PC MAGAZINE



WHO IS #1?

FASTEST MOBILE NETWORKS 2014

DIGITAL EDITION
JULY 2014

PC MAGAZINE

CONTENTS

JULY 2014

FEATURES

COVER STORY

FASTEST MOBILE NETWORKS 2014

What's the fastest mobile Internet service in the United States? *PC Magazine* drove to 30 cities and across thousands of miles testing AT&T, Sprint, T-Mobile, and Verizon Wireless to find out.



REVIEWS

CONSUMER ELECTRONICS

Braven BRV-X

Canon PowerShot N100

Garmin Forerunner 15

Asus PadFone X (AT&T)



Canon PowerShot N100

HARDWARE

Microsoft Surface Pro 3

Digital Storm Coridium

Acer H276HL

WobbleWorks 3Doodler



Garmin Forerunner 15

SOFTWARE & APPS

Sticky Password 7

Our Favorite Apps for July



Microsoft Surface Pro 3

WHAT'S NEW NOW



20 COOL THINGS ABOUT MAC OS X YOSEMITE

Apple's new update adds exciting features and fresh design elements to Mac OS X.

BRINGING THE ACTION FROM THE MOVIE SCREEN TO THE AUDIENCE

New titles at the Tribeca Film Festival used tech to put audiences in control.

SSD UPDATE COULD TRIPLE PERFORMANCE

Garbage collection changes could supercharge solid-state drives.

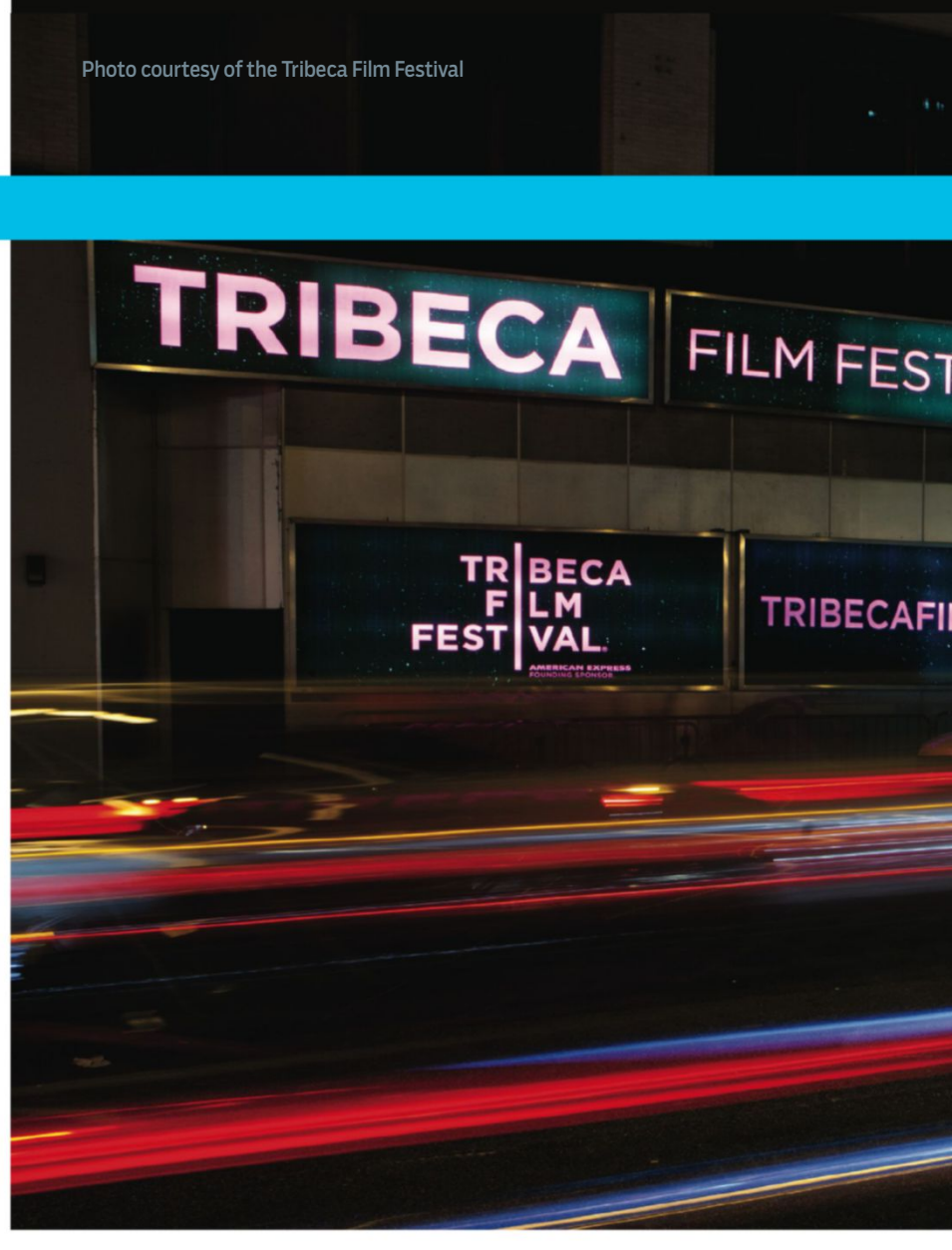
CHAT

Behavioral economist Dan Ariely says smartphone apps could be the key to staying motivated.

TOP GEAR

LAUNCH WINDOW

Photo courtesy of the Tribeca Film Festival





Launch Window: Withings Aura

OPINIONS

DAN COSTA
First Word

SASCHA SEGAN
Apple's Swift Language Changes the App Game

SAMARA LYNN
Should Comcast's Public Hotspots Leave Users Cold?

TIM BAJARIN
Web Subscriptions Are the Future of TV

> A dog has more real computing power than the biggest super-computer.

JOHN C. DVORAK
Last Word

DIGITAL LIFE



GET ORGANIZED
Streamline Your News Feeds

TIPS
Master Google Drive

HOW TO
Rescue Files Trapped on Old Storage Media

SHOPPING
Hot Gear for Staying Cool

DAN COSTA



On the Road Again

If it's summer, it must be time for *PC Magazine*'s annual Fastest Mobile Networks feature. The story originated from a conversation I had with Lead Mobile Analyst Sascha Segan about four years ago. Verizon was just about to light up its first LTE locations and it seemed like this could be a game changer for the industry. The question was, how could we evaluate the speed of all the existing networks and help consumers understand their choices? Sascha explained that the only way to do it would be to drive-test every major city in the country.

So that's exactly what we did. And we've been doing it every year since.

It's no small task. We hit not just all four national carriers, but every network they operate. That means 3G still gets tested. Our friends at Ford were kind enough to lend us some sporty C-Max Hybrid crossovers, and our team proceeded to visit 30 of the largest cities in the country. The test kit consisted of eight phones, connected to power inverters and constantly running speed tests. After three weeks of testing and some 20,000 miles of driving, we had more than 90,000 tests to parse. In the end, the winner was clear.

Although we have kept our testing methodology pretty consistent since we began doing this story in 2010, the winners have traded places multiple times. The first year, AT&T took the prize. Despite the fact that iPhone users were complaining about the provider, it had the fastest and most consistent 3G network in the country. The next year, Verizon passed it by rolling out its LTE network before any

of its competitors. Last year, AT&T struck back with ubiquitous LTE of its own. Now, thanks to some technical enhancements that you can read more about in our feature story, Verizon XLTE earns the crown as the fastest nationwide network.

But that's only half the story. Knowing the fastest mobile network nationwide is interesting, but it's far more useful to know who has the fastest network where you live. Dig into the numbers and you'll see that T-Mobile scored top marks in 15 cities; in fact, only weak performance in suburban and rural areas held it back from stealing the nationwide title. And if, like me, you're a Sprint customer, you can see how far that carrier has to go to be competitive again.

We're giving Sascha a break from analyzing spreadsheets for a while—he's fallen behind on his phone reviews—but we'll be on the road again soon when we test Canadian mobile networks for the second time later this summer. And in the fall we'll release our annual fastest ISP rankings.

Before I go, I want to welcome our new subscribers from Next Issue Media. As platforms like the Sony Reader go away, it's nice to see new distributors rising up to take their places. NIM has only been around for a few months, but it's making a lot of noise in publishing circles, and *PC Magazine* is glad to be part of it.



dan_costa@pcmag.com

What's New Now

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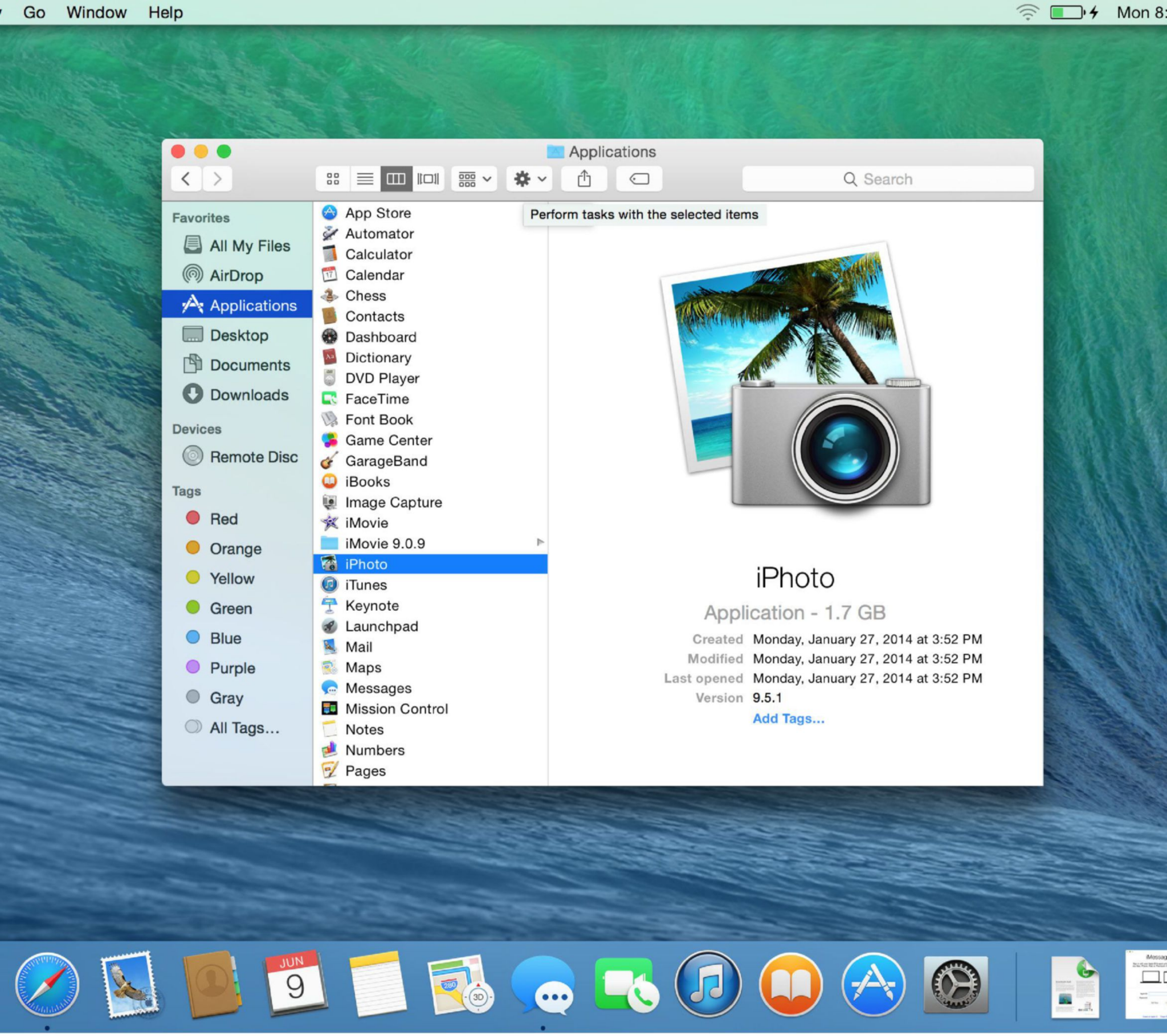
20 Cool Things About Mac OS X Yosemite

BY EDWARD MENDELSON



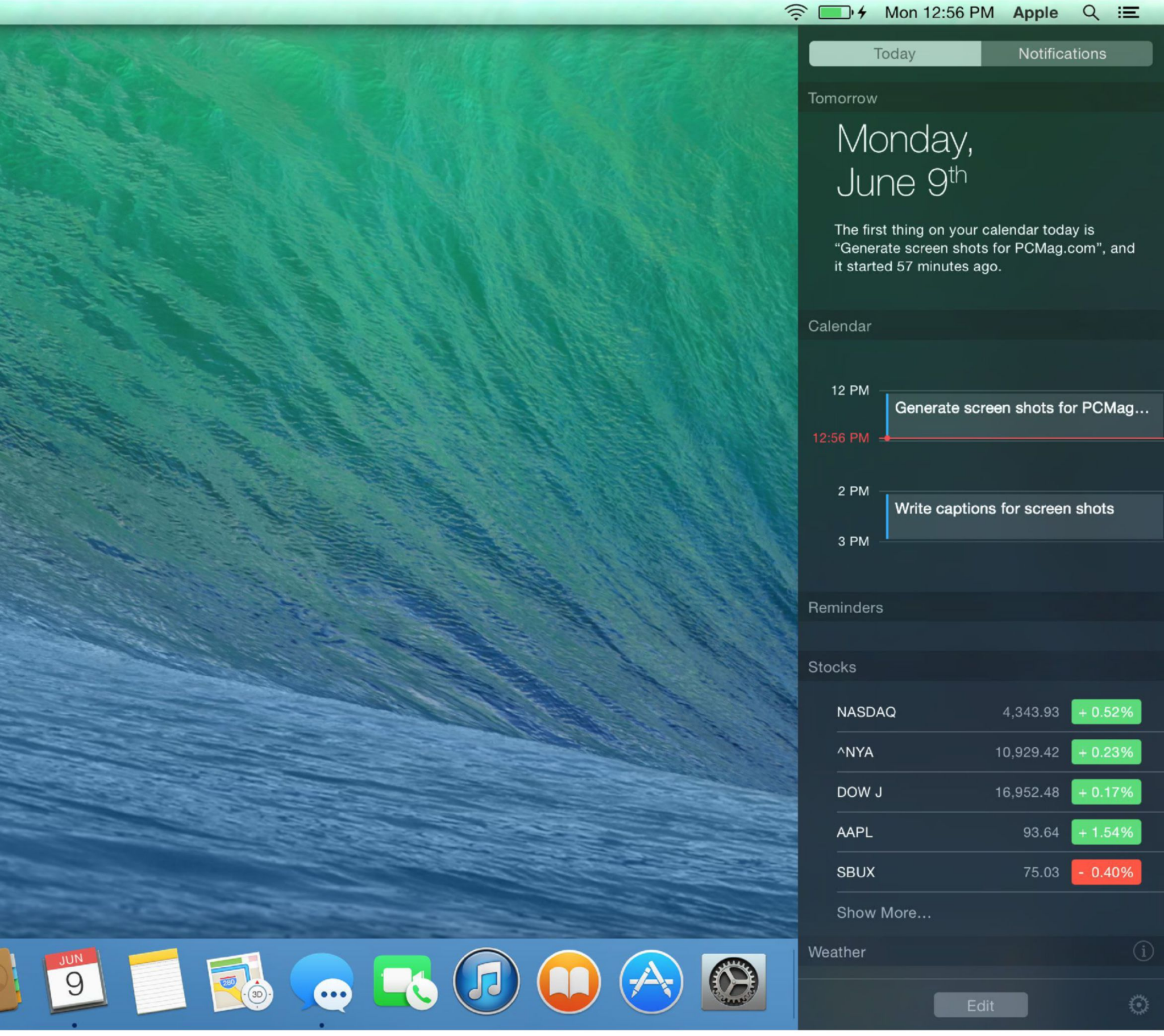
Apple OS X Yosemite, the tenth version of OS X, is due to arrive in the fall as a free upgrade, usable on just about any Mac manufactured since mid 2007. It's a classic Apple-style upgrade: Despite dozens of changes and new features, you won't need to relearn anything to use it. But if you own an iPhone or iPad running the upcoming iOS 8, your Mac and mobile device will work together in ways you never imagined. You'll be able to answer your phone on your Mac, for example, or start a mail message on your phone and finish typing it on your Mac. Add in a full-scale visual makeover and Yosemite also looks spacious and relaxing as it delivers unparalleled integration among built-in apps and networked devices.

We explored an early preview version of the operating system on a 15-inch MacBook Pro, with a Retina display that showed off the OS's clean, precise redesign. Here's our look at the 20 top features you can expect from Yosemite.



1. A New Look

The first thing you notice about Yosemite is that it looks a lot like iOS 7, with its flat design and low-key toolbar buttons. The dock is now two-dimensional, and the only traces of three-dimensional effects are the subtle shadows under the windows. If you look closely, you'll see that some design elements are slightly translucent. The Finder sidebar is a good example. Also notice the redesigned icons for the standard apps. Does anyone else think the old Finder icon looked equally cheerful but a lot more intelligent?



