Fi networks.

Each successive update to Wi-Fi has pushed data rates higher, but 802.11ax offers a huge boost by adding several varied techniques, each of which adds a unique advantage. Taken together, the maximum raw data rate across an 802.11ax base station (e.g., a Wi-Fi router) could be a whopping 14Gbps compared to just 3.5Gbps for the best similarly configured 802.11ac router. In

practice, you will never see that maximum potential speed, but 802.11ax is still poised to offer multiple times the rates of 802.11ac, and will better meet solid requirements for video with many people streaming or transferring files at once.

Here's a top-level rundown of how 802.11ax pulls this off:

## DENSER DATA ENCODING

Wi-Fi encodes data into radio waves, and there are calculable limits to how much data can be carried at a given frequency. WLAN standards, however, are still working toward that upper maximum. Over time, the chips that process signals have become more powerful, allowing more efficient cramming of data into the same space, especially over very short distances between a base station and a

receiving device, typically in the same room and with line of sight, which is perfect for video streaming.

802.11ac started down this path, allowing encodings with 33 percent more data than 802.11n; 802.11ax bumps that up another 25 percent. As an analogy, consider egg cartons made up of squares with an inset circle for eggs, arranged in rows and columns. Now, replace the square with a hexagonal grid with less cardboard between each egg. That might result in more broken eggs, just at these densely packed wireless signals can suffer some loss via error, but you typically wind up with many more eggs.

## ADDING 2.4GHZ BACK INTO THE MIX

The 2.4GHz band is often given shorter shrift, because it's crowded full of other so-called unlicensed uses that rely on wireless data—like baby monitors, wireless doorbells, cordless phones, and the like—that don't play well with high-speed Wi-Fi networks. Many of those non-Wi-Fi
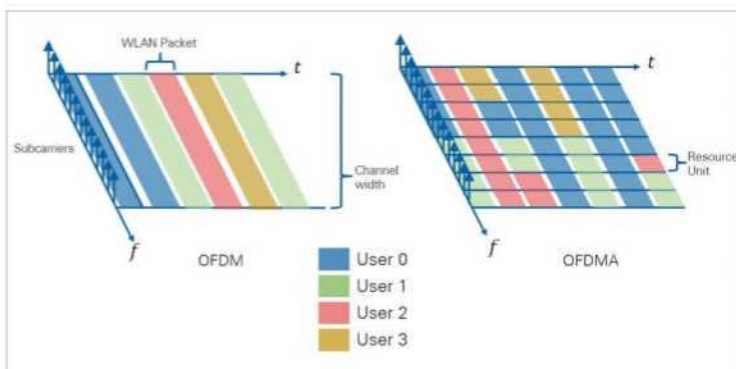


**OFDMA (Orthogonal Frequency Division Multiple Access) allows mingling data for different receiving devices across transmissions, like packing a truck full by combining palettes of boxes intended for different recipients.**

uses have shifted to other bands or now rely on Wi-Fi. 802.11ax is the first standard in more than a decade that improves performance in 2.4GHz, which opens up as many as gigabits per second more data while also taking advantage of that band's long wavelengths compared to 5GHz: longer wavelengths better penetrate solids objects, like walls, floors, and furniture.



**MU-MIMO allows Wi-Fi routers and access points to communicate simultaneously with multiple devices, reducing wasted parts of transmissions.**
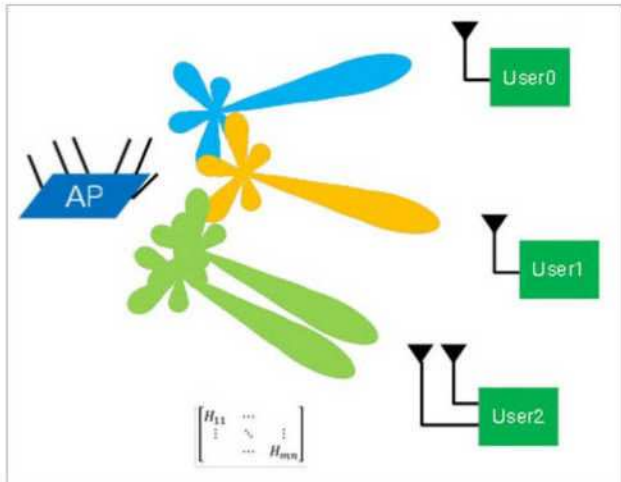
This is especially useful for mesh networks, in which current mesh nodes typically have two radios, one for 2.4GHz and one for 5GHz, one of which is used to communicate among nodes. With much higher data rates on the better-penetrating 2.4GHz band, mesh networking with 802.11ax will result in better throughput across a whole network.

## TALKING AND LISTENING TO MULTIPLE DEVICES AT ONCE

The 802.11n standard added a spatial multiplexing technology known as MIMO (multiple in, multiple out). MIMO is a means of sending multiple streams of data across different physical paths, like playing billiards with radio waves. This required multiple sending and receiving antennas and the equivalent of additional radios for each stream. But many devices, especially small mobile and smart-home units, didn't have multiple radios. A wireless router with MIMO thus wastes much of its potential bandwidth at any given time when it's constrained to a single stream.

Starting with 802.11ac, routers gained the ability to talk simultaneously with different devices at the same time (multiple-user or MU-MIMO), improving efficiency. In 802.11ax, client devices can now also respond simultaneously. That's extremely helpful for streaming media players, allowing more reliable audio and video playback to first pass from the player to the router, and then from the router to your viewing or listening

device (e.g., your smart TV, media streamer, or smartphone, or digital audio player). 802.11ax also doubles the number of possible streams from four to eight, but that feature is likely to be seen only on expensive enterprise equipment, not home devices.

## SUBCHANNELS

Borrowing a trick from 4G LTE and a few earlier standards, 802.11ax adds a way to break a Wi-Fi channel down into as many as a couple thousand tightly spaced "subcarriers" or subchannels. Each of these subchannels can carry various combined payloads of data for different devices, and interference or noise in one subchannel is isolated from the rest, reducing the need to retransmit or slow down the entire conversation to a lower data rate that can be received clearly. (This tech is called Orthogonal Frequency Division Multiple Access or OFDMA.)

You might think of this as the difference



**You could think of data traveling over your Wi-Fi network as if it were the cargo carried by big rigs. In some of the earlier Wi-Fi standards, each truck could carry only one type of cargo, even if the truck was only partially full.**
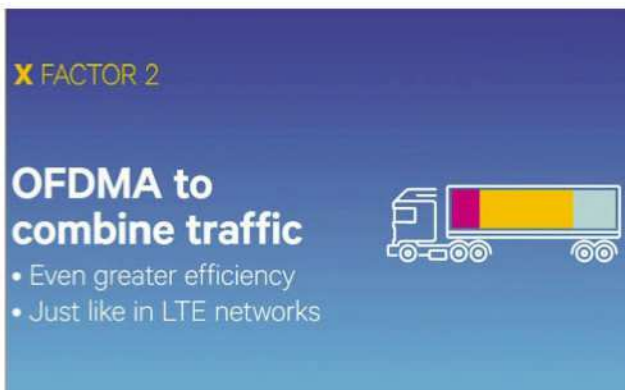


**Continuing with the big-rig analogy above, the 802.11ax standard allows each big rig to carry different types of cargo so that all of its capacity can be utilized.**

between having one giant truck with a single large packing container inside occupying an entire highway, and many smaller trucks with very thin dividers between lanes carrying a

variety of boxes traveling on the same highway. Analysts and manufacturers say that in the right circumstances, OFDMA could allow four times the throughput as with current networks.

## BETTER DISCRIMINATION OF OTHER NETWORKS

In many cities and suburbs, dozens to hundreds of Wi-Fi networks overlap. 802.11ax includes a technique that will let the standard discriminate between the network you're on and weakly received signals from other networks, which in turn allows greater throughput.

## A HOST OF SMALLER TECHNICAL IMPROVEMENTS

While the elements above might seem technical enough, a number of other small improvements add up, including letting 802.11ax break up data for a single destination into different sized chunks to fit into available slots, using longer runs of encoded data, and better focusing energy for "beamforming" (go.macworld.com/ bmfm) to target receiving devices more exactly. 802.11ax is also better at avoiding conflicts where devices talk over one another, called contention.

## IMPROVED CLIENT BATTERY PERFORMANCE

Here's one more bonus that's not related

to speed: Various mobile-targeted improvements, including one that tells network client devices that put their Wi-Fi radios to sleep to conserve power when exactly to wake them up. This could dramatically reduce Wi-Fi-related power consumption, extending battery life.

## THE RISKS FOR EARLY ADOPTERS

While the standard is still under development at the IEEE task group, some manufacturers are prepping for the near-term release of Wi-Fi routers that will be labeled 802.11ax, even though they're using a preliminary version of the spec as interpreted by a single manufacturer or chipmaker. D-Link (go.macworld.com/dnax) and Asus announced routers at CES in January, and as chipmakers get close to finalizing 802.11ax chipsets, we'll see more manufacturers start to make their plans.

Buying early could come with a cost. With the last few rounds of standards, changes were significant but constrained, and few routers had issues with obtaining updates to bring them into full compliance. 802.11ax, however, has so many substantive improvements and differences that it's possible early routers won't be as robust and compliant as ones created using later generations of chips. Manufacturers and chipmakers sit on the IEEE committee making decisions and are part of the Wi-Fi

**Asus intends to be early to the 802.11ax router market with its RT-AX88U Wi-Fi router.**

Alliance that certifies products as interoperable, but it's still a risk.

Few of 802.11ax's advantages can accrue without new client adapters in phones, tablets, computers, and other devices, and those always come more slowly as new generations of equipment are introduced. While 2019 will likely be the year that 802.11ax starts to appear in hundreds of millions of new devices, it will still easily be two or three years before you have enough new equipment to take full advantage of the new technology.

Backward compatibility is always a concern for new generations of hardware, but the history of Wi-Fi has largely encompassed all previous standards without too much compromise. Routers that declare themselves as supporting 802.11ax will also seamlessly handle every previous 802.11 standard, typically back to 802.11g, the first version to support more modern network security methods. With few exceptions, you can keep using all the devices you used in the past.

You won't need to configure anything special to enable backwards compatibility, although some routers may have modes you can turn on that disable older forms of Wi-Fi. Compatibility comes with an overhead cost, and turning off older modes can boost performance somewhat. ◼

AMERICA,
## LET'S DO LUNCH.

Lola Silvestri, SINCE 1921. Conversation and good company are her domain.
Now, she and 1 in 6 seniors face the threat of hunger and millions more
live in isolation. So pop by, drop off a hot meal and say a warm hello.
Volunteer for Meals on Wheels at **AmericaLetsDoLunch.org**

# 5 reasons to switch from Spotify Premium to its new free tier (and 5 reasons not to)

Freemium or Premium? The choice isn't so easy.

BY MICHAEL SIMON

S potify announced a major upgrade to its mobile app (go.macworld.com/frsp) at an event at the Gramercy Theater in New York City today. The service will no longer treat its free users as second-class citizens. Now, whether you're one of Spotify's 90 million free users or opt to pay $10 a month to unlock the full experience, your music will take center stage, with curated playlists, on-demand listening, and smarter playlist creation. It's so good, in fact, some users might want to consider downgrading to the free tier from the

premium one. Here are five reasons why you might want to switch (and five reasons why you shouldn't):

## 5 REASONS TO GO FREE

### 1. It's way more personal

When you sign up for the free plan inside the new Spotify app, you'll be greeted with a redesigned on-boarding screen that asks you to select your favorite artists. That sets the machine learning algorithm in motion, and you'll instantly be greeted with a playlist of songs you might enjoy. Then, as you listen, like, and hide songs, your invisible curator will become smarter and deliver more personal recommendations every day.

### 2. You can play songs on demand

This is the big one. Where Spotify's free users previously had access to all the service's playlists, they could only listen to them in shuffle mode. That's changing with the new app. Spotify will now offer 15 playlists a day to its free users—including popular ones like the awesome Rap Caviar mix—with unrestricted listening, meaning you can play the same song 100 times in a row if you'd like. Some of these playlists
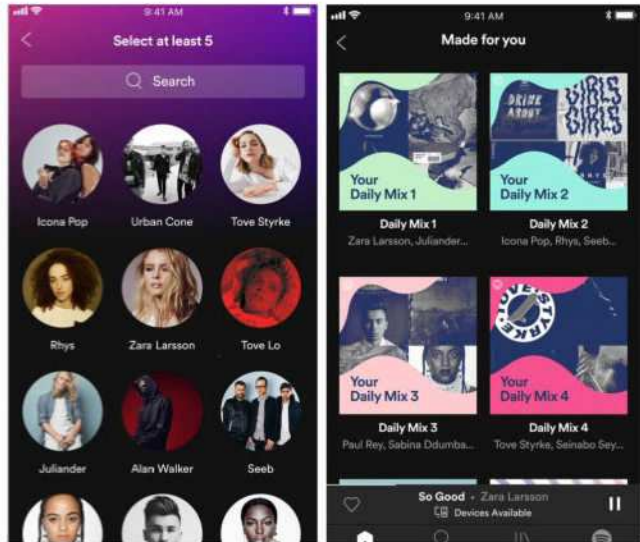


**Spotify's free tier is way more personal than it was before.**

will be updated daily, others weekly, but Spotify promises more than 750 personalized tracks will be available for on-demand streaming every day.