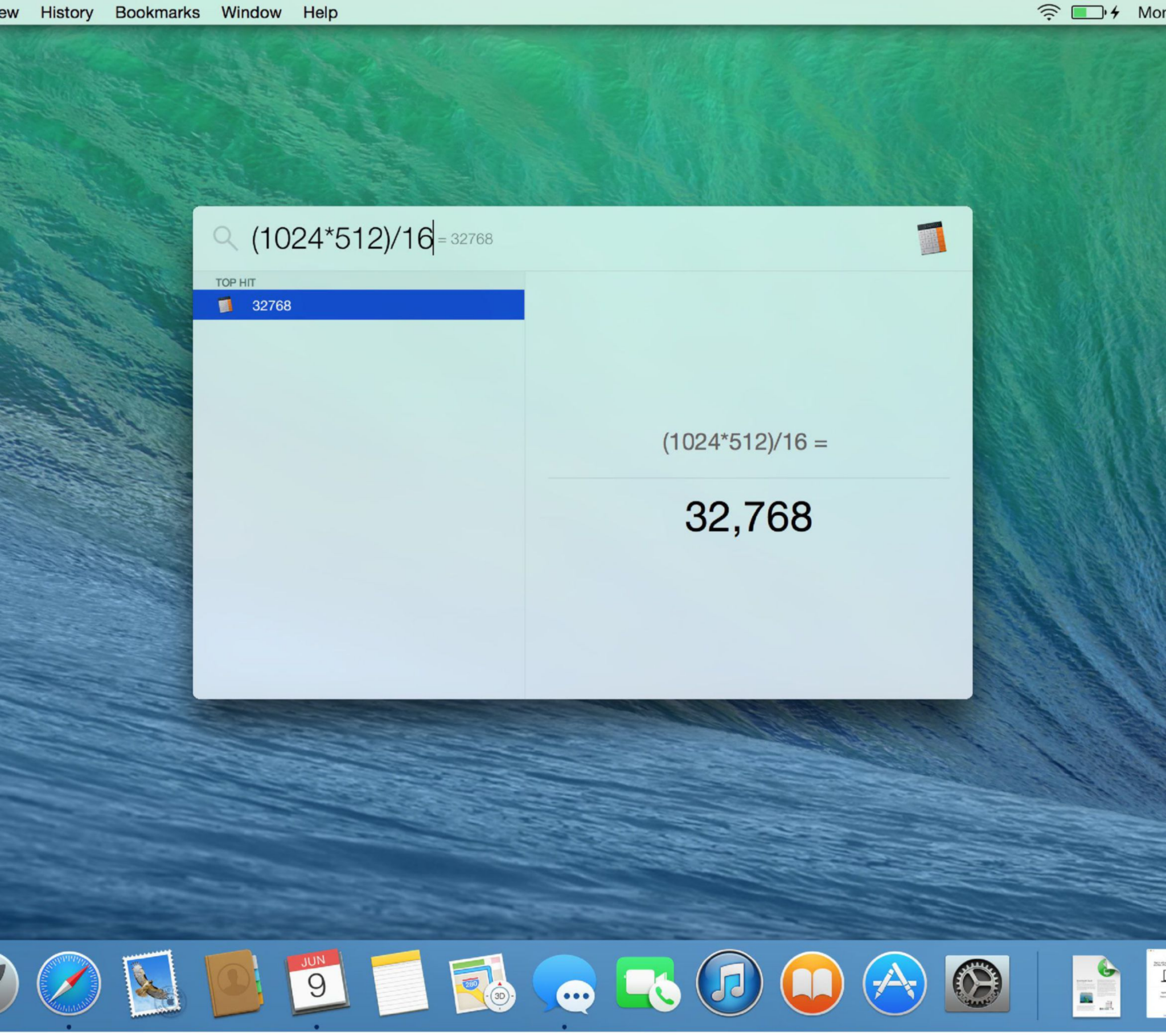
2. Notification Center Updates

OS X's Notification Center now packs a lot more information, including a Today panel that's linked to your Calendar. Notice the stock widget—one of a new breed of Notification Center widgets programmers can create for use on both iOS 8 and Yosemite. You can still use your old Dashboard widgets, but only in the Dashboard. The Dashboard will still be available on new systems, but if you upgrade to Yosemite from an earlier version of OS X and the installer detects that you've never used the Dashboard at all, the OS will quietly delete it to save space.



3. Spotlight on Spotlight

Spotlight moves—you guessed it—into the spotlight, right in the center of the screen, instead of tucked away in the upper-right corner. Previews appear in a separate panel instead of in the cramped little window of in earlier versions. Notice that searches now report items from the iTunes store, too. One interface feature that's especially obvious here is the new system font, Helvetica Neue, which replaces the Lucida Grande font used in previous versions.



4. Spotlight Gets a Calculator

If you're in the habit of opening your browser and typing simple calculations in the Google search box, now you can simply press Command-Space to open Spotlight and type your calculations in the search field. Press Command-C to copy the result and Command-V to paste it into any app.



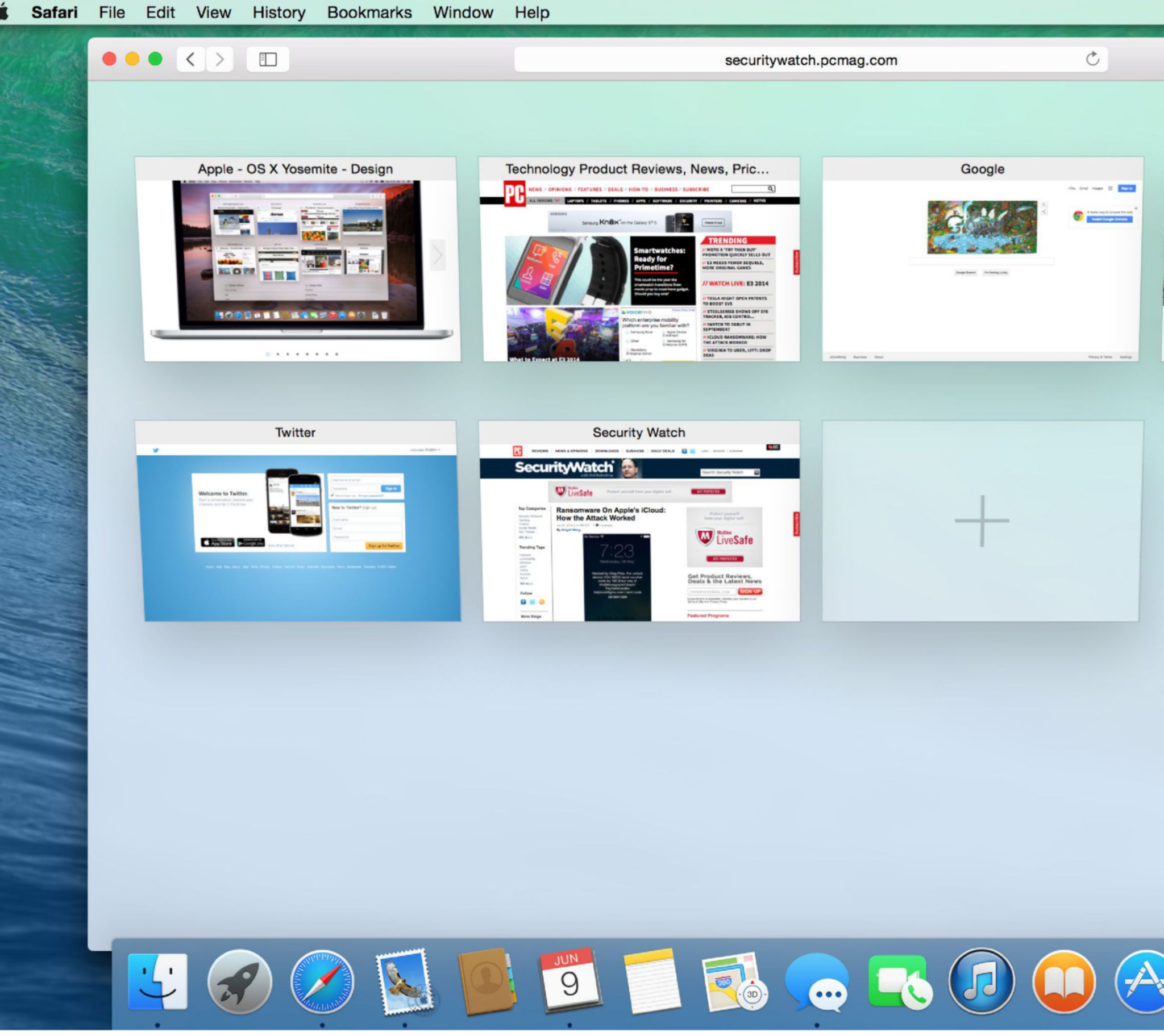
5. Spotlight Gets Smarter

Spotlight also works a bit like a silent version of Siri on iOS, giving you a lot of information when you search for something. Type in the name of a movie, for example, and Spotlight provides you with links to nearby showings. If you're really intent on wasting time, click on some of the trailers that Spotlight also offers.



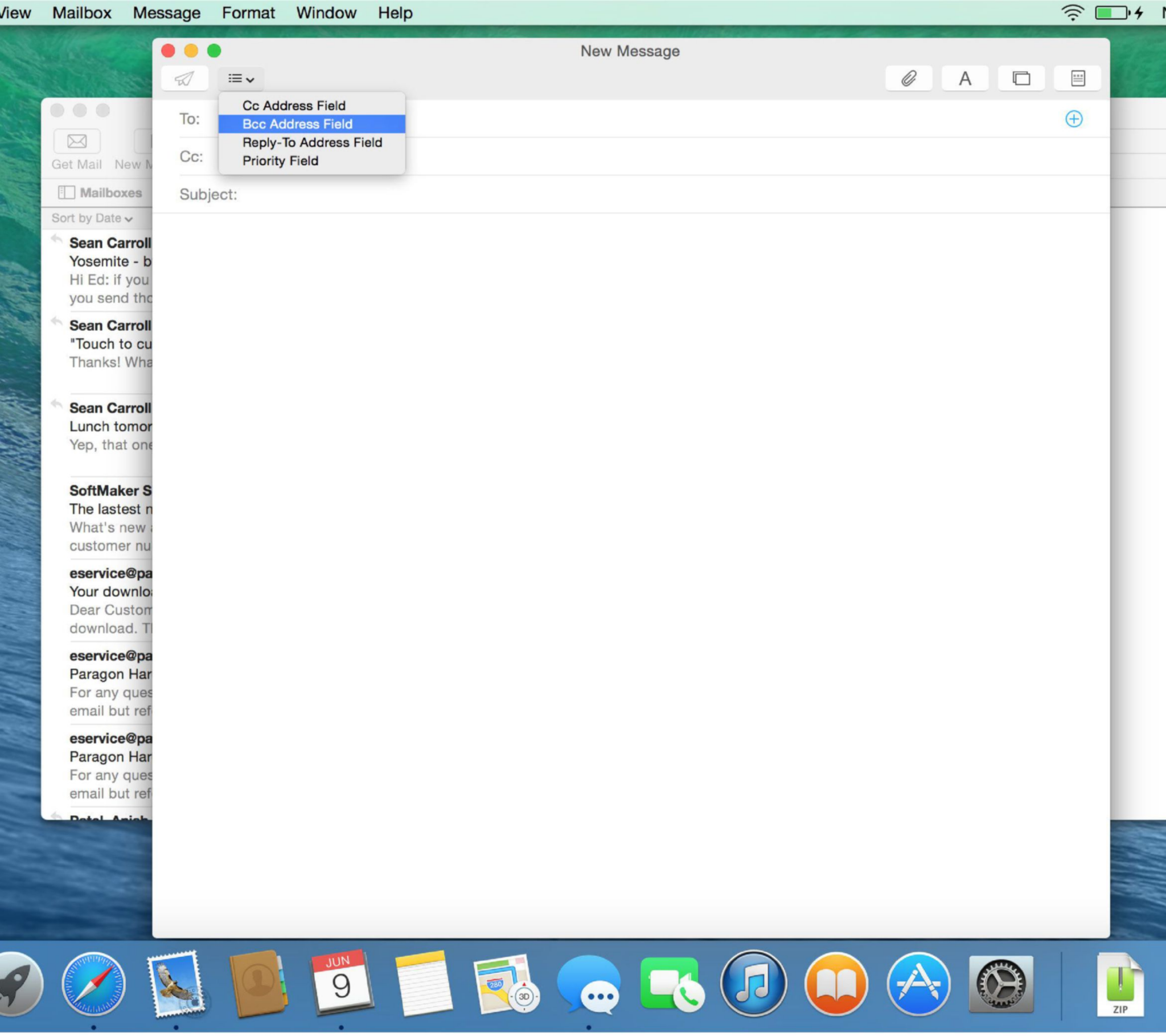
6. Safari Favorites

Safari gets a major makeover, with a single toolbar at the top. But don't worry: You can still display your old bookmarks bar by enabling it from a menu.



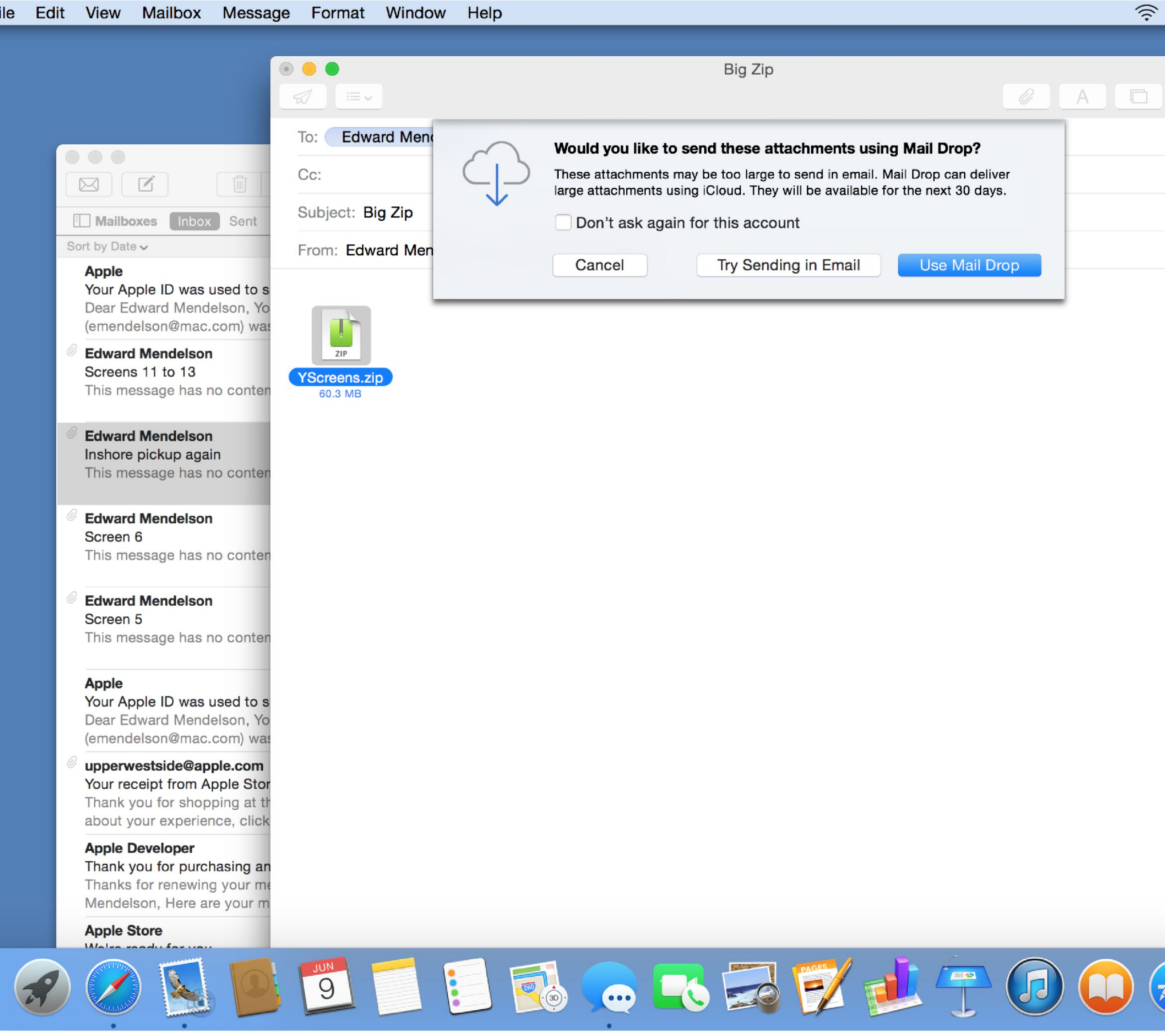
7. Keeping Tabs on Safari

In iOS, you can display a card-shuffle-style view of all your open pages in Safari. Yosemite gets a similar feature with its Show All Tabs view. You can open this view by clicking the button at the far-right edge of the toolbar, with a keystroke, or from the top-line menu. Of course, the blank icon with the plus sign lets you open a new, empty tab.