### 3. It'll keep your playlists fresh

One of the Spotify app's greatest strengths over its competitors has been easy playlist creation on its mobile app. That's not changing with the new version—nor is the shuffle-only restrictions on the free tier—but there is one feature Spotify is bringing over from Premium that might help you make better mixes. As you curate your playlists, Spotify will continually suggest songs based on your musical tastes, the artists and genres you've picked, and
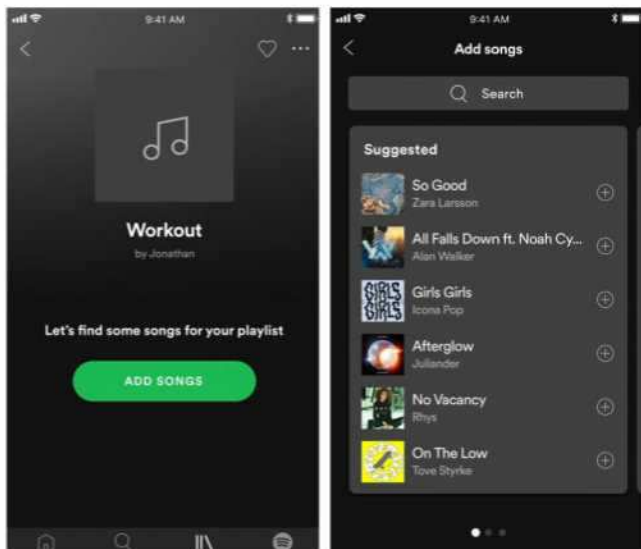
**You don't have to be a Premium user to get playlist assistance.**

even the name of the playlist itself. And what's more, it'll keep recommending new songs as you listen to it, so your favorite playlists won't get stale.

**4. It'll save your data**

With the new app update, Spotify is removing one of the major pain points for its free users, mobile data usage. While free users still won't be able to download songs for offline listening, Spotify is introducing a new Data Saver toggle in Settings that will enable automatic caching of your favorite songs and playlists so you won't have to burn through you monthly data allotment while working out at the gym. With prompts based on mobile data

usage, Spotify estimates this will decrease data usage by as much as 75 percent.

**5. Radio is everywhere**

One of the first things people will notice when launching the new Spotify app is that the Radio tab is gone. That means you won't be able to quickly jump into a station and start rocking out to J. Cole or Drake, but that doesn't mean you won't get a radio-style listening experience with the free tier. In fact, it's just the opposite. When you hit the Search tab now, you'll be presented with a list of genres to help the service focus on your mood. Then you'll get recommendations of artists, songs, and playlists tailored specifically for your tastes rather than generic radio stations that may or may not fit the bill.

## 5 REASONS TO STAY PREMIUM

**1. There aren't any ads**

Obviously, ads are the main reason why people opt to pay Spotify $10 a month, and after today's update, that hasn't changed. If you don't want to hear 15-second ads between songs, stay on the Premium tier.

## 2. You have full access to Spotify's library

While Spotify is giving its free users on-demand access to hundreds of songs every day, it pales in comparison to the 35-million-song library that Premium users get. Sure, free users can search the entire catalogue, select songs for playlists, and add anything to their library, but only paid subscribers have the ability to play them whenever they like. So if you want to hear J. Cole's "Friends" without waiting for it to appear on one of the free tier's unrestricted playlists, Premium is the only way to go.

You can pick and play some songs on the free tier, but only Premium gives you access to all of them.

## 3. You can listen offline

Spotify's new app might have a data-saver mode for on-the-go listening, but nothing beats the ability to download songs right to your device. If they have a spotty connection or a dwindling data pool, Spotify's free users may be out of luck, while Premium subscribers can listen for hours and hours without using a single megabyte of LTE data.

## 4. You can listen through a smart speaker

Spotify didn't announce a speaker or any other hardware at its event, so you'll still need to use a Google Home (go.macworld. com/ghsp), an Amazon Echo (go.macworld. com/amsp), or a Sonos One (go.macworld. com/sns1)—sorry, HomePod (go.macworld. com/nohp) fans—if you want a voice-controlled listening experience at home. But to do that you'll need a Premium subscription (go.macworld.com/prsb).

## 5. You can get Hulu for super cheap

A few weeks ago, Spotify and Hulu announced they were teaming up to offer a one-of-a-kind digital bundle. For $13 a month (go.macworld.com/hulu), you'll get a subscription to Spotify Premium (normally $10 a month) and Hulu's Limited Commercial plan (normally $8 a month). That's a savings of $5 a month or $70 a year, and it lets you choose between streaming Taylor Swift's *Reputation* or Margaret Atwood's *The Handmaid's Tale*. If that's not a double-threat, I don't know what is. ■

# ANKER SOUNDCORE BOOST BLUETOOTH SPEAKER: THIS LITTLE BOX DELIVERS MORE THUMP THAN YOU'D THINK

BY JON L. JACOBI

We get lots of pitches from Bluetooth speaker manufacturers, and not all of the products that come through the door turn out to be shining beacons of audio fidelity. Anker's SoundCore Boost proved a pleasant surprise, especially in terms of the low-end frequency response it delivers for its modest price tag.

## DESIGN AND FEATURES

The SoundCore Boost is a black rectangular box with rounded (in the vertical) corners that measures approximately 8- by 2.8- by 2.7 inches and weighs a hair over 20 ounces. A firmly attached captive rubber plug hides a full-size USB port for charging other devices, a micro-USB port for charging the

speaker, and a stereo 3.5mm auxiliary input. It feels very solid, though some of that no doubt comes courtesy of the hefty 5,200mAh battery.

Five buttons on top control the speaker: Power/Bluetooth pairing, volume down, play/pause, volume up, and a bass-boost button labeled simply UP. The controls pull double-duty during phone calls for answering, rejecting, switching, and ending calls on a paired smartphone.

## PERFORMANCE

The overall sound of the SoundCore Boost is very good for its class, but hardly sonic perfection. The upper mids are a bit stunted and muddled at higher volumes; but that's par for water-resistant (IPX5) stereo speakers, and the Boost actually suffers less from the weather-proofing than many a speaker with the same design criteria.

The Boost is rather directional, so placement and angle are important if you want the best results. And being front- and rear-firing it's also highly dependent upon its surroundings. The sound from the back is more muffled than that

from the front, so I'm guessing it's passively radiated or ported. The upshot was that I preferred the speaker set well away from a reflecting surface to minimize the effect.

Okay, this may seem odd, but the Anker (and many other speakers of similar design) sounds best when held to the back of your neck, firing past your ears. Why would you do such a thing? I do it to see if the speaker is stereo (the Boost is) or mono and also to eliminate the effect of the environment so I can more accurately gauge the overall frequency reproduction.

You might do it to listen to music on your phone through better speakers when you're lying on the grass with the SoundCore Boost as your "pillow". Like peanut butter and bologna, it's one of those unlikely things that



**The SoundCore Boost's controls are simple, easy to understand, and control your phone calls as well.**

just works.

Frequency-wise, there's plenty of thump when you press the UP bass-boost button. It might not make it for dance parties, but I found the best balance quite to my liking. The top-end is much better accounted for than the usual water-resistant speaker. Note that the volume dropped quite a bit for phone calls. This is good thing if you're playing it loud, not so much if you're playing the speaker quietly.

If I have any major complaint about the SoundCore Boost's sound it's that the mids will muddle, especially at higher volumes (at 20 watts, it gets decently loud). This, as well as the SoundCore Boost's minimal stereo separation are not uncommon with stereo speakers mounted in such close proximity. Much of this disappears when you—yes—use the speaker as a headrest. (This technique makes a good shopping test—the speaker equivalent of thumping a melon.)

I saw about 11 hours of run time out of the SoundCore Boost playing quietly with the bass boost on. Your mileage will vary. The Boost also appeared in the Bluetooth device list immediately, and paired quickly with all my devices, including my older Windows phone. This is not always the case. If your phone supports NFC (near-field communication), you can pair it even more quickly.

## BOTTOM LINE

For pure sound, the SoundCore Boost is definitely among the best IPX5 water-resistant speakers I've heard—especially at lower volume. For the price, you'll be hard pressed to find a better speaker. I'd go so far as to call it a bargain. ◼

### Anker SoundCore Boost Bluetooth speaker

**PROS**
- Excellent sound and bass for the price.
- Small form factor and good battery life.

**CONS**
- Stunted and muddled midrange at higher volume levels.

**PRICE**
$79

# Q Acoustics' 3000i speaker lineup promises to extend the company's bang-for-the-buck hi-fi tradition

Refinement, not revolution, takes center stage in this redesign.

**BY THEO NICOLAKIS**

British speaker manufacturer Q Acoustics has taken the wraps off its all-new 3000i loudspeaker series. The company says the new lineup builds on the success of its original 3000 speaker series and features innovative audio and design technologies taken from its $6,000 flagship, the Concept 500.

I had a chance to audition the new lineup first hand and left favorably impressed with the price/performance ratio on offer. At first listen, it looks like Q Acoustics has once again delivered bona fide hi-fi performance at mainstream price points.

The three models target varying budgets and living-space constraints: The

compact 3010i, mid-sized 3020i bookshelf, and floor-standing 3050i. Q Acoustics also announced the 3090Ci center channel and Q3060S subwoofer for home theater applications, but those weren't available during the demo.

## PREMIUM FINISHES

Sometimes when companies come out with updates to their products, you're hard-pressed to figure out what those updates are and what they do. That's certainly not the case here, there are lots of evident changes inside and out.

The line comes in four finishes: Graphite Grey, English Walnut, Carbon Black, and Arctic White. Unlike the previous series, buyers won't need to pay extra for any of them. Q Acoustics helpfully brought along samples of the original 3000 series, so I could make direct comparisons. The new finishes are a significant improvement.

The finish now comes edge to edge, adding refinement to the speakers' looks. Chrome accents around each driver add a stylish flair when you see them with their magnetic grills removed.

## ROBUST INTERNAL BRACING

A Q Acoustics representative told me the 3000i range includes point-to-point internal bracing, construction first employed in the company's top-of-the-



**The speaker's low-profile five-way binding posts allow you to insert banana plugs fully into the cabinet.**

line Concept 500 floor-standing speakers. The intent is to eliminate the vibration-induced cabinet resonance that can color a speaker's sonic reproduction. The 3000i speakers feature internal supports at key junctures as indicated by computer analysis.

But it's not just the cabinet design that helps reduce resonances. The soft-dome tweeter is decoupled from the baffle via a suspension system to isolate it from the woofer.

The 3000i's binding posts are brand new and a significant improvement over the previous generation. Speakers with

low-profile binding posts have a huge drawback: banana plugs stick half way out from the back of the enclosure. The original 3000 series employed an awkward, angled binding post to alleviate the problem. The 3000i series' binding posts are recessed into the cabinet, so that banana plugs practically disappear inside.



**The 3010i compact speaker.**

The speaker's low-profile rear five-way binding posts allow you to insert banana plugs fully—without

The most obvious difference between the old and new series, however, is the size. The cabinets for the 3010i and 3020i bookshelf models are slightly taller and 25-percent deeper than the previous generation. Q Acoustics says the increased physical volume extends low-end frequencies for a more powerful bass that belies the speakers' diminutive size. After listening to them during the demo, I must agree.

### 3010I COMPACT SPEAKER
The 3010i is a compact speaker that's perfect for a bookshelf, countertop, or anywhere you want high performance from a small footprint. Priced at $250 a

pair, the 3010i is a two-way reflex speaker with a 4-inch bass driver and a 0.9-inch tweeter crossed over at 2.6kHz. Frequency response is rated at 65Hz to 30kHz (+3dB, -6dB). Each speaker weighs 9 pounds and measures 5.9 inches x 10 inches x 9.9 inches. I was shocked by this speaker's performance considering its size and price tag.

### 3020I BOOKSHELF SPEAKER
The mid-sized 3020i speaker weighs in at 12 pounds and is priced at $300 for the pair. The 3020i sports a larger, 5-inch driver, but retains the same 0.9-inch tweeter. The tweeter and driver are crossed over at 2.4kHz, with a frequency response of 64Hz to 30kHz. The 3020i should serve equally well as a stereo pair or as part of a surround-sound setup for a home theater.

**Q Acoustics 3020i speaker.**

## 3050I FLOOR-STANDING SPEAKER

The 3050i floor-stander is the 3000i series' flagship. Priced at $800 for the pair, the 3050i weigh in at 39.2 pounds each and measure 12.2-inches x 40.2-inches x 12.2-inches. An MTM-design arranges the drivers in a midrange, tweeter, midrange configuration.

The twin midrange drivers are 6.5



**The 3050i has an MTM driver arrangement.**

inches in diameter and the tweeter is the same 0.9 inches as the other speakers in the lineup. The woofers are crossed over to the tweeter at 2.5kHz. Unsurprisingly, the 3050i delivers the deepest bass of the three models, with a rated frequency response of 44Hz-30kHz.