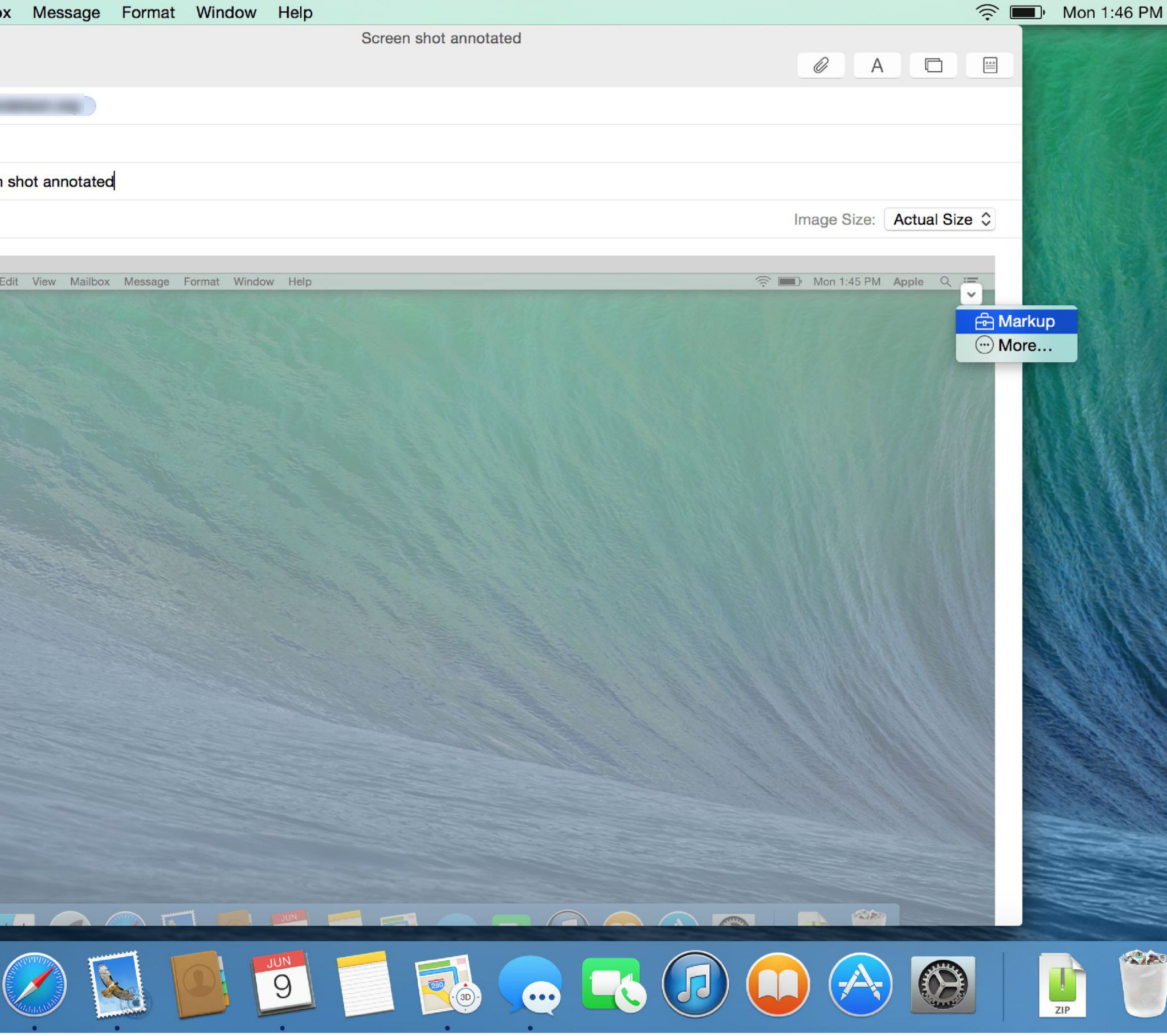
8. Mail Tooltip

We'll get to the more eye-catching features in Mail later, but here's one that a lot of users will appreciate: a drop-down menu that lets you quickly add BCC and other address fields. Notice also the light-colored iOS-style plus icon at the right that replaces the garish button for adding addressees found in earlier version of OS X.



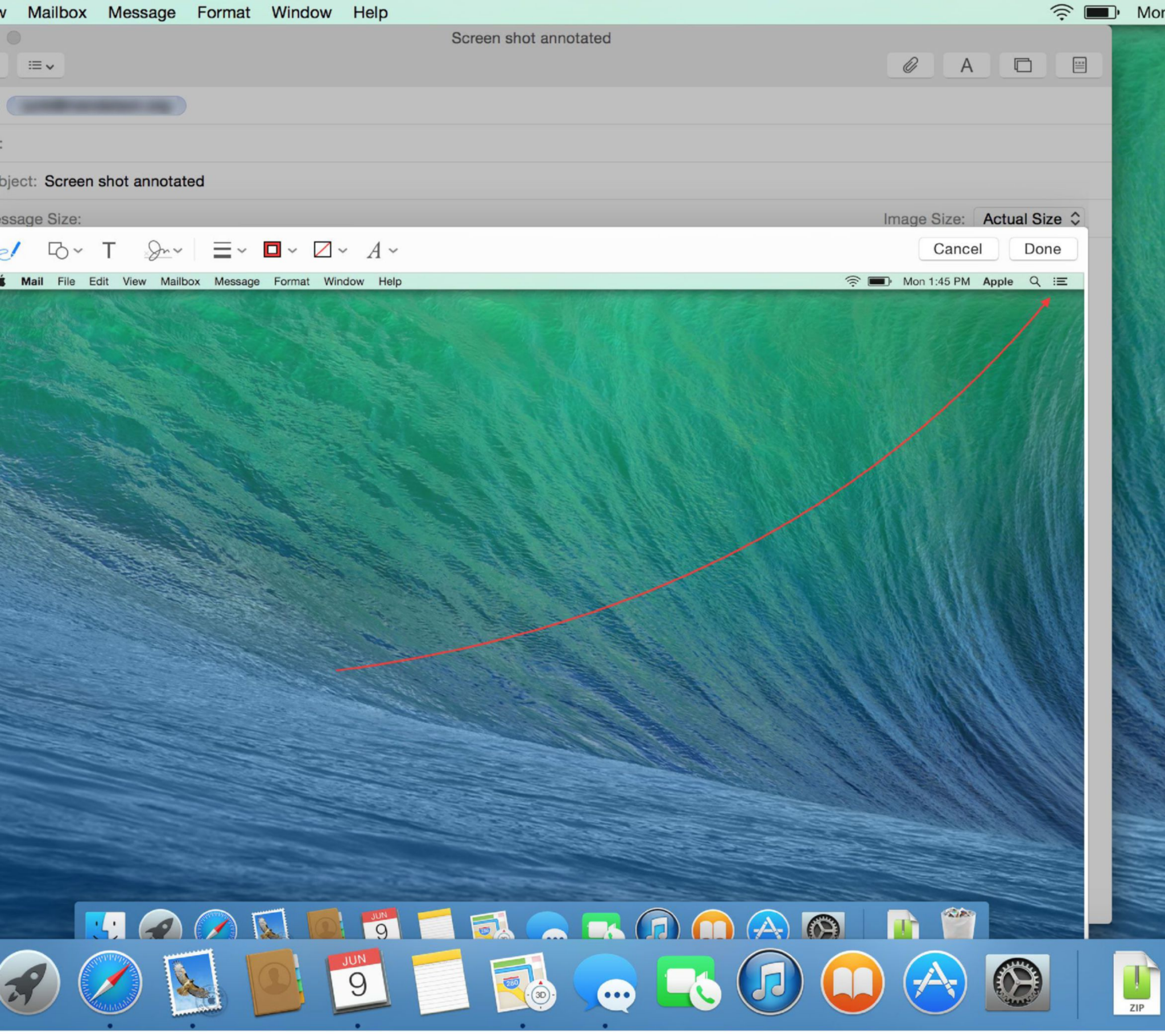
9. MailDrop Drops

Just when you'd gotten used to the routine of uploading a large file to Dropbox or some other service and sending a download link via Mail, along comes MailDrop. Apple's new service lets you upload files up to 5GB in size to a 30-day storage site, and then MailDrop sends you a download link in a mail message. It's all done in Mail, and it's blissfully simple. By the way, as far as we can tell, MailDrop isn't actually working yet, but our preview version of Yosemite at least let us see how it will work when it does.



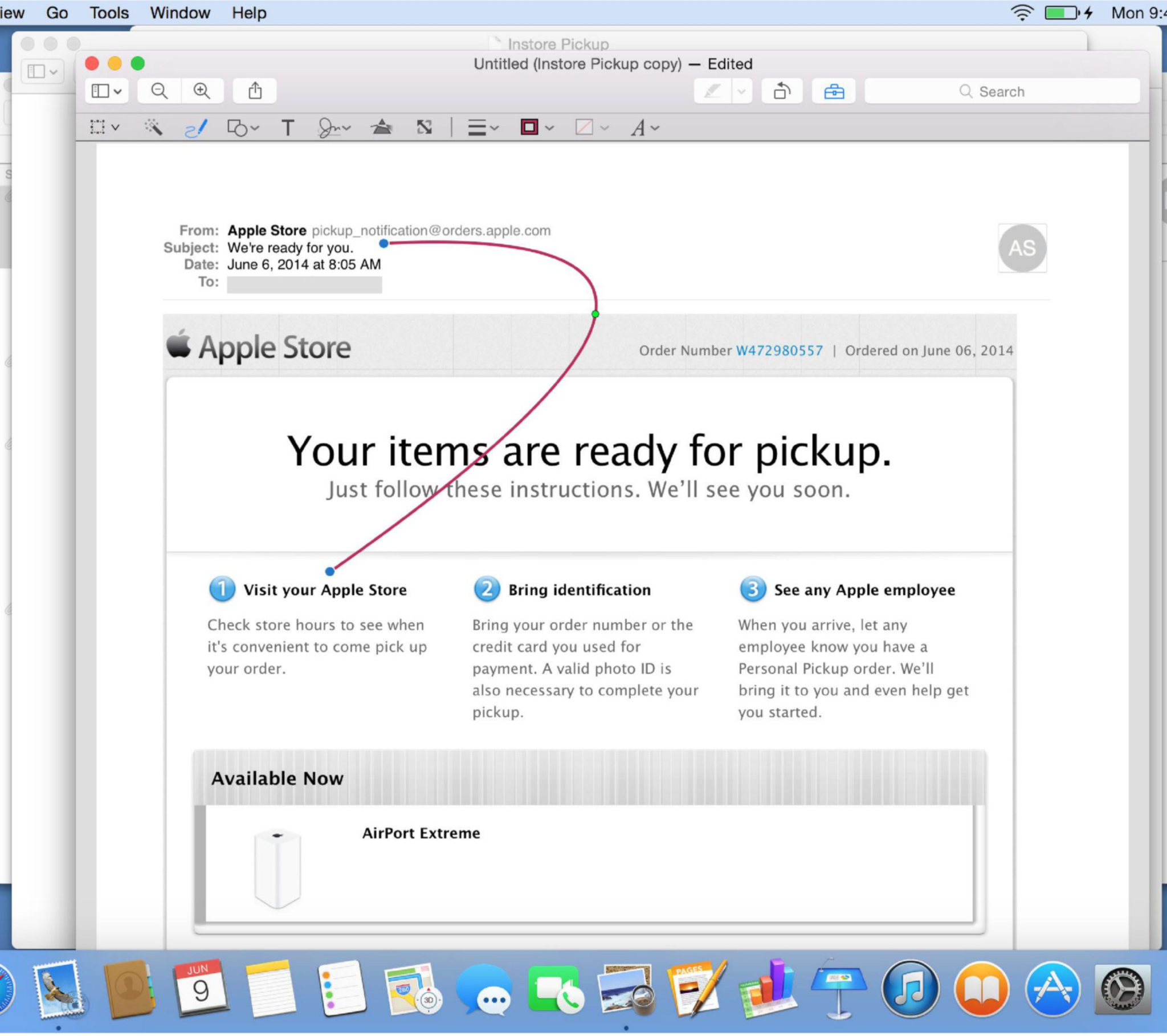
10. Mail Markups

If you're used to opening up a graphics program to mark up images before sending them via Mail, you can now mark them up in Mail itself. Hover the cursor over an image in a Mail message, and a Markup menu becomes available.



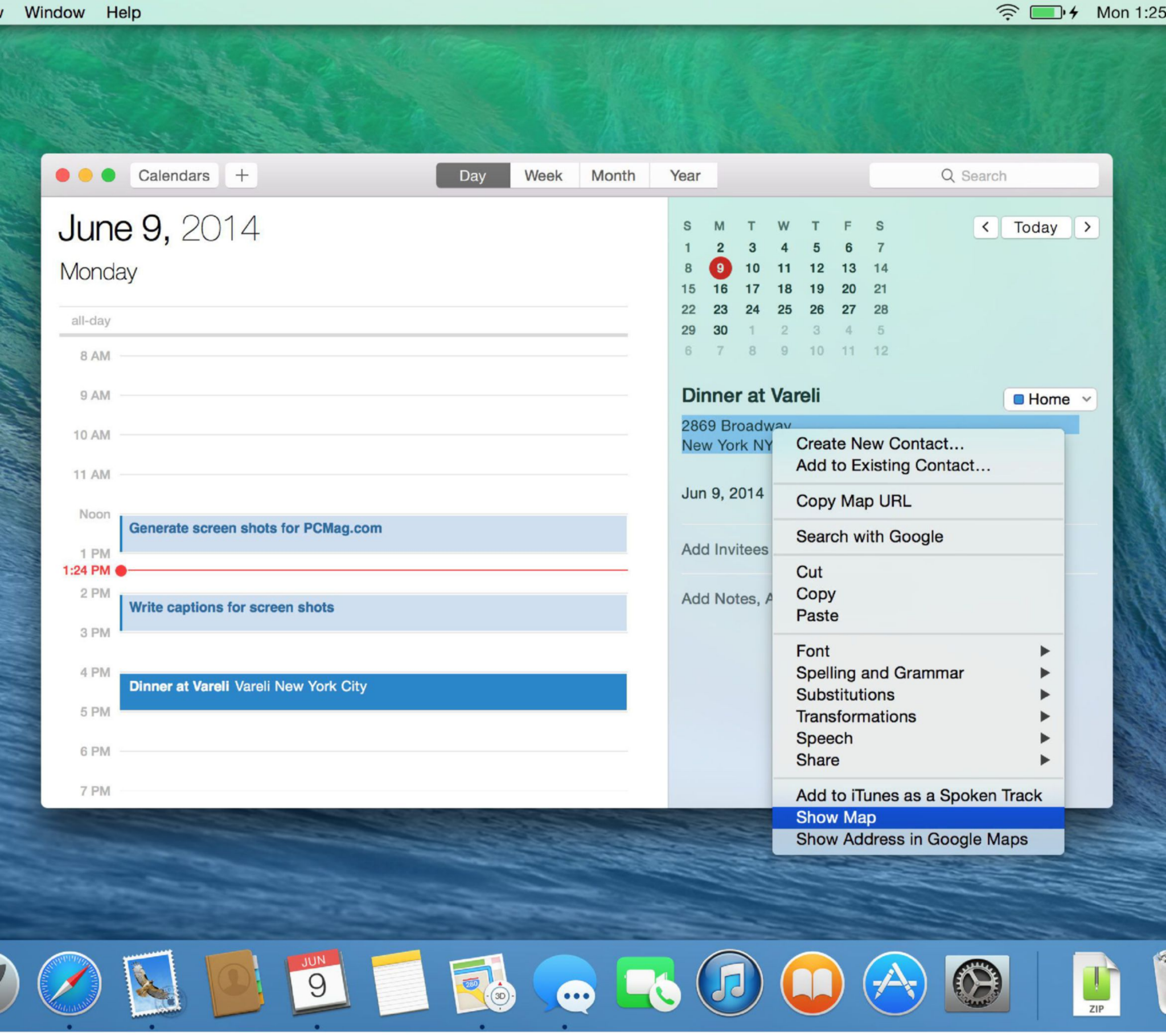
11. Mail Gets Arty

The toolbar offers a basic set of drawing tools—boxes, lines, text, and so on—but the really nifty part is the way OS X converts your hand-drawn scrawl into a smooth line. I used my fingertip on the trackpad to draw a messy arrow, which Yosemite converted into this perfect Bezier curve with an arrowhead.



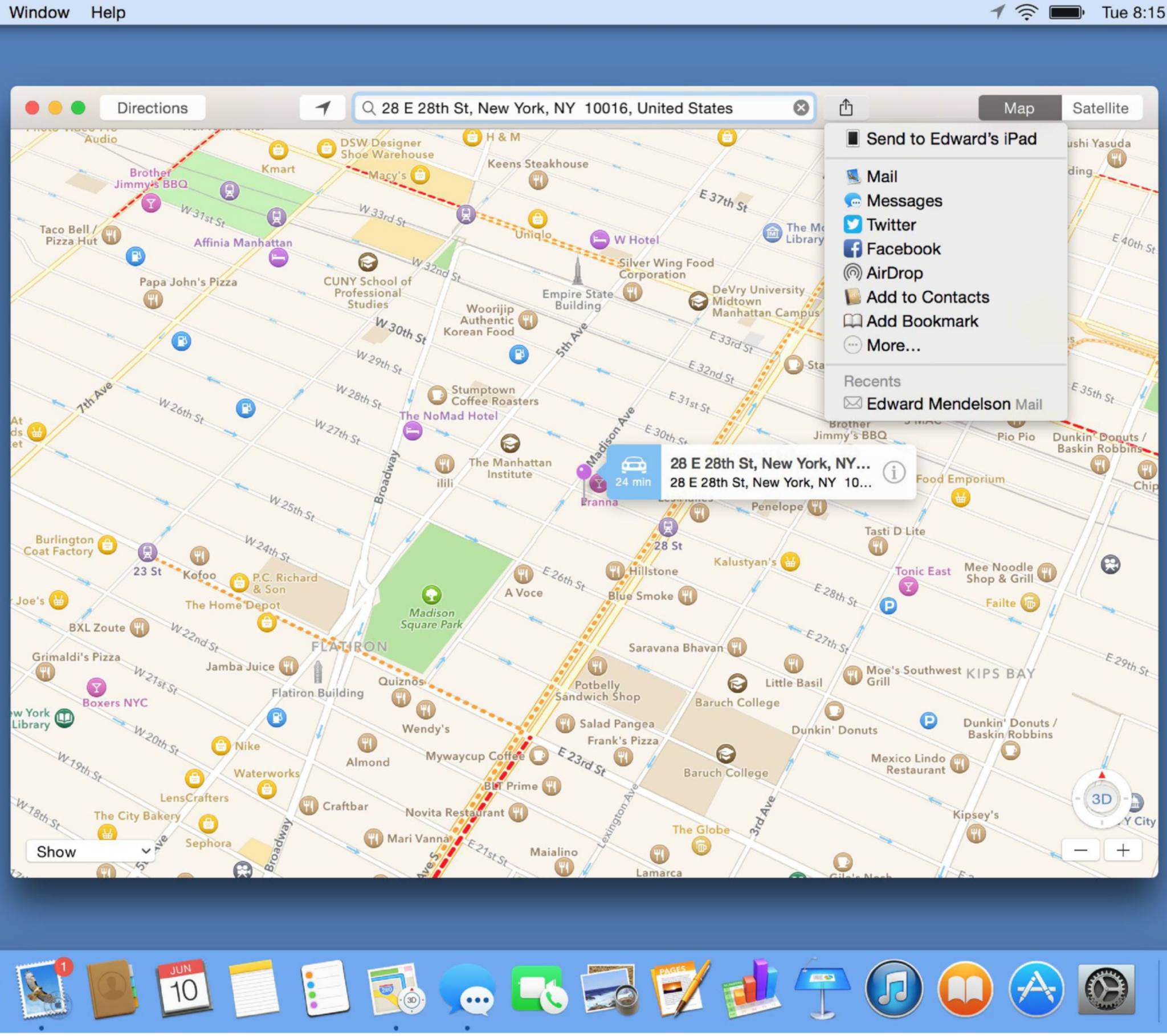
12. Preview Markups

The same markup feature is available in Preview for when you aren't mailing an image. Here you see the endpoints of the curve that OS X offers to draw in place of the scrawling curve that I drew using the trackpad.



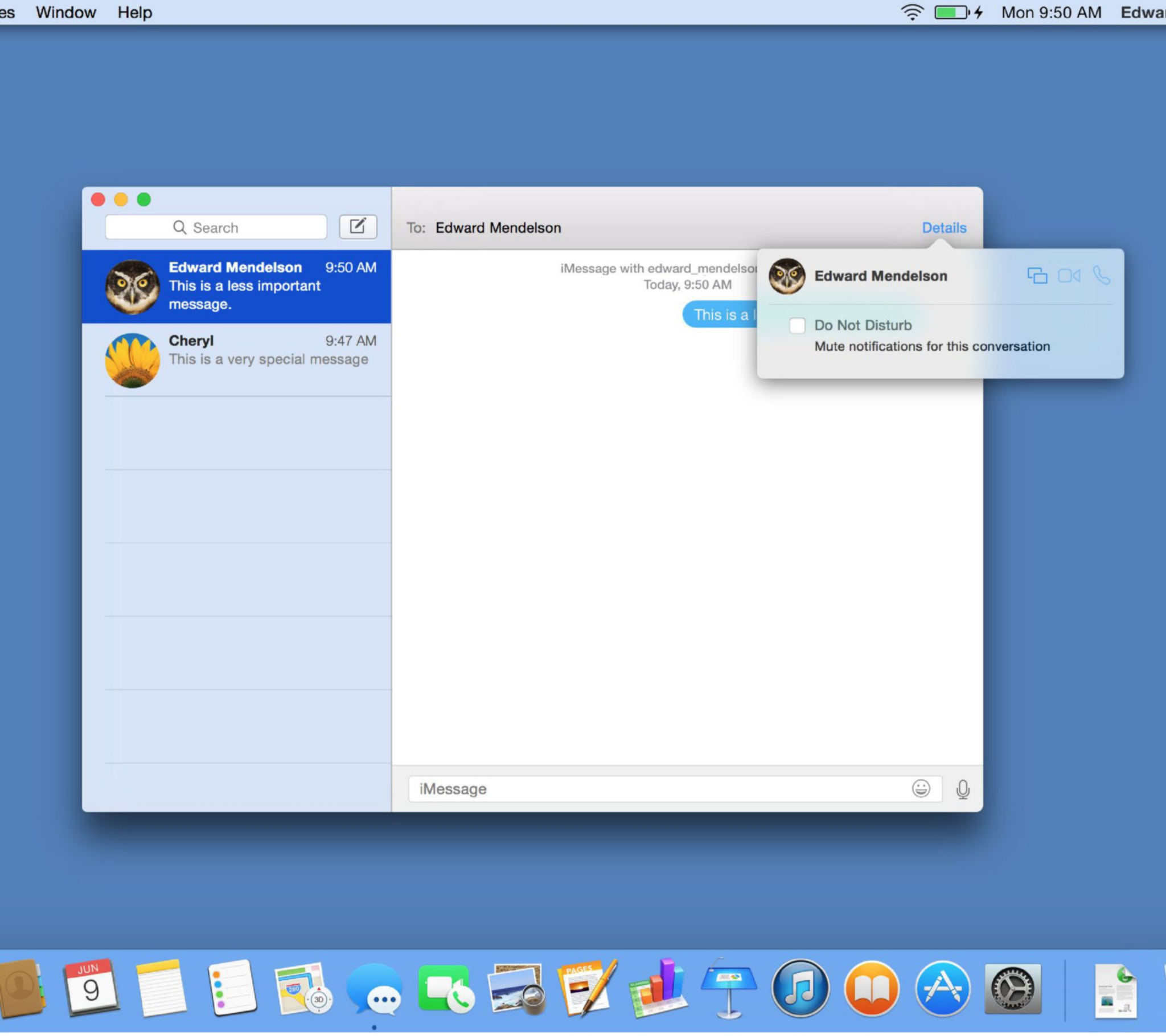
13. Newly Appointed Calendar

Calendar gets a revamped all-day view, complete with new options in the drop-down menus. As in Contacts and other apps, the iOS and OS X Calendars now look a lot more like each other.



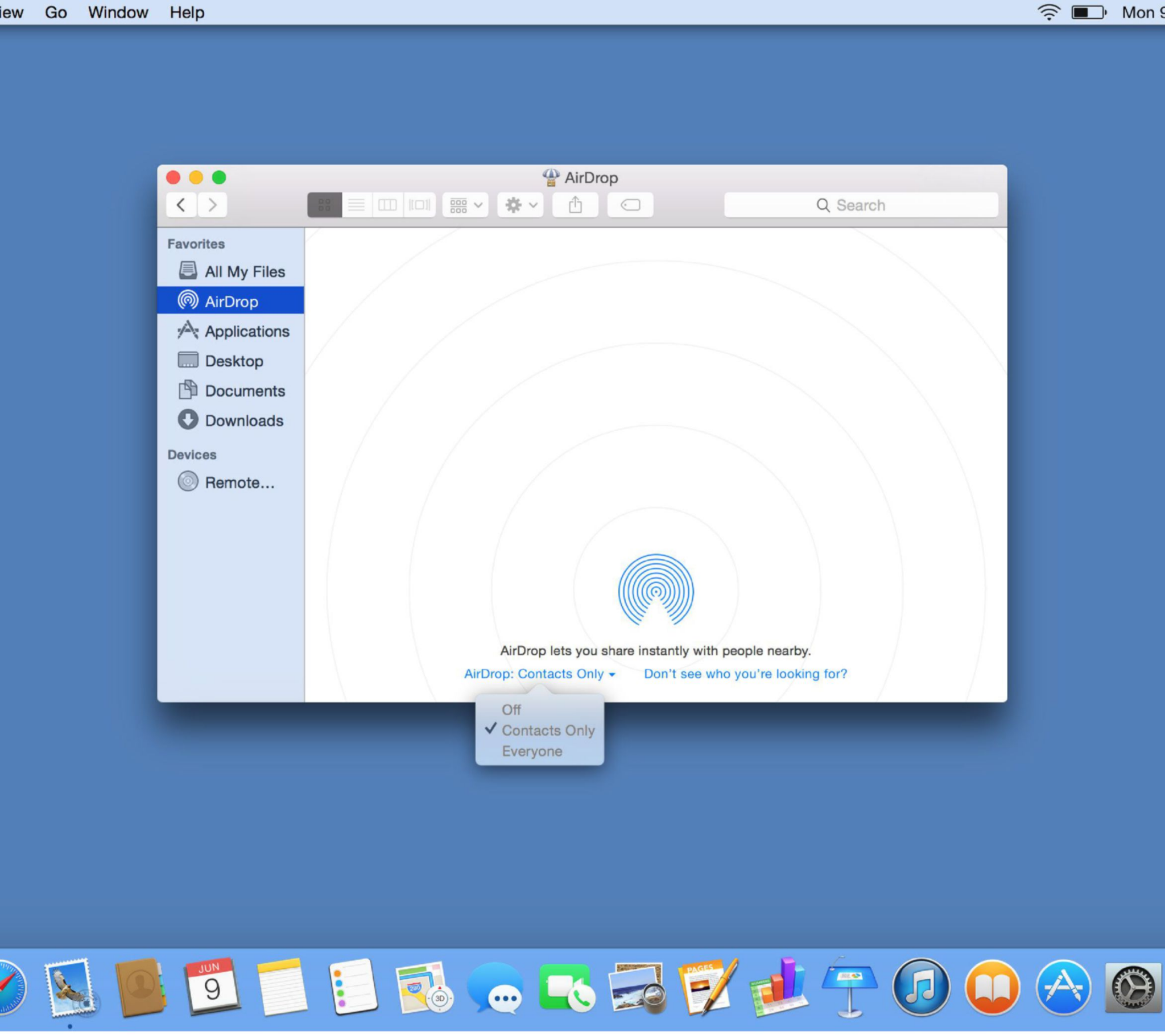
14. Maps

Maps gets a clean new interface in keeping with the rest of Yosemite, featuring only a single toolbar. Notice the wide range of options available from the Share menu, including one that moves the map to an iOS device.



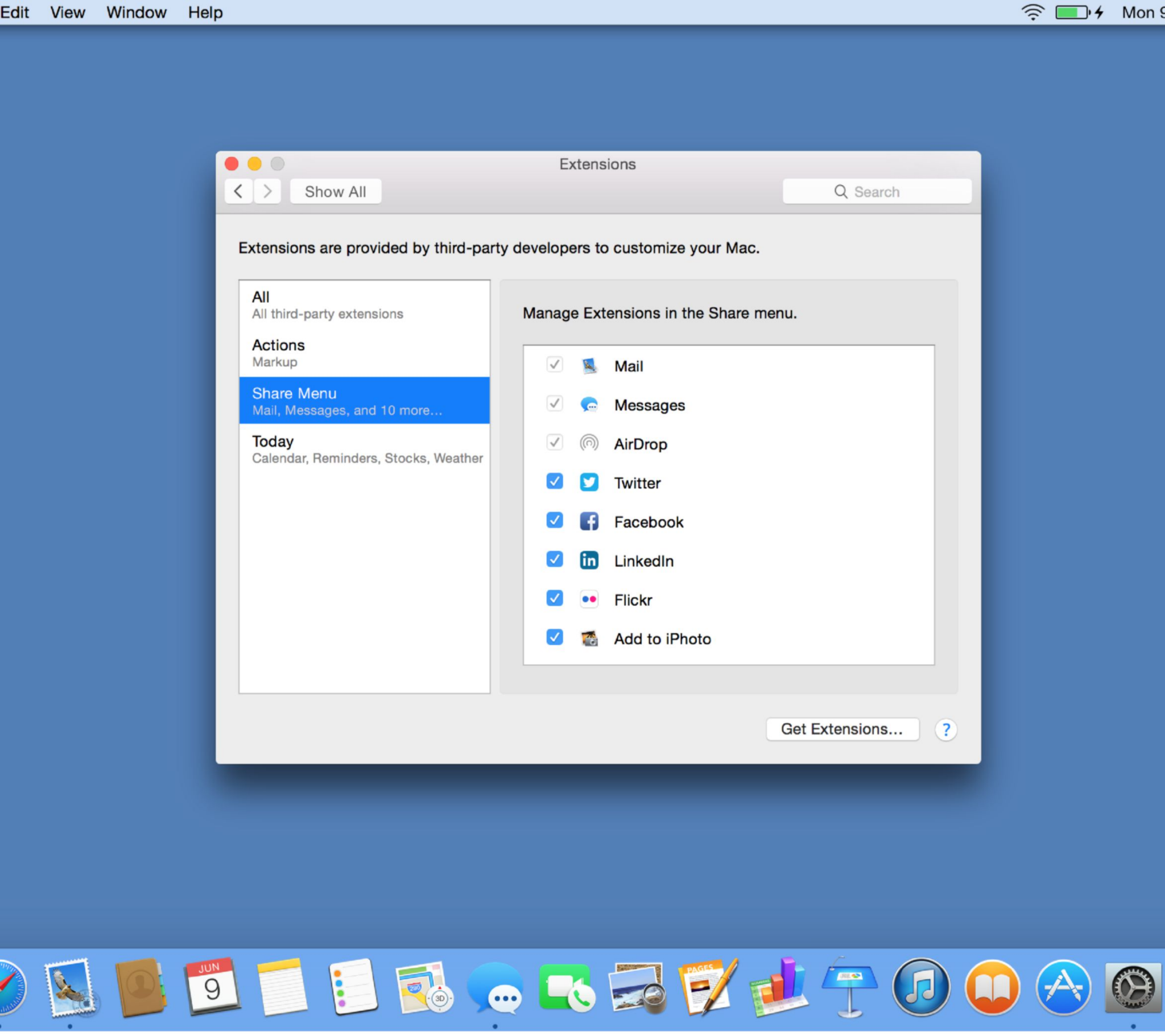
15. Messages: Do Not Disturb

Messages gets a lot of new features built into a button at the upper-right corner of the window, including an option to mute a chatty message thread that you don't want to deal with right now.



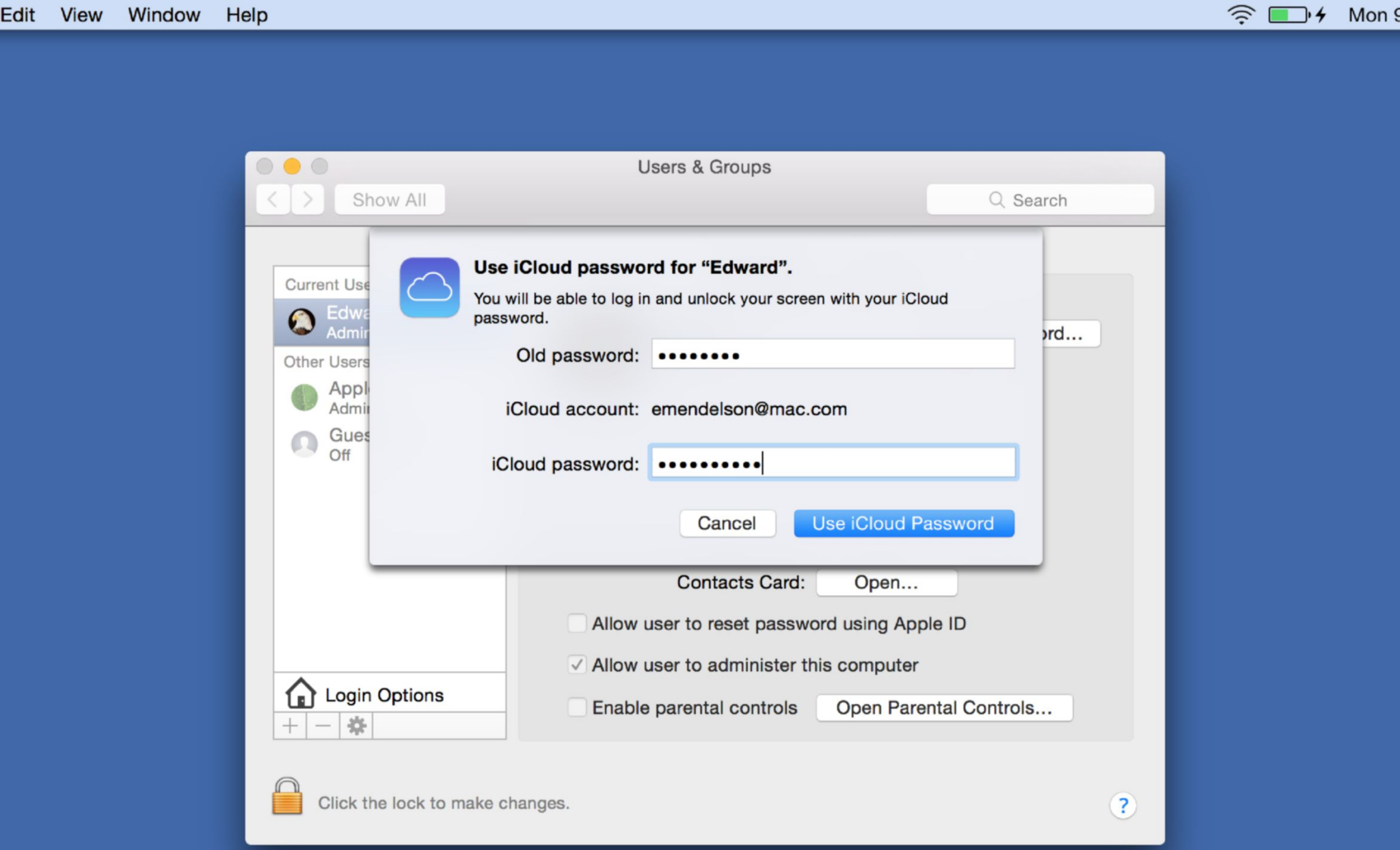
16. AirDrop Options

The AirDrop file transfer feature, which now works between iOS and Mac OS, lets you restrict AirDrop to devices owned by your contacts. It looks like one minor inconvenience will result from the new AirDrop technology in Yosemite and iOS 8: You have to choose a special option if you want to exchange files with a Mac running an earlier version of OS X.