Tall loudspeakers can be susceptible to increased internal pressure caused by standing waves. To address the unwanted resonance, the 3050i employees a Helmholtz Pressure Equalizer tube inside the cabinet, which evens out the cabinet's internal pressure.

I had a chance to sample all three models, fed by a Naim music server playing tracks from Tidal. In short, at first listen, the 3000i series promises to deliver the outstanding sonic value that Q Acoustics has become known for. We'll be doing a full, hands-on review of some of the 3000i models in the near future.

## AVAILABILITY

The new 3000i lineup is available now in the U.K., with the 3010i, 3020i, and 3050i scheduled to ship in the second week in May for U.S. customers. U.S. customers won't be able to get a hold of the accompanying center channel and subwoofer models until summer. ◼

DIGITAL AUDIO PLAYER

# ASTELL&KERN KANN: THIS HIGH-RESOLUTION DIGITAL AUDIO PLAYER DELIVERS SWEET SOUND, BUT WITH A STEEP PRICE TAG

BY THEO NICOLAKIS

Astell&Kern is back with another reference hi-res audio player: the Kann. Paired with exceptional headphones and top-notch recordings, you'll be hard-pressed to find a more blissful sonic experience from a hi-res audio player at this price point. Just be warned, Kann's price tag is as big as its bulky size.

## A BOLD DESIGN

Every Astell&Kern player has a bold, distinctive design that breaks the mold. Kann is no different. The Kann's aluminum mass is sculpted into a trapezoidal work of art that is remarkably natural to hold and use. The Kann comes in a choice of Astro

IMAGE: ASTELL&KERN

Silver and Eos Blue finishes. My review sample came in the former.

The Kann's sides are ribbed. Slightly scalloped lines traverse the back. I tip my hat to the industrial design team; the play of light and shadows on the player is something truly beautiful to look at.

The player's right side is rounded. That simple attention to detail made it comfortable to hold with my right thumb naturally resting on the volume dial.

The Kann's tapered backside makes the large, ribbed volume dial well-suited for left or right handed use. However, I noticed a design quirk in my testing.

To lower the volume, you rotate the dial toward the Kann's screen. On a few occasions, while the player's screen was active, my thumb inadvertently hit the touch screen when lowering the volume. Because Astell&Kern's interface makes the entire touch screen part of the volume control, hitting the outer edge made the volume jump louder. The sudden volume increase jolted me. If you rotate the volume dial with your left thumb across the front screen, the likelihood of accidentally swiping the screen becomes even greater. After a few days (and jolts) I learned to be more careful.

The player's aluminum housing got very warm when I used it for extended periods. The heat output was exacerbated when I put the Kann in closed quarters, like a pocket. The player never overheated, but it's something to monitor.

Astell&Kern has moved all physical player controls to the Kann's front, directly under the 4-inch 800 x 480-resolution touchscreen. Buttons are large and easy to decipher by touch. In addition to the standard play/pause, forward, and reverse, there's a "home" button with a circular symbol. Pressing the home button returns you to the main screen no matter how deep you are in the player's menus or folders. I loved having that option.



**Be careful. You might accidentally hit the screen when lowering the volume, causing the volume to jump louder.**

**The Kann has 3.5mm unbalanced and 2.5mm balanced headphone jacks, as well as 3.5- and 2.5mm analog line-level outputs.**

The Kann's user interface is consistent with all other Astell&Kern players. The UI is intuitive, easy-to-navigate, and responsive (mostly). The Kann, like all the other Astell&Kern players I've tested, exhibits a lag when loading artwork, loading very large indexes from DLNA servers, or working with the companion mobile app. Compared to the AK70 MKII, I appreciated the Kann's slightly larger screen (4.0-inches vs. 3.3-inches). I was less prone to typing errors when performing music searches or entering Tidal credentials via the on-screen keyboard.

## UNDER THE HOOD

A single AKM AK4490 DAC lies at the heart of the Kann. Astell&Kern's implementation of this high-end converter features bit-for-bit playback up to 32-bit/384kHz hi-res music files, and native DSD playback up to 11.2MHz. Unless you get your hands on music files exceeding 32-bit/384kHz, there is no downsampling anywhere along the signal path. Kann also features Parametric EQ and VCXO Reference Clock (Femto Clock) for minimal jitter.

A 6,200mAh 3.7V Li-Polymer battery promises a battery life of up to 15 hours. What's unique is that a single hour of charge time via the USB-C cable will deliver up to 6.5 hours of listening time. You can get a full charge in about two hours.
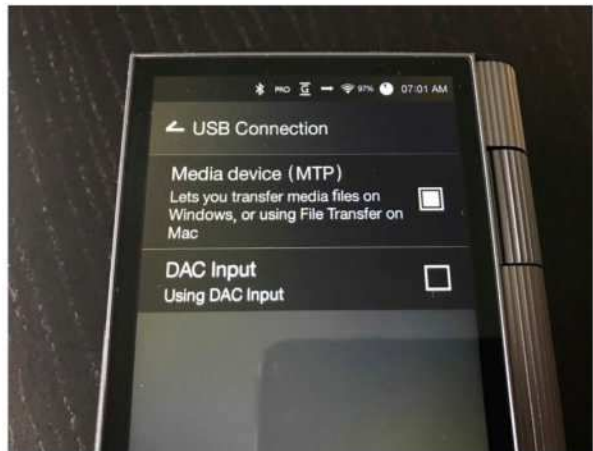


**The Kann can act as a hi-res DAC for your computer audio via its micro-USB port.**

The Kann features 802.11 b/g/n 2.4GHz Wi-Fi and Bluetooth 4.0, adding even more value. I connected the Kann to my car's stereo, and could stream any supported content—even FLAC or DSD files. Bluetooth streaming is obviously limited to the quality of the Bluetooth codec that can be used.

Like other recent Astell&Kern players, the Kann comes with the aptX HD codec for hi-res music streaming over Bluetooth. AptX HD lets you wirelessly stream hi-res audio up to 24-bit/48kHz. You'll need a pair of Bluetooth headphones with aptX HD to take full advantage. Today, very few wireless headphones support aptX HD. You can always use Astell&Kern's own XB10 Bluetooth amplifier and DAC to enjoy wireless hi-res audio with any pair of wired headphones.

Kann does not currently support MQA. I asked Astell&Kern about their plans and a company spokesperson told me, "We currently do not offer MQA support, but it is a feature we are looking into.  We do not have an ETA on when we may support it."

You have the option for 3.5mm single-ended and 2.5mm balanced headphone cables. There are two line-level outputs: a 2.5mm balanced and 3.5mm single-ended. Line out is analog only. There is no Toslink optical or coax S/PDIF (though you do have USB output, described below).

Not only are dual line out ports



**The Kann can play DSD files natively.**

unusual, but Astell&Kern has raised the stakes another notch: You can choose variable or fixed line out. Should you choose fixed line out, you can manually select any one of four voltage settings—0.7V, 1V, 1.25V, or 2V. An Astell&Kern representative told me that the higher output is intended for larger home systems. The lower voltage output is for smaller desktop amp setups, since the higher voltage output could cause clipping with smaller-capacity amp systems.

Like all Astell&Kern players, the Kann will output digital audio via USB. You'll need a USB OTG cable (not included), which

you'll connect to the micro-USB port to serve up music files stored on the device to your amplifier. The Kann will also play DSD files via DoP (DSD over PCM), in which a DSD file is sent on top of PCM data frames.

Ports and expansion slots are located on the Kann's top and bottom.

## A LITERAL HEAVYWEIGHT

Unfortunately, there's nothing Astell&Kern can do design-wise to temper the Kann's weight: It's flat-out heavy. Put it in the pocket of your blazer and its bulk will weigh that one side down. If you're looking for a true pocket-sized player, you'll be happier with Astell&Kern's AK70 MKII.

## EXPANSION GALORE

The Kann's top and bottom house all the player's ports. The bottom of the player has full-size SD and microSD card reader slots. Storage options are crazy for a portable player. The player is certified to support 400GB microSD and 512GB full-sized SD cards. Added to the player's internal 64GB of memory, you can have up to 978GB of storage at any one time.

Next to the SD card slots you'll find a 10Gbps USB-C (USB 3.0) and a micro-USB port. If you think that the two ports are there for both future and backwards compatibility, you'd be only half right. Look carefully and you'll see that the USB-C

port is labeled "Data/Charge" and the micro-USB port is labeled "audio."

The two ports have completely independent functions. USB-C is used for fast charging and lightning-fast data transfers. If you are on a Mac, you'll need to use the free Android File Utility to transfer files to and from the player.

The micro-USB port handles USB DAC functionality and USB audio output. It will also connect to Astell&Kern's CD-Ripper. You cannot charge the Kann via the micro-USB port as with previous players. As someone who tested the Kann on a MacBook Pro with USB-C ports, I would

have loved to have one cable to rule them all.

## POWERFUL NETWORK STREAMING

I said it in my Astell&Kern's AK70 Mark II review (go.macworld.com/70m2) and I'll repeat myself here: If you think the Kann is simply a hi-res music player, you've totally missed the memo. In fact, you've left some of the player's most powerful features completely unused.

You have your choice of three streaming services on the Kann: Tidal, Moov, and Groovers+. Tidal tracks sounded beautiful. The Kann and Focal Clear (go.macworld.com/fcle) one-two
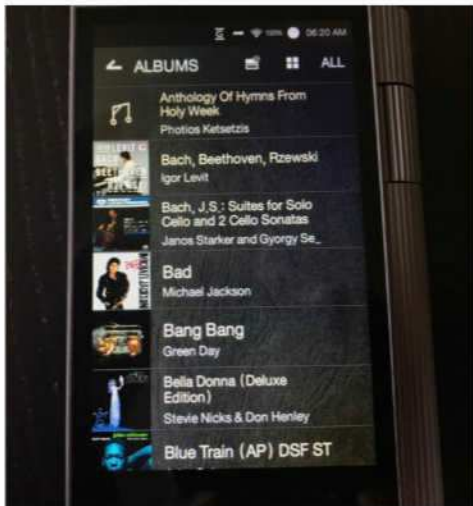


**The Kann's UI is straightforward, offering multiple views.**

combo was pure bliss.

Via AK Connect, the Kann will connect to any DLNA-compliant server. It even comes with free, cross-platform DLNA server software if you need it. I had a flawless experience streaming music from both the Astell&Kern DLNA server and Twonky DLNA server on my Mac.

The free AK Connect mobile app (available for both iOS and Android) bridges your iOS or Android smart device for both controlling the Kann remotely and playing content from the Kann on an iPhone. One feature that is worth emphasizing is that I could play both FLAC and DSD files from the Kann to my iPhone. These are two formats that the iPhone doesn't natively support. Just like the AK70 MKII, the Kann can act as a full-fledged, portable music server!

## EXPERIENCE THE MUSIC

I performed my listening with Focal Clear, Oppo PM2 (go.macworld.com/opp2), B&W P9 Signature (go.macworld.com/bwsg) over-the-ear headphones as well as Aurvana Trio and Periodic Audio Beryllium in-ear-monitors.

Let me cut right to the chase. This is a sweet-sounding, reference hi-res audio player by any measure. There's something oh so right about the sound and presentation. To really appreciate the Kann, pair it with equally exceptional
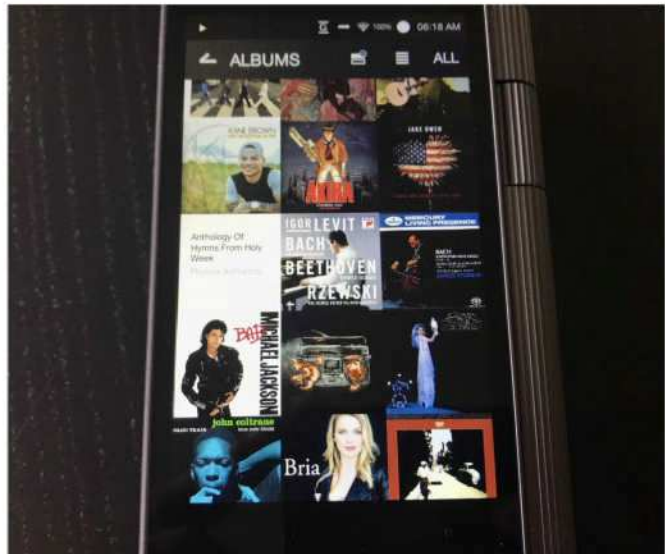
headphones. You'll be duly rewarded.

Every time I turned on the Kann, the player's sweet sound beckoned me to indulge in album after album, track after track. I gladly obliged.

What struck me almost immediately was the Kann's uncanny ability to bring music to life, letting a performance's energy burst forth. The 16-bit/44.1kHz CD rips of Alanis Morissette's "Woman Down" and "Guardian" streamed via



**The Kann has several ways to view your music, including an all-graphical collage view**

the Astell&Kern DLNA server acted as heralds of what I was in for. The Kann did an outstanding job reproducing the sheer energy and life of both songs. The soundstage was wide and instrument placement spot on with Morissette's vocals perfectly set.