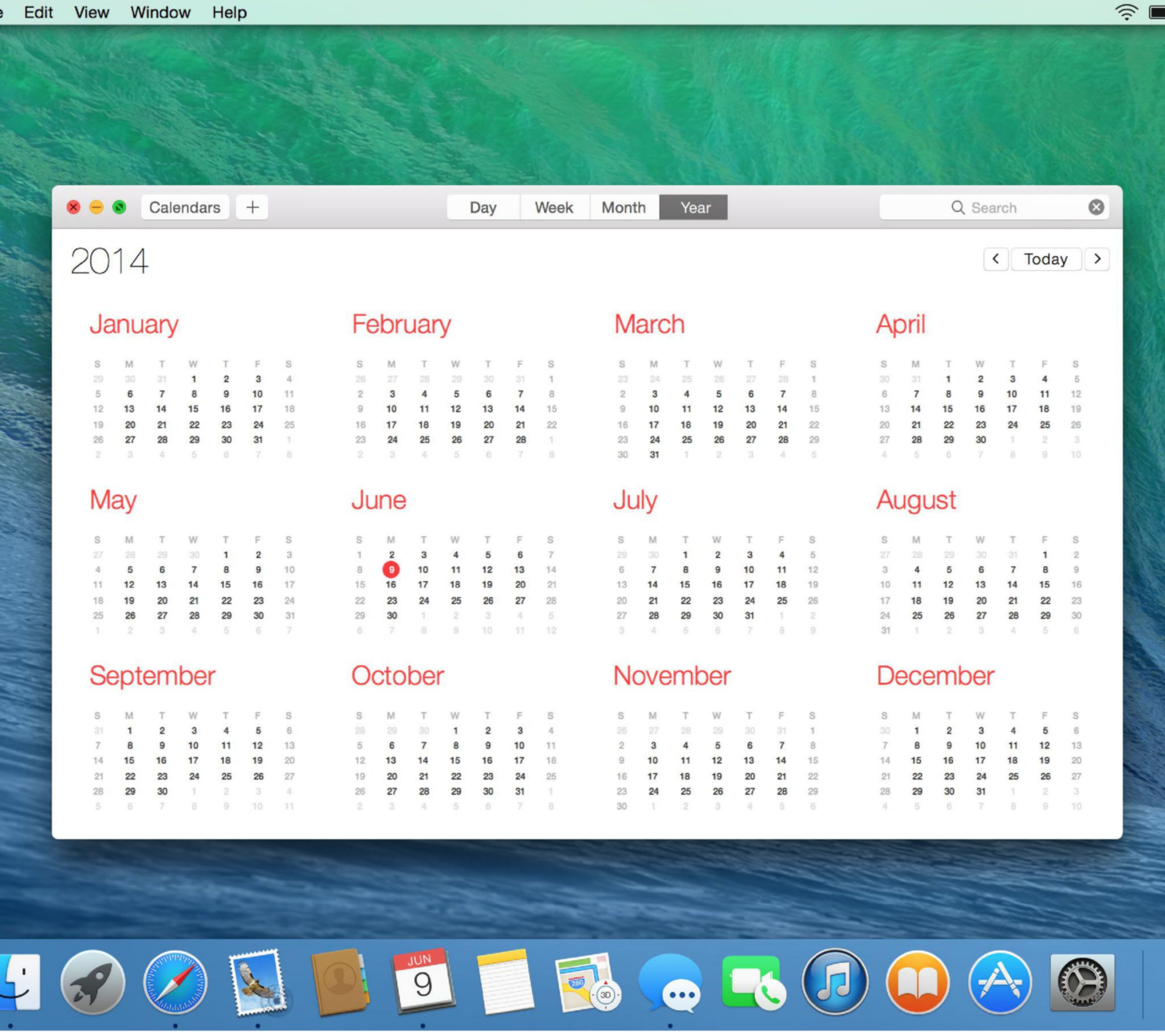
17. Extensions

A new panel in System Preferences lets you control extensions that Apple or third-party developers provide for the Notification Center and other apps that will support the new widget technology. Here I've added stocks and other features to the Notification Center.



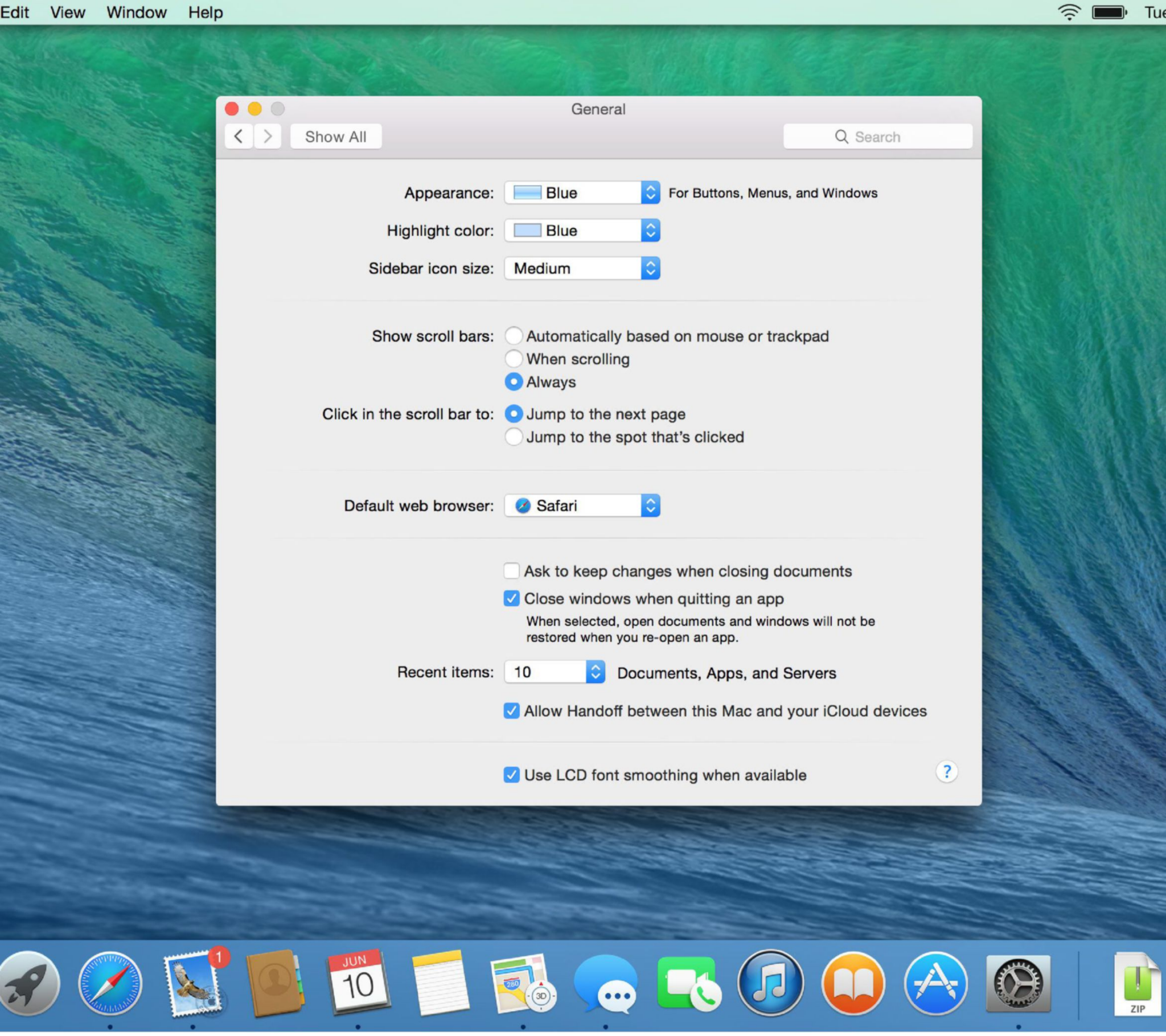
18. iCloud Passwords

Apple borrows for Yosemite a feature that Microsoft introduced in Windows 8: You can now use your iCloud password to log into OS X, instead of the traditional account password. You can continue to use old-style account passwords if you prefer, however.



19. The Full-Screen Button

The point of this screen isn't to show you the clean design of the Calendar but to point out the red, yellow, and green buttons at the upper left—and the absence of the old full-screen button that used to be at the upper right of many OS X apps. Yosemite ditches the old button and repurposes the green button to work as a full-screen button in apps that support full-screen mode. In apps that won't work in full-screen mode, the green button sets the window size to its default maximum, as it always did.



20. New Buttons

Design changes throughout Yosemite include clean, bright buttons and drop-down menus, like the blue radio buttons shown here. Incidentally, if you're as annoyed as I am by the way OS X hides scroll bars until you move the trackpad pointer into the scroll bar area, change the "Show scroll bars" setting to "Always" as I've done here.

Bringing the Action From the Movie Screen to the Audience

The Tribeca Film Festival's Storyscapes exhibit used a variety of technologies to make audiences part of the movies they watched. BY CHANDRA STEELE



Photo courtesy of Tribeca Film Festival

Film can be an impersonal medium. Unless you're at a midnight showing of *The Rocky Horror Picture Show*, watching movies is usually a rather passive event. But for this year's Tribeca Film Festival, the Storyscapes experience sought to change that. Two floors of a building on Varick Street in Manhattan were transformed into the Bombay Sapphire House of Imagination for the second year of the transmedia event.

"It's about what a story is like when it truly surrounds you," said Ingrid Kopp, director of digital initiatives at the Tribeca Film Institute.



On a Human Scale was the simplest of the projects, but in some ways the most emotional. Artist and musician Matthew Matthew approached New Yorkers on the street and had them do something that not many would attempt in public, let alone at the behest of a stranger: sing. He substituted a piano's notes with their voices to create a portable, playable human orchestra linked with images of each of the singers.

Around the corner from *On a Human Scale* were two Oculus Rift–based projects. Visitors, including Film Festival cofounder Robert De Niro, could enter the world of *Clouds* either by slipping on the virtual-reality goggles or using their bodies to power a Kinect version. The interactive documentary was a self-navigated exploration of artists who used computer code in their work. "It's made much more like a video game than a film," director James George said of the piece, for which he and codirector Jonathan Minard were given the Bombay Sapphire Award for Transmedia.

"We'd been working with this material, these 3D-scanned interviews, at the same time that the Oculus Rift came out, and when we tried putting the two together we found it was the perfect synergy as a way to view this new emerging media of cinema," George said. "We had no other choice beside, you know, let's make it work for the Rift."



ON A HUMAN SCALE
Matthew Carey (above) created this project in which each press of a piano key triggered video of a different person, from a different walk of life, singing a different note.

Photo credits (clockwise from top left): Matthew Matthew; Xavier Veal and Christian Trigueros; Wei Wei Dong



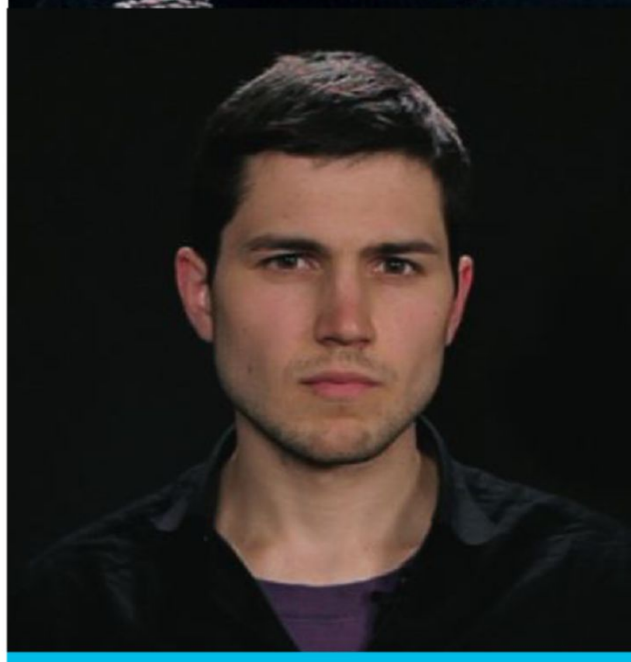


Also Rift-based was *Rise*, which was not in the competition at Storyscapes but took a frame from a film and put viewers inside a tense moment between a protagonist, a villain, and a bomb. Director David Karlak worked on the project with Scott Metzger, cofounder of Nurulize. “It’s a frozen moment in time that the audience is allowed to explore,” Karlak said.

When Kopp saw the Oculus Rift, she knew it was a must for Storyscapes. “Obviously if we’re talking about immersiveness and we’re talking about stories surrounding you, it would be crazy not to have the Oculus, which is going to change, I think, the way that we think about virtual reality and the way we think about the kinds of films that we consume,” she said.

Journalist Nonny de la Peña was looking to get people involved in real stories and issues. Her *Use of Force* recreated witness accounts and cell-phone video footage of the brutal death of Anastacio Hernandez Rojas at the hands of border patrol guards. By using a virtual-reality device originally developed pre–Oculus Rift by the company’s founder, Palmer Luckey, visitors felt as helpless and incensed as the witnesses that they lived through. “I’ve put thousands of people through and seen how powerful these experiences can be for telling news stories,” de la Peña said.





CLOUDS
Codirectors James George (top) and Jonathan Minard 3D-scanned hacker community conversations to create this nonlinear documentary, which was assembled from code.

Image credits (top to bottom): *Clouds* title screen by James George and Jonathan Minard; photos by Alexander Porter



Image credits (top to bottom): Render of Hotel Vancouver ballroom courtesy of the National Film Board of Canada; photo of Stan Douglas by Michael Courtney

CIRCA 1948

Long-lost areas from the past of Vancouver, B.C., come alive in Stan Douglas' meticulous, historically accurate dissection of class disparity in post–World War II Canada.



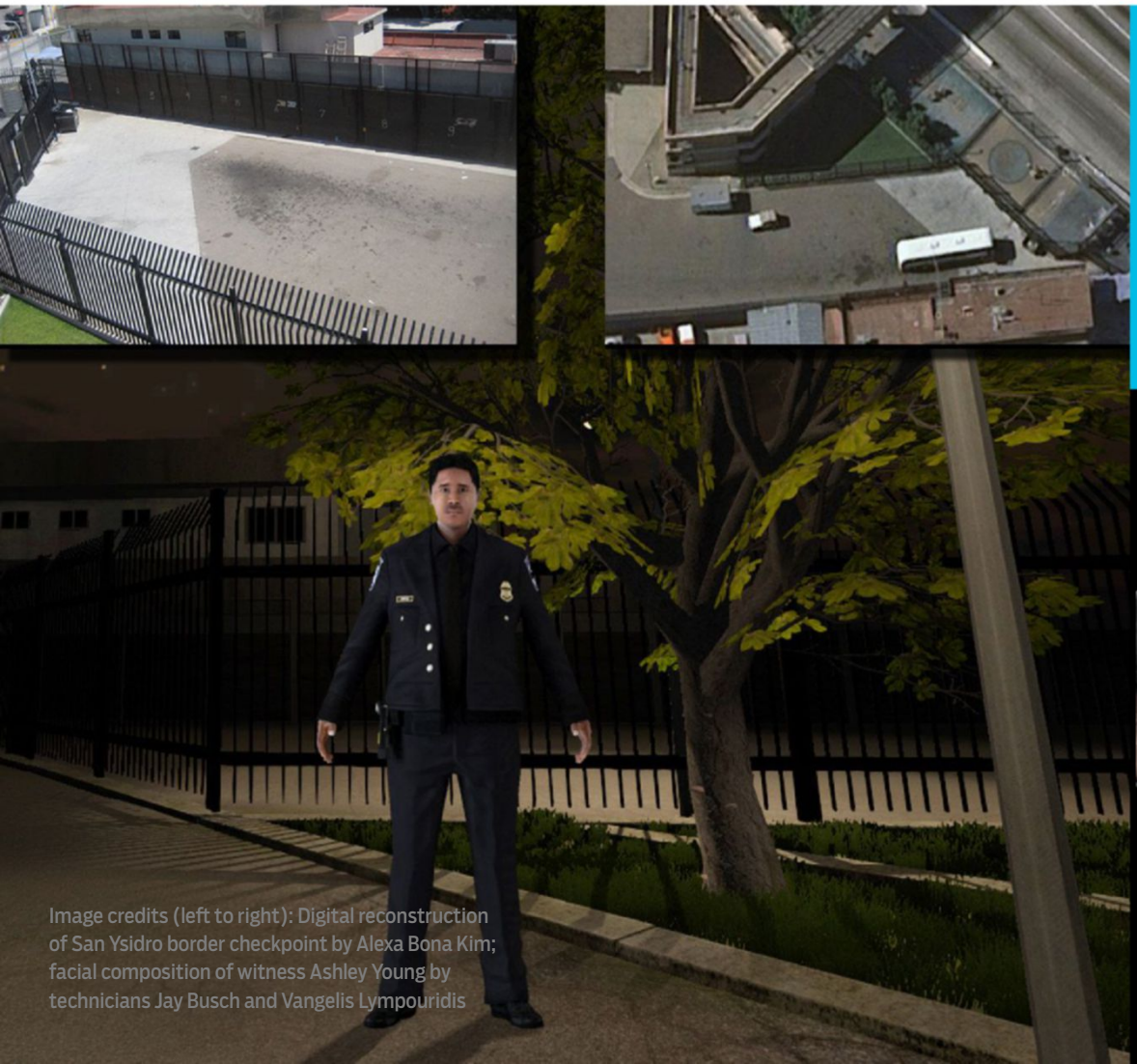
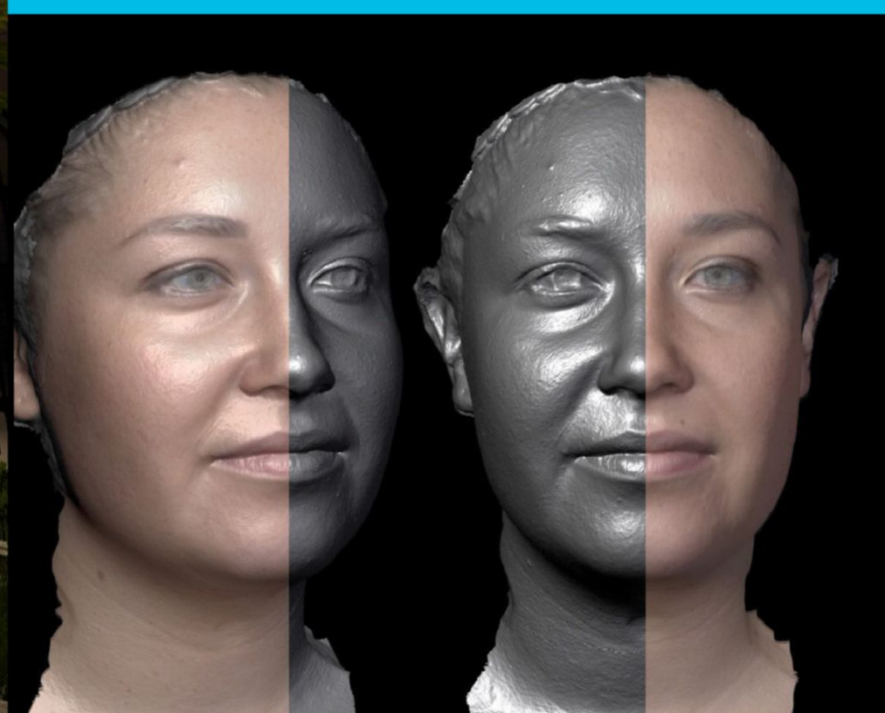


Image credits (left to right): Digital reconstruction of San Ysidro border checkpoint by Alexa Bona Kim; facial composition of witness Ashley Young by technicians Jay Busch and Vangelis Lympouridis

USE OF FORCE

Nonny de la Peña's immersive documentary puts you into the center of the investigation into the death of a migrant worker who was killed by border patrol on the U.S.–Mexico border in 2010.





Although *Use of Force* transported participants to an emotional place they might not have visited, *Circa 1948* brought them to a place they can no longer visit: a post–World War II Vancouver, British Columbia, divided between the wealthy West End and the "ethnic slum" of East Vancouver. Participants could walk through projections that surround an entire room, a Kinect tracking their steps. For those who couldn't make it to the House of Imagination, an accompanying app (with the same title) recreates the experience on smartphones and tablets.

Finally, writer and performer Nathan Penlington took people through a walk of a different kind in his live show, *Choose Your Own Documentary*. His quest to find the owner of 106 books from the cherished 1980s *Choose Your Own Adventure* series is done, of course, choose-your-own-adventure style (there are 1,566 versions of the show and five possible endings), with Penlington narrating the events that led him to acquire the books of Terence Prendergast and the heartbreaking 20-year-old diary tucked inside. A meander through the House of Imagination had the same number of endings as Penlington's show.

CHOOSE YOUR OWN DOCUMENTARY

There are more than 1,500 possible versions of creator Nathan Penlington's story of what happened when he discovered a diary in a 1980s *Choose Your Own Adventure* book.



Photo credit: Colin Ross

New Garbage Collection Method Could Triple SSD Performance

BY JOEL HRUSKA



A team of Japanese researchers at the Faculty of Science and Engineering of Chuo University is claiming to have developed a new method of solid-state drive (SSD) garbage collection that can improve drive performance up to 300 percent in certain cases. The researchers' findings, which were presented at the 2014 IEEE International Memory Workshop, are sure to raise interest at a time when NAND flash performance is expected to only improve slowly over the next few years.

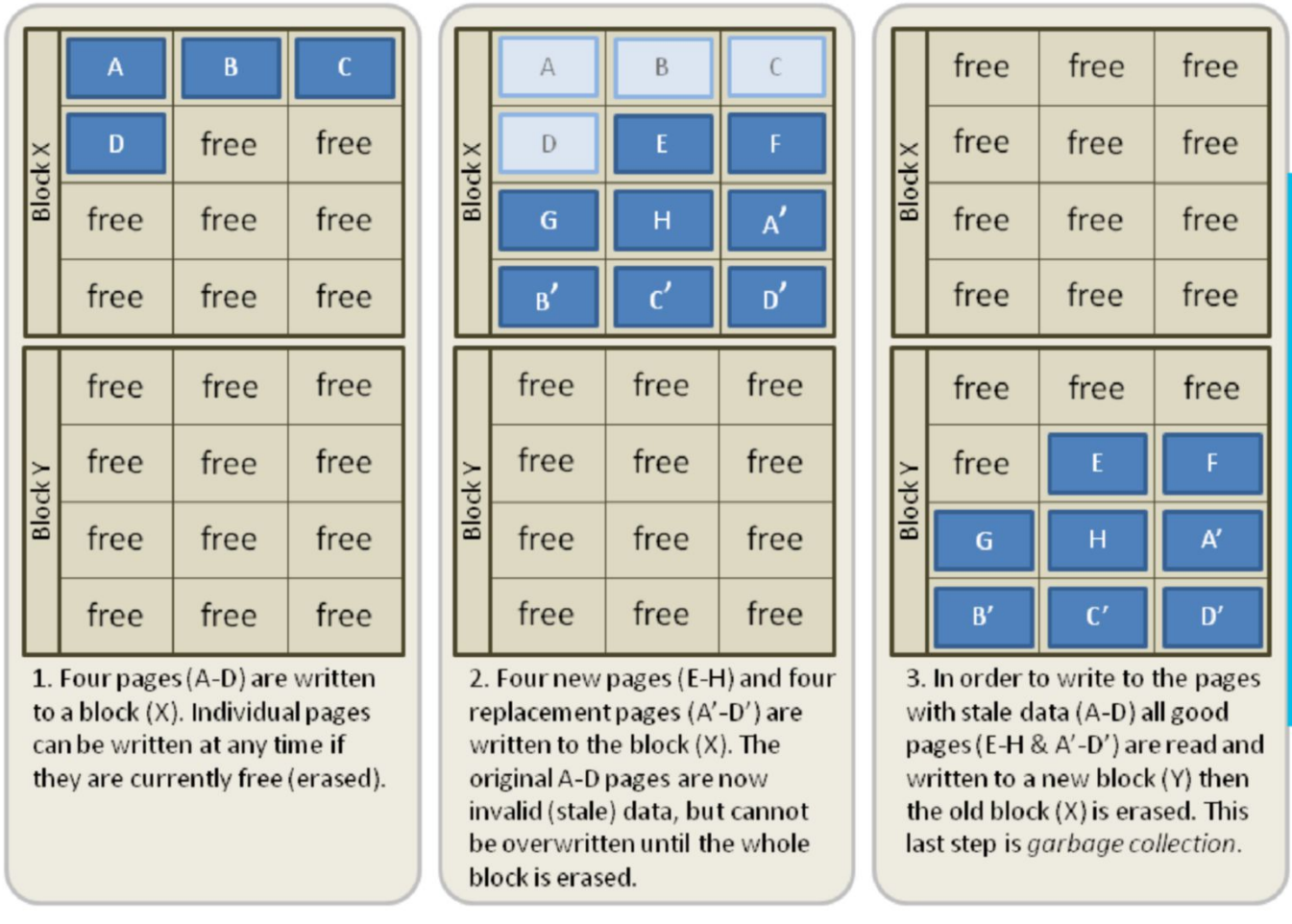
In order to explain what this means, we need to discuss some of the characteristics and idiosyncrasies of NAND flash. First, writing to NAND is an intrinsically destructive process. It requires a great deal of energy (relatively speaking), and there's no way to prevent some of that electricity from leaking into NAND cells immediately adjacent to the actual targets. Over time, this wears out the NAND cells until they fail.

Second, writing data to NAND happens at the page level (2-4KB per page) but an erasure targets an entire block (a collection of pages from 128-512KB). When a user deletes data from a flash drive, that information may be scattered across multiple pages in a single block or across multiple blocks. In order to actually free the area, the drive must perform "garbage collection," the process by which good information is copied off of blocks that are slated to be wiped and written to unused blocks.

Under the current system, changed data must be written to a new area of the drive before the old area is erased. This new method would write new page data to blocks that are already scheduled for a garbage collection cycle, which would drive up the number of invalid pages in a block and trigger a garbage collection cycle more quickly. If that seems counterintuitive, it may help to consider actual garbage collection.

Imagine that you're in charge of emptying the garbage of several floors in a midsize office building. Each floor has multiple clusters of cubicles and each cubicle has its own garbage can. Every time a certain number of the garbage cans in a cubicle area are full, you race over and dump out the garbage—but because each arrangement of cubicles is set apart from the others and there are multiple cubicle clusters per floor, you'll spend far more time running around than you will dumping garbage. And because each individual garbage can is small, you can't perform much work in any given cycle.

Under this proposed system, instead of dumping garbage into lots of tiny cans, workers would instead allocate it to one garbage can per cubicle. The amount of garbage workers throw away doesn't change, but the speed and



1. Four pages (A-D) are written to a block (X). Individual pages can be written at any time if they are currently free (erased).

2. Four new pages (E-H) and four replacement pages (A′-D′) are written to the block (X). The original A-D pages are now invalid (stale) data, but cannot be overwritten until the whole block is erased.

3. In order to write to the pages with stale data (A-D) all good pages (E-H & A′-D′) are read and written to a new block (Y) then the old block (X) is erased. This last step is *garbage collection*.

TAKING OUT THE TRASH

Garbage collection today writes data to a free block before it's deleted from the old block. A new method could make the process more efficient and three times faster.

efficiency with which you can collect it and throw it away is vastly improved.

Though not perfect, this analogy roughly describes what the Chuo University researchers propose: a strategy for handling garbage collection that would allow for more parallel writes and lower overall drive power consumption. Along the way it might boost drive longevity as well—performing less (but more efficient) garbage collection could reduce the number of write cycles to any single block.

The 300 percent performance benefit is a corner case, but the gains are significant at every workload level—generally at least 10 to 20 percent faster than conventional garbage collection.

“The 300 percent performance benefit is a corner case, but the gains are significant at every workload level.”

The good news is that techniques like this will become increasingly important. NAND flash’s performance is not expected to increase at a significant rate in the near future—manufacturers already have their hands full migrating to increasingly smaller process nodes and dealing with lower reliability as a result. That means performance improvements will come from controller technology, new bus interfaces, more efficient management mechanisms (like the one proposed here), and clever tricks like the one seen on Samsung’s 840 EVO, which marries a small pool of high-performance single-level cell (SLC) NAND to a larger, cheaper triple-level cell (TLC) configuration. Companies like IBM are searching for alternative memory technologies, but for now, NAND is here to stay.



The bad news is that mechanisms like this are still theoretical and need to be integrated into next-generation controllers before they’ll become a shipping reality. Don’t count on a firmware update to breathe new performance into your existing SSD—but future drives in the coming years could see significant uplift from this kind of approach.

Finding Motivation With Apps

Behavioral economist Dan Ariely explains why mobile apps could be the key to staying motivated, and why most app developers don't get it right. BY JILL DUFFY



Productivity apps promise to make us more efficient, better focused, and, of course, highly organized. But how do they do it? Do they work? And if so, how? How do productivity apps influence us so that we accomplish the things we really want to accomplish?

Dan Ariely, who is the James B. Duke Professor of Psychology and Behavioral Economics at Duke University, a founding member of the Center for Advanced Hindsight, and author of *The Upside of Irrationality* and *Predictably*

Irrational, is interested in how technology can affect our actions. Much of his research looks at why people so often fail to act in their own best interests.

I spoke with Ariely recently about how technology, and smartphone apps in particular, can keep us motivated and help us procrastinate less.

Are there any differences between how people motivate themselves in the real or online worlds versus how they do it with apps and technology?
If you think about changing something in the environment in your house [to influence your behavior], it will only be effective when you get to that place. Because the phone is with us all the time, it has much more reach into aspects of our lives. The second thing is that all of a sudden, small rewards are possible, like a compliment or a notification. It's also easier to do things that are in context. If you think about the broad topic of behavioral economics, it's really about the fact that the environment matters more than we think. If that's the case, that means if we control the environment, or we control some elements in the environment, we can get people to behave differently, hopefully better. From that perspective, the phone is actually a wonderful tool.

One of the things I've noticed in health and fitness applications is that push notifications are almost never motivational—they're usually reminders. How do you imagine rewards on mobile phones could develop and change this?
Think about that big experiment that happened in New York City, where basically every fast food place had to start having calorie information on the menu. The logic was that people are overeating [because] there's no information about calories. We'll put the calorie information out there, and everybody would behave well. It turns out that didn't happen. We have this intuition that every time people don't behave well, the



DAN ARIELY
Dan Ariely, James B. Duke Professor of Psychology & Behavioral Economics at Duke University, is dedicated to helping people live more sensible—if not rational—lives. In addition to appointments at the Fuqua School of Business, the Center for Cognitive Neuroscience, the Department of Economics, and the School of Medicine at Duke University, Ariely is also a founding member of the Center for Advanced Hindsight, and the author of the *New York Times* bestsellers *Predictably Irrational*, *The Upside of Irrationality*, and *The Honest Truth About Dishonesty*.



barrier is lack of knowledge. The reason people do the wrong thing is often not because they don't have the right information, it's because they don't care right now. Now the question is, "How do we increase motivation?" On the one hand, it's very, very tough to think about how to create motivation. On the other hand, we do know something about it. We know, for example, that compliments really work. We know that having a goal really works. We know that knowing your distance from the goal really works. Being able to do something better than expected, or better than other people, and creating a competition really works. We also know that reputation is important. If we switch from an information perspective to a motivational perspective, and think about all the motivations, we could do much better.

One other element that comes up with a lot of health and fitness apps is accountability. Can you talk about whether accountability actually works, or whether it works differently for different kinds of people?
We know it works, but I can't tell you how it works differently for different people. There are two components to this. First is that [the task, objective, or goal] is more apparent to you. It's not about the fact that somebody else is going to nag you. It's about the fact that when we reflect [a goal or promise] in the outside world to some degree, we take what we call the outside perspective, [which] is a really good indicator for people to behave well. The moment we think about things from an outside perspective, we think more long-term, and often we behave better. We actually become more rational. You can think about this in all kinds of ways in your life. Every time you face a decision, you could say, "What would I advise somebody if it wasn't me?" It basically allows you to

eliminate some of your own emotional reactions and so on, and think more long-term and better. The second component is actually other people nagging us and being responsible. That one … has more variations across people because it depends who you pick. If I pick my sister, she might not hold me accountable. If I pick one of my colleagues, he might keep me more accountable. There are all kinds of things like that: How embarrassed you would be if you violated something [you said you would or wouldn't do]; how much you can get away with? It's an important component, but a bit trickier. As long as you think that somebody is watching your activities from the outside, you might behave better.

Why do people procrastinate and what helps them stop doing it?

If you think about it, procrastination is really favoring what's pleasurable now over what we think we should be doing. The sad thing is we fail, and we fail continuously. Not only that, but we need to recognize the fact that procrastination or self-control is only becoming a harder problem.… There's too much temptation. One solution to eliminate temptation is to create a rule. Having rules actually creates a very clear delineation of what is acceptable and not, and when are we violating the rule or not. Having rules for behavior is good for fighting temptation. And having those rules link to somebody's "higher-order level" helps. If you [say to yourself], "This is what a good person does," then it would be linked to higher-order meaning and you'd be more likely to do it. A more extreme version of the same approach is to create a habit. A habit is not just a rule. It's something that you do automatically.