Vocals and musical arrangements flowed smoothly. Norah Jones' album, *Featuring* has some classic duets. On "Here We Go Again," with Ray Charles, the Kann reproduced exceptional timbre across the band. Jones' and Charles' distinctive vocals were near perfect. Moreover, instruments and vocalists were precisely placed on a three-dimensional soundstage. Ray Charles

was positioned slightly left of center with Norah Jones' vocals slightly to the right on "Here We Go Again."

The Kann resisted any tendency to accentuate vocal characteristics, keeping a warm, balanced, natural presentation. Natalie Merchant's vocals on "Ladybird" from her self-titled album were intimate and warm. The 24-bit/96kHz version of Robert Plant and Alison Krauss' Raising Sand was enthralling. On "Please Read the Letter" Plant's and Krauss' vocals were pitch perfect against a velvety black background.

The Kann was at home with raucous metal or the finest classical. Do you prefer

Nirvana, Megadeth, or Whitesnake? No problem. The Kann nailed the energy of the guitar riffs on the 24-bit/96kHz remastered version of Whitesnake's "Still of the Night." What about Mahler and Bach? I just sat back, closed my eyes and soaked up Janos Starker's mastery on the 24-bit/176.4kHz recording of Bach's Cello suites as though I were invited to experience an intimate concert.

The Kann had an uncanny ability to command my attention—even with songs and performances I knew well. I did a double-take every time I played the 24-bit/88.2kHz version of Sarah Barielles "Brave." Thumping bass notes from the song's opening punched out with outstanding dynamic range, yet total control.

What about the bass output? It's audiophile grade, not "bass-enhanced" gimmicky. If you have open-back headphones, you'll really appreciate what the Kann can do. On the *Black Panther* soundtrack, the Kann put vice-like command on every bass line on tracks such as "Bloody Waters" or "King's Dead." Bass response was dynamic, starting and stopping on a dime. The deep bass output of Sarah McLachlan's "I

Love You" on Surfacing felt intense and controlled. And those famous bass lines on Holly Cole's "Train Song?" Outstanding.

Now the logical question, is the Kann *better* than the AK70 MKII? The answer is—it depends. I felt as though the AK70 MKII delivered a cleaner, more detailed presentation. Consumers who prefer that will like the AK70 MKII better. The Kann, by contrast, was a richer and smoother sonic experience with a more exciting and dynamic bottom end. Which is better? That's a question only your ears can answer.

## BOTTOM LINE

Rich, refined, yet endlessly involving and exciting are how I'd summarize my experience with Astell&Kern's Kann. It's not the last word in sonic perfection, but it is the type of audio gear that brings you closer to your music in so many intangible ways. Not only that, it supports every hi-res format that matters, it provides massive storage capability, it offers outstanding DLNA network streaming, it can function as a USB DAC, and it's portable (as bulky as it is). By any measure, this Astell&Kern has delivered a reference player that makes the music its top priority. ∎

**Astell&Kern Kann**

PROS

• Lush, rich, and warm sound that brings out the best in well-recorded, hi-res music files.

• Very fast charging and data transfer via USB-C.

• aptX HD support.

CONS

• Bulky, heavy, and very expensive.

• Streaming services limited to Tidal, Moov, and Groovers+.

PRICE

$999

# YOUR BODY
## YOUR HOPE

**Your immune system may be the key to beating cancer.**

Immunotherapy, a new approach to cancer treatment, is bringing hope to cancer survivors everywhere. Immunotherapy works by empowering your body's own immune system to correctly identify and eradicate cancer cells. This approach has been used to effectively fight many types of cancer, with new research leading to greater hope each day. Speak with your doctor and visit **standuptocancer.org/immunotherapy** to learn if immunotherapy may be right for you.

Jimmy Smits, SU2C Ambassador
Photo By: Timothy White

**STAND UP TO CANCER**

# Mac 911

Solutions to your most vexing Mac problems.

**BY GLENN FLEISHMAN**

## Problems with an Apple AirPort? It could be a hardware failure

Hardware fails in very different ways. Sometimes, it's catastrophic and abrupt, and you hear terrible sounds coming from inside your hard drive. Other times, it's subtle, and a failing component or system causes hardware to limp along, throwing out errors you can't troubleshoot, because they aren't consistent. I spent months

with one of these problems in early 2015 (go.macworld.com/evbr).

However, it's much clearer resolving issues with Apple's seemingly now-retired line of AirPort and Time Capsule base stations. Apple hasn't commented on the record as to whether the products will ever be updated, and the most recent versions remain on sale. But it's been years since the last hardware improvements, and reports indicate the AirPort product team

(go.macworld.com/appt) was disbanded.

Apple's base stations unfortunately had a long history of not having a, uh, long history. For a long time, despite their high cost relative to competitors with similar general features, I recommended Mac and iOS users purchase Apple Wi-Fi routers, because of the better integration and support, including a native configuration tool—AirPort Utility.

However, Apple's Wi-Fi hardware has a long-term reputation for not having the same staying power as most of its other gear, often because of failing power-supply components. This was particularly galling as these devices have no moving parts, except for the hard drives in Time Capsule models. I've lost track of how many I've gone through in about 18 years, but I've had substantially fewer Macs fail in that period than Apple base stations. (I've run Wi-Fi routers from other companies sometimes in parallel or instead, and I've had almost none of those fail under similar conditions, but I've owned many fewer of them.)

Because people have shifted to buy routers from other companies, we've gotten fewer and fewer queries about quirks with Apple's access points, but they still come in every week or two, and the

latest from *Macworld* reader Ian is typical. He has both an AirPort Extreme and some of the less-expensive AirPort Express extenders on his network. AirPort Utility shows all the Apple base stations, but he can get the Express models to open up their configuration in AirPort Utility. Clicking Edit for the AirPort Extreme results in nothing.

I've had the same report from other readers, and experienced something similar a few years ago with the latest-generation AirPort Extreme. It would lock

**I've lost track of how many I've gone through in about 18 years, but I've had substantially fewer Macs fail in that period than Apple base stations.**

up in weird circumstances, sometimes including when trying to use the printer attached via its USB port. Eventually, I replaced it with a TP-Link router, which has given me no grief after years (so far).

I suggested to Ian that the hardware was probably failing, since this matched my and other people's experience. He believed it was out of warranty, but I suggested he check a little-known angle that Apple offers for extended warranty support. If you purchase an AppleCare warranty for a Mac, not only is the Mac

covered for three years from its initial date of purchase, but any AirPort base station bought up to two years before that point is also covered through that three year period. You could wind up with a total of five years of warranty coverage.

Ian followed up to let me know that while he didn't have a qualifying warranty, he had previously reported problems to Apple while his router remained under warranty, and the company agreed to replace it at no charge. His new AirPort Extreme isn't showing any of the problems the old one did.