Another direction is reward-substitution. In the beginning of *The Upside of Irrationality*, I told a story about how I had to take interferon. It's a horrible medication to take. Every time I had to take it, I had to decide to either inject myself and have a miserable night, or not inject myself and have a good night,



APPS ARE THE KEY

Apps are capable of helping you solve many problems, Ariely argues, but the first step is moving from an informational perspective to a motivational one.



but if I skip these medications, I might get liver sclerosis in 30 years.

What I did for myself is I changed my environment and I made it such that every time I took the injection, I could also watch a movie, which was something I really wanted to do. We call this reward-substitution, because it's not as if I started caring about my liver. It's not as if I understood something more about liver sclerosis. It's that I started thinking about the fact that I wanted to see a movie. Now, movies are much less important than liver sclerosis, but they were immediate and now. You can think about this as gamification in general. You could say there are a lot of things about procrastination that [are] really about favoring the short term over the long term. But can we do some things to make the short term more appealing?

The final mechanism, which is incredibly important, is called the Ulysses contract. This idea is basically saying, "I know that my future self will be tempted, so let me do something so that my future self is not tempted." My undergrads, during exam week, often give their Facebook accounts to one of their friends and ask them to change the password and not to tell them what it is until after exam week is over. That's a mechanism in which you basically force your future self to not be able to make stupid mistakes. Self-control contracts are incredibly useful and important and good ways to eliminate procrastination. The problem of procrastination, broadly defined, is incredibly central to all of our lives. Figuring out how we can overcome it is an important challenge and an important role for technology.

The phone as a digital part of our lives has the capacity to make us unproductive, or make it easier for us to overcome a lot of barriers. And it's really a question of how we design the phone and how we design the apps.

What We Love Most This Month

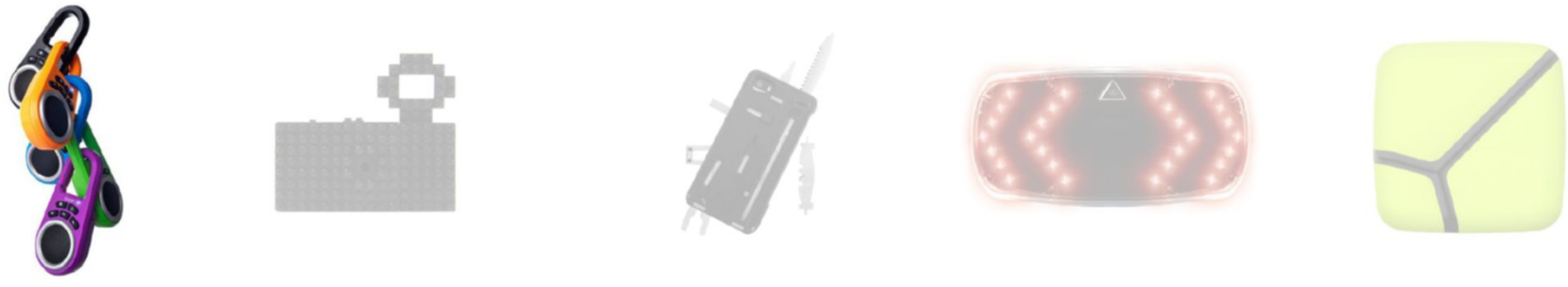
BY STEPHANIE MLOT



CLIPSTER WIRELESS SPEAKER

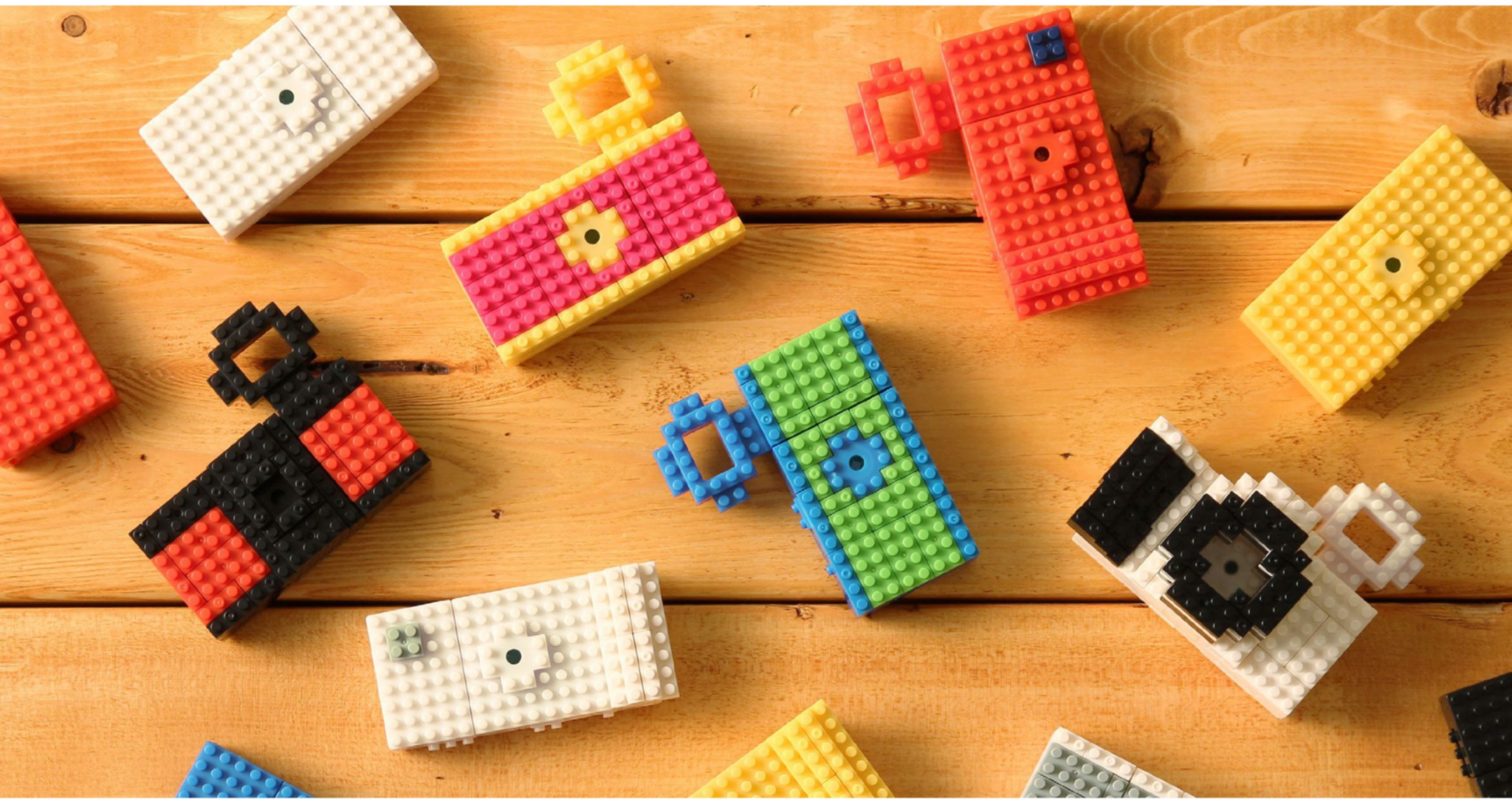
Heading to the beach this summer, but don't want to feel excluded by plugging in a pair of earbuds and sticking your nose in a book? Try the Clipster wireless speaker, which easily attaches to your backpack, purse, belt loop, or bikini bottom for on-the-go tunes. Via Bluetooth technology and a rechargeable battery, the Clipster wirelessly connects to any iOS or Android device, making every day a little more lyrical. The clip-on stereo comes in black, red, blue, pink, purple, orange, and green to match your outfit and your personality.

$29.99 ionaudio.com



What We Love Most This Month

BY STEPHANIE MLOT



FUUVI NANOBLOCK CUSTOMIZABLE TOY CAMERA

Sure, you can slap on an Instagram filter and suddenly a cell-phone photo becomes an antiquated masterpiece. But for an experience slightly closer to the real thing, try the Nanoblock Customizable Toy Camera. An updated take on the 1980s Holga, the Nanoblock shoots stills and video (with sound!), and makes it easy to share retro-looking images via the built-in USB connector. Plus, its Lego-like exterior means hours of customizable fun while you wait for the picture-perfect moment.

$50 acgears.com







What We Love Most This Month

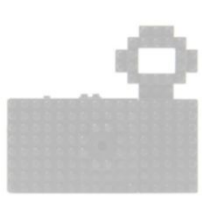
BY STEPHANIE MLOT



TASKONE G3 IPHONE 5/5S CASE

This ultimate all-in-one tool ensures you'll never leave home without a knife, screwdriver, miniature saw, Allen wrench, wine stripper, ruler, bottle opener, or wine cutter. Unless, of course, you forget your phone. The TaskOne G3 Pro case fits on the iPhone 5 and 5s to provide protection for your handset and yourself, if the occasion arises. Housing 22 stainless steel tools in its steel shell, the TaskOne is the perfect gift for any modern-day MacGyver.

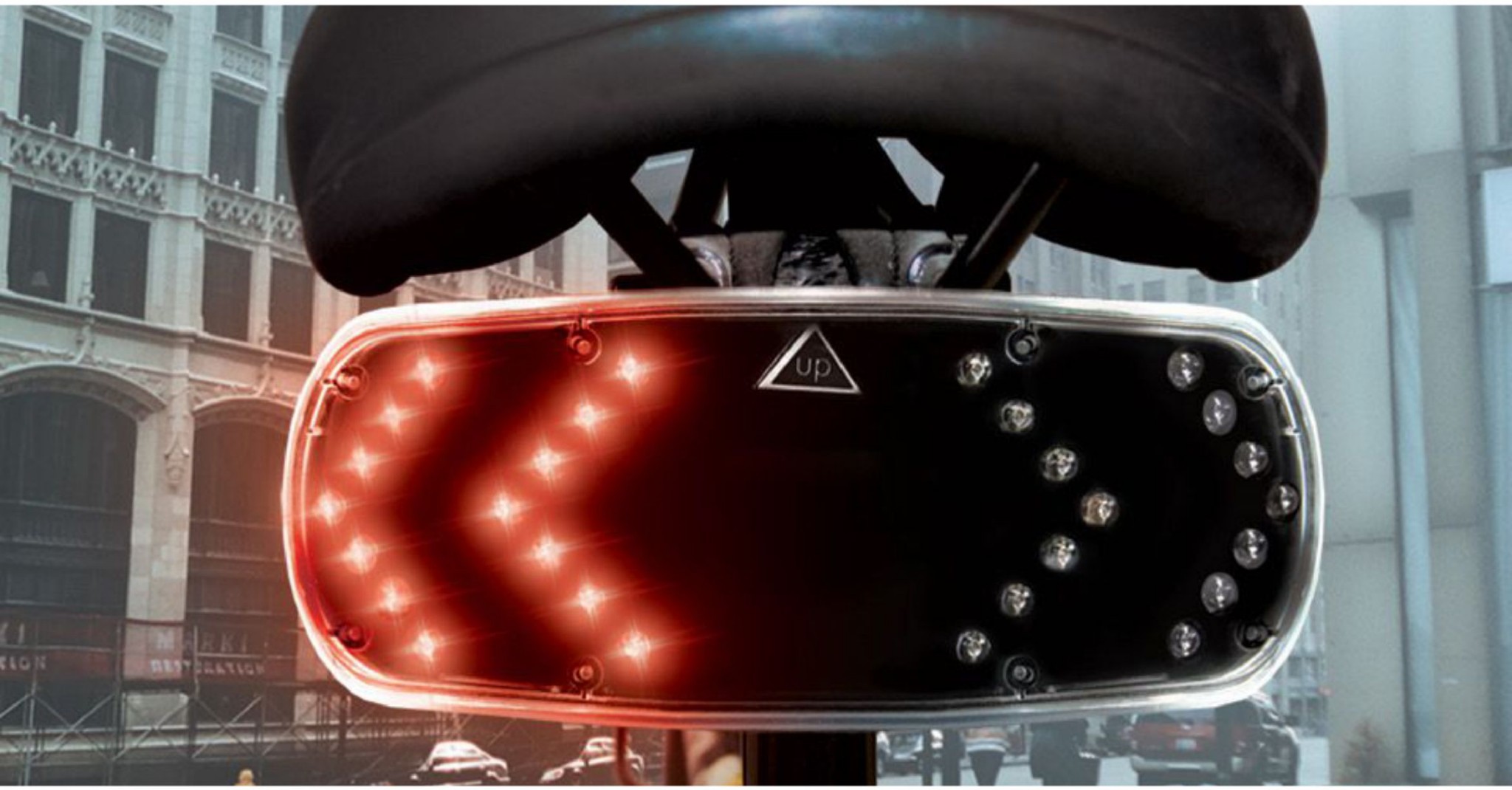
$100 thetasklab.com




What We Love Most This Month

BY STEPHANIE MLOT



WIRELESS BICYCLE TURN SIGNAL

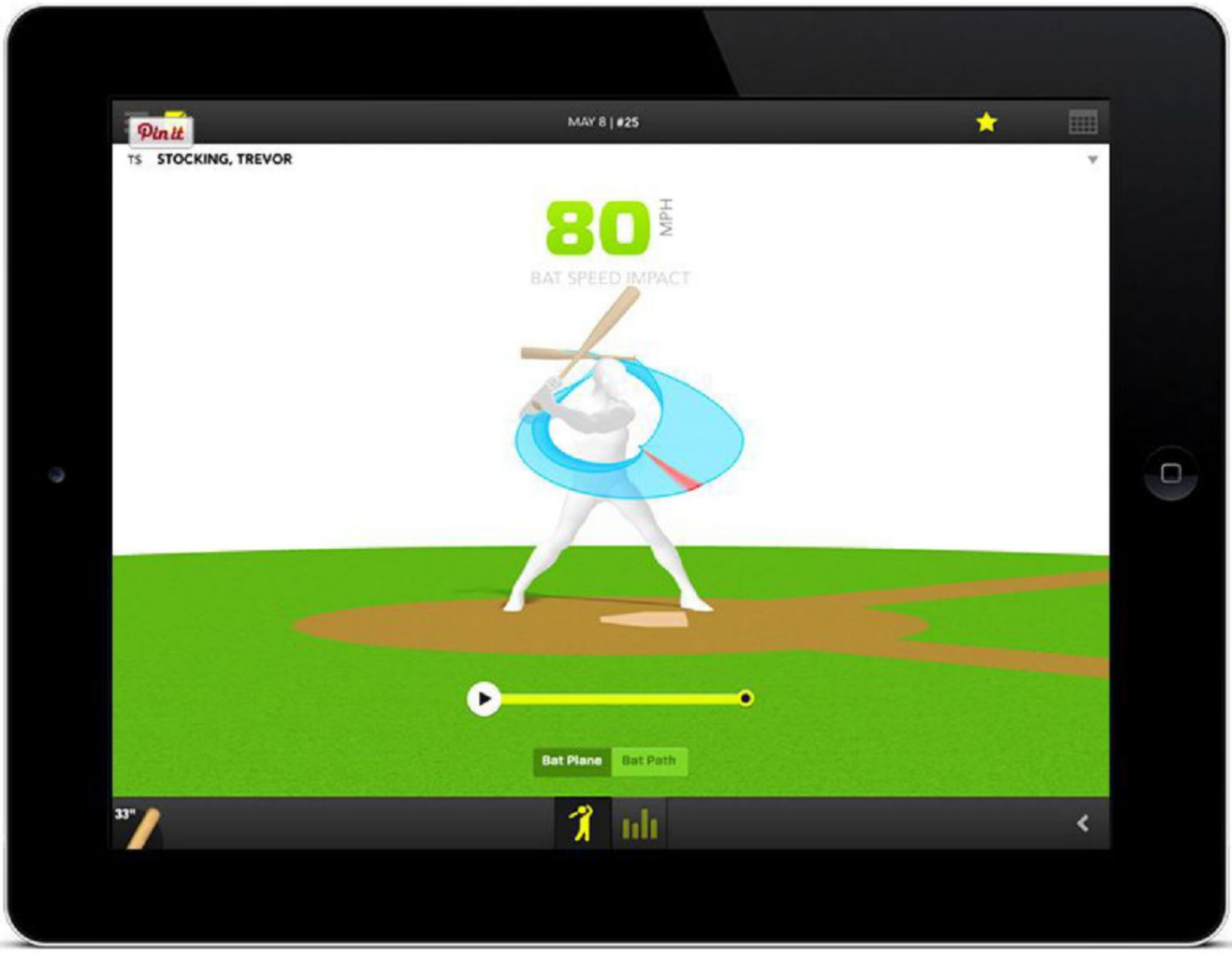
Sometimes, during a long bike ride, you just can't be bothered to throw out your arm to signal your right turn to oncoming traffic. But attach a wireless bicycle turn signal system and the tap of a button is all you'll need to warn approaching vehicles and pedestrians that you're heading in the direction of the nearest Dunkin' Donuts. The unit attaches to your rear seat post and a controller to the handlebars, then LED signals and beeping sounds alert everyone in your path of your intentions.

$59.99 sharperimage.com



What We Love Most This Month

BY STEPHANIE MLOT





ZEPP SWING ANALYZERS

There is no shortage of help available—both human and digital—for baseball, golf, and tennis players looking to improve their swing. Among them is the miniature Zepp analyzer, a rechargeable device that slips onto your golf glove or attaches to the end of a bat or racquet. The bright yellow gadget records 1,000 data points per second to capture your swing in 3D, storing up to 2,000 swings in the iOS and Android companion apps. Record up to 8 hours of practice, then rewatch the animated videos to polish your technique.

$149.95 zepp.com



Hot Future Tech Releases

Wondering what's coming out in the world of technology, gadgets, and games? This calendar tells you when the best new stuff ships.

BY ANTONIO VILLAS-BOAS

1

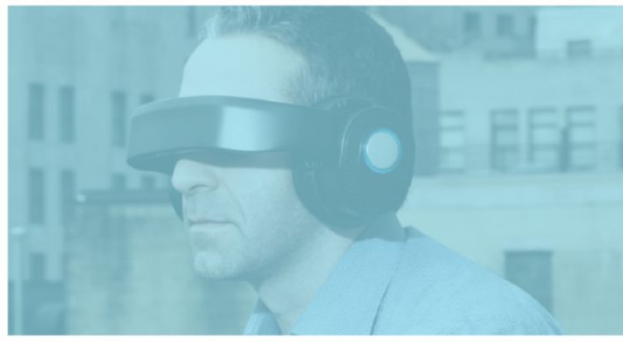
GIROPTIC 360CAM

giroptic.com

Release: Holiday 2014

Wide-angle cameras capture some of the action, but Giroptic's 360cam captures it all. Like most action cameras, it's simple to operate and you can use it remotely through a mobile app. The result is 360-degree HD video that's recorded at up to 2K resolution and seamlessly stitched up inside the camera, so no processing or special software is needed. And it can take snapshots at 4K to boot. The 360cam will be commercially available for less than $500.



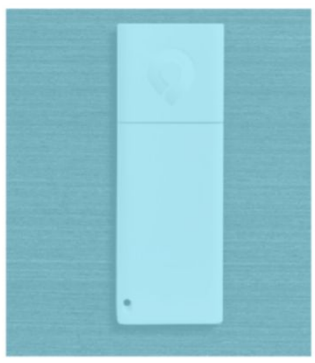


















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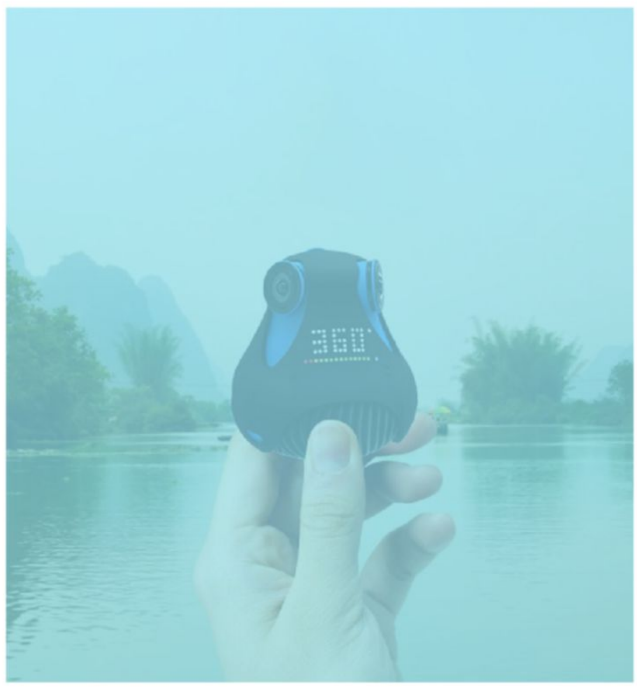
2

AVEGANT GLYPH

avegant.com

Release: Q1 2015

The people behind the Avegant Glyph have clearly ignored warnings about sitting too close to the TV. In fact, they're bringing any media that uses HDMI right up to your eyes with a head-worn device à la the Oculus Rift. A virtual retinal display uses a micromirror array to project light onto the backs of your eyeballs, basically turning your retinas into a screen, and prevents any pixels from being visible. Headphones come integrated as part of the headset, too.



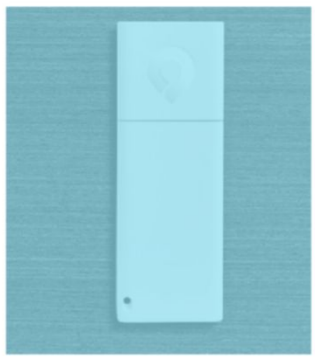


















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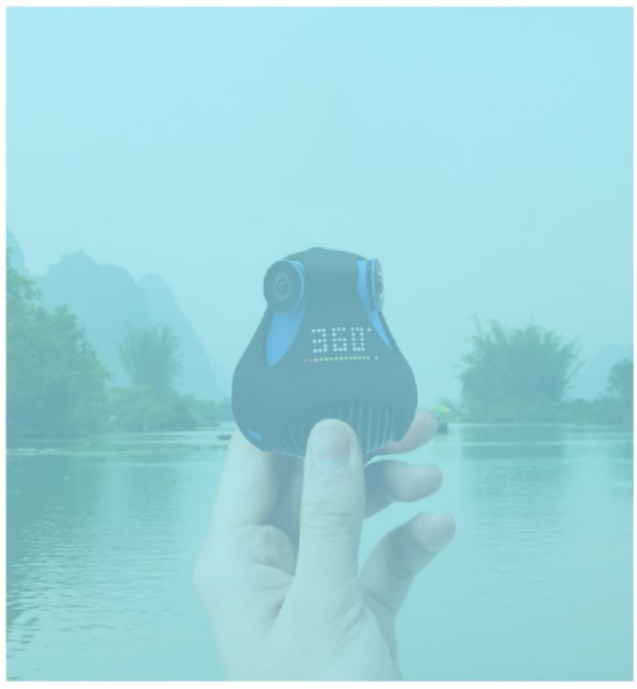
3

RAZER JUNGLECAT

razerzone.com

Release: July 2014

Nothing beats physical controls when it comes to gaming. Razer's Junglecat aims to combine an iPhone case with a game controller that won't add absurd bulk to your sleek handset. The controller slides out to reveal a D-pad, a central OK button, and the traditional A, B, X, and Y buttons in a diamond layout. Not surprising for a gaming peripheral company, Razer lets you customize and adjust the Junglecat's controls and sensitivity with the companion iOS app.



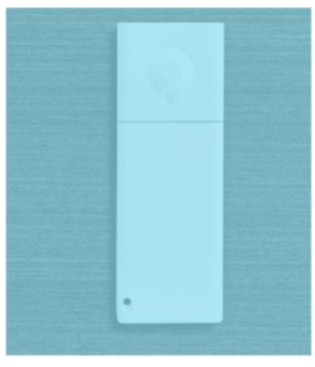


















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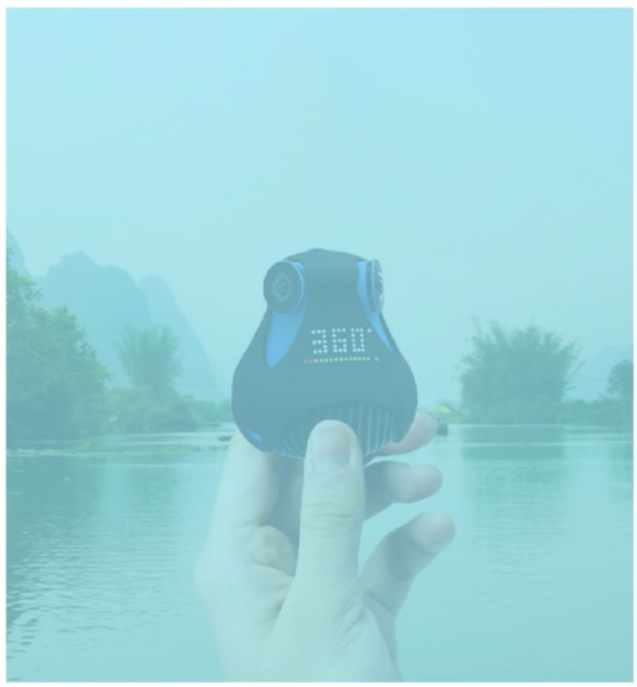
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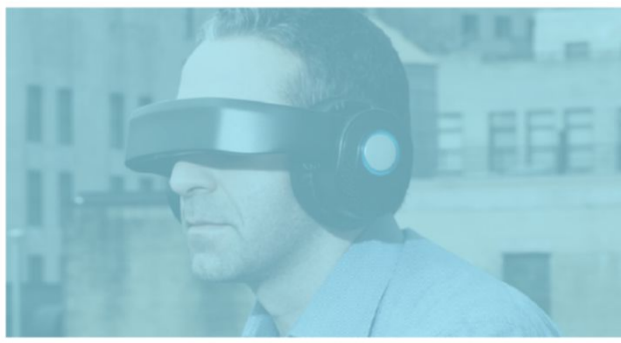
HONEYWELL LYRIC

honeywell.com

Release: August 2014

Honeywell's answer to the Nest Thermostat, the $279 Lyric lets you control your home's indoor climate through your mobile device, and uses a wide variety of sensors and capabilities to get your home temperature and humidity just right. GeoFencing senses your location via your phone's GPS and activates your climate control hardware when you get close to home. You can also create climate shortcuts for specific situations, such as parties or sleep, and the Lyric will also remind you about maintenance schedules.



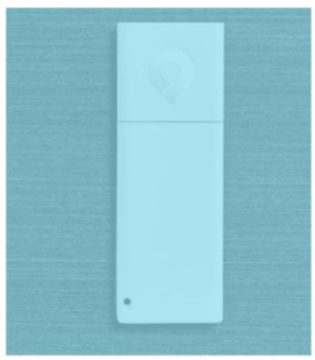


















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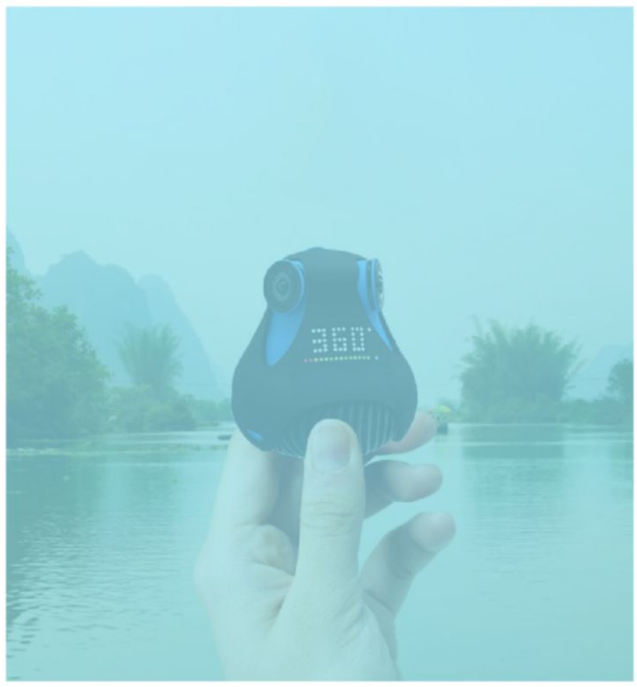
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HP PRO X612

hp.com

Release: Summer 2014

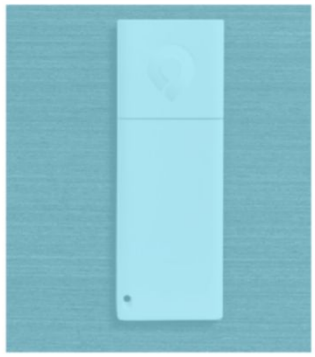
Competing against Microsoft's Surface Pro 3, the Pro x612 is HP's upcoming Windows 8.1 Pro hybrid tablet-notebook with a detachable backlit keyboard that also acts as a dock and houses an extra battery. With an 11.6-inch 1,366-by-768 display, hardware upgrades that go up to an Intel Core i5 processor and 4GB of RAM, and a refreshed design over the original HP Pro series, the Pro x612 should work and feel like an even more portable ultrabook.














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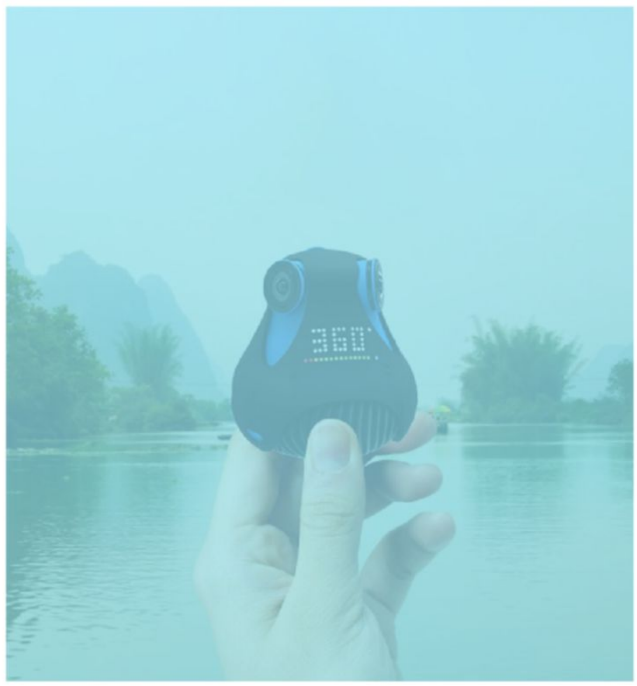
6

THE DIVISION

tomclancy-thedivision.ubi.com

Release: 2015

Developed by Ubisoft, Tom Clancy's The Division is an eagerly anticipated third-person tactical shooter that takes place in New York City during an outbreak of a mysterious disease that's affecting the entire United States. You play as part of the Strategic Homeland Division (or just "The Division"), which is tasked with salvaging what remains of society by any means necessary. The Division will be available for Xbox One, PS4, and PC.



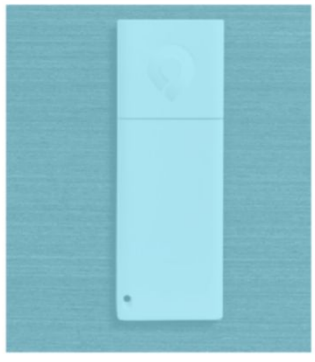


















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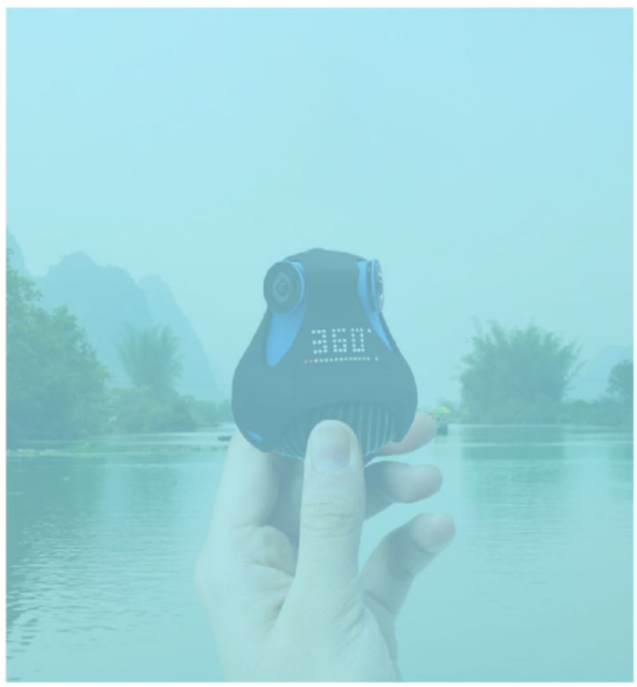
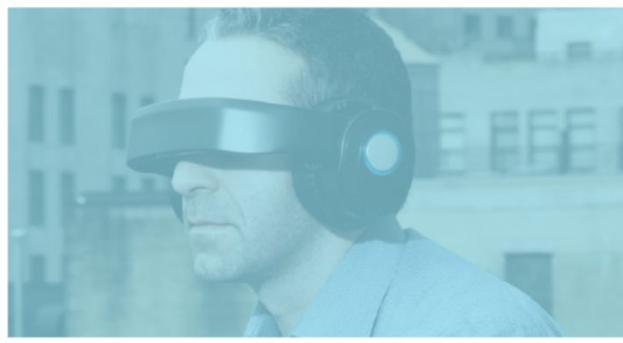
7

DROPCAM TABS

dropcam.com

Release: Summer 2014

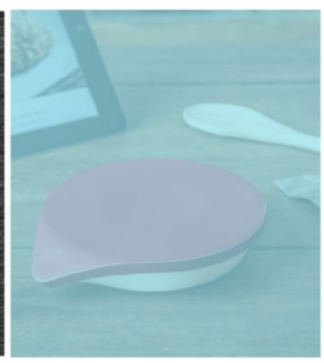
Dropcam Tabs is a wireless movement sensor that requires the Dropcam Pro, and as you might guess from the name, it keeps tabs on activity. When placed on doors, windows, or even objects like computers and bags, Tabs will sense motion and alert you on your mobile devices. It's even rated for outdoor use so you can monitor yard fences. The Dropcam Pro can tell the difference between pets and humans