## macOS High Sierra: Why you can't format an internal SSD with HFS+ format

I've written quite a bit about the not-quite-so-new Apple File System (APFS) format (go.macworld.com/afls) that Apple adopted for both iOS and—with macOS 10.13 High Sierra—for SSDs that are a Mac's boot volume. While questions have largely tapered off in recent weeks after a spate of issues with Time Machine, APFS, and external drives (go.macworld.com/dctm), people are clearly still wrestling with some of the details.

*Macworld* reader Andrew wrote in asking about reformatting his High Sierra system, and wanting to choose HFS+ (Mac OS Extended, Journaled). However, after booting into macOS Recovery (go.
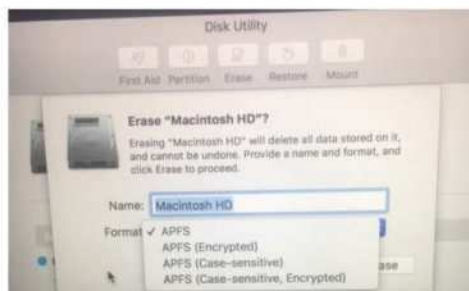


**A *Macworld* reader can't get the HFS+ option to appear, but that's by design.**

macworld.com/mosr), the Disk Utility app only offers up APFS options. Why is that?

MacOS Recovery is in sync with High Sierra, and Apple converts a boot SSD volume into APFS when you install High Sierra. While that was optional during High Sierra's public beta period, it became mandatory and unavoidable on release. As a result, even trying to erase a boot SSD volume only presents APFS options.

It's possible you could force HFS+ on a boot SSD with High Sierra with some Terminal monkeying around, but I can't see that would end well, and I'm not sure it offers any advantages. It's too risky to recommend.

However, if you're trying to downgrade to Sierra or an earlier version of macOS, I would create a bootable installer (go. macworld.com/btin) of that version of macOS, start up your Mac from it, and then use Disk Utility within Sierra or earlier to reformat the SSD with HFS+.

Then you can install previous versions of macOS on that Mac.

## How to find your FileVault recovery key in macOS

The FileVault option in macOS is a fantastic way to enhance the security of your data at rest. It's full-disk encryption (FDE), meaning that your entire startup volume is locked away when macOS is shut down (not just sleeping) using strong encryption. Without the password that unlocks an account on your Mac that's authorized to log in with FileVault, there's no effective way to bring that computer to life.

That's a problem, however, if you forget the password to all the authorized account or, in some cases I've received a few emails about, something goes wrong and the Recovery Disk—used both for "cold start" logins to macOS and to diagnose problems on your startup volume— demands a login that doesn't work.

In those cases, the recovery key set at the time you turned on FileVault on your

Mac can do the trick. But if enough time has passed, you might have forgotten where you stashed the key or how to retrieve it. *Macworld* reader Elaina falls into that camp. She can't find the key, and she remembers using the iCloud option to store it, but has examined iCloud Drive and can't find it. She hasn't yet been in a situation where she needs it, but she's concerned that you could wind up locked out and not be able to obtain the recovery key.

This is a problem with security options on systems reliable enough that you don't have to work with them regularly to refresh your memory. (And it's why Apple shifted iOS two years ago to require that you enter your passphrase every six days (go. macworld.com/pc6d), even if you have Touch ID enabled.)

When you first set up FileVault in the Security & Privacy system preference pane in the FileVault tab, one of the steps asks you whether you want to use your iCloud account as a way to unlock your disk and



**You can opt to store your recovery key as part of your iCloud account for password resets.**

reset your macOS account password if you can't find your recovery key.

If you choose iCloud, the recovery key isn't stored loosely in iCloud Drive or as a file, but it's tied into behind-the-scenes account information that Apple maintains. It's fully encrypted in such a way that even Apple doesn't have access to the unencrypted recovery key data, but Apple can deliver the encrypted recovery key to your Mac if you need to reset your password. You never see the recovery key nor have to enter it in this configuration. (The process is a little involved: Apple describes it in the section "Reset using the Reset Password assistant (FileVault must be on)" in this support document (go. macworld.com/rsps).)

If you choose the other path, where FileVault generates a recovery key and displays it, you need to make sure and write it down or enter it electronically, and store it securely in such a way that you'll have access even when your Mac can't be booted. I use 1Password's secure notes for this purpose, but any method of storage that's reliable, secure, and accessible will work.

A good strategy would be to set a quarterly reminder to look for your recovery key (and other important passwords and keys you have to store in the same place). If you can't find it, disable FileVault in macOS and re-enable it. This

will take a while, as the entire drive is decrypted and then re-encrypted, but macOS generates an entirely new recovery key, which you can then more carefully note again.

With each of the above situations, if you can't log into iCloud or you lose the recovery key, your Mac's files are irretrievable forever, as I wrote about last year (go.macworld.com/rcfv).

## How to recover an iCloud account when a factor for two-factor authentication goes missing

Two-factor authentication (2FA) is highly recommend with your Apple ID, especially for iCloud or iTunes and App Store purchases, but there's one drawback: you need access to a second factor, or you might wind up losing everything associated with your account.

Normally, this shouldn't be a problem. The second factor for Apple's system is always at least one Mac or one iOS device plus a phone number (one that receives either text messages or voice calls, so a landline is an option). It would seem an unlikely scenario in which you lost all of that at once.

You can also add other phone numbers as backups, which is what my wife and I have done with each other's cell numbers. Even if we lost access to our devices and

You can set up two-factor authentication for iCloud.

Apple offers a semi-automated account-recovery process (go.macworld.com/rcid) that hinges on how much information you can provide. The more information, the faster the process goes. Human beings are involved to make it difficult or impossible to automate the recovery for malicious ends, but Apple also may decide it can't verify your identity well enough, even if you own the account, to give you access back. ∎

our own numbers, we could still log in. (Telephone numbers can be reassigned, and hackers sometimes socially engineer or otherwise shift them for identity theft or worse purposes.) But it happened to *Macworld* reader Edgar, who writes in about his problems after switching away from the iPhone to a different platform:

> *I need to get into my iCloud account to access photos, notes, contacts, etc. but had two-factor authentication enabled. I'm being prompted to enter the code when I login online but the phone lines have been switched, so I don't have access to the 2FA code on iPhone.*

He may be in a pickle, although having the password to his account should help.

## Ask Mac 911

We've compiled a list of the most commonly asked questions we get, and the answers to them: go.macworld.com/mac911faq to see if you're covered. If not, we're always looking for new problems to solve! Email us at mac911@macworld.com including screen captures as appropriate.

*Mac 911* can't provide direct email responses or answers for every question and we don't provide direct troubleshooting advice. For that, turn to AppleCare, an Apple Store Genius Bar, or the Apple Support Communities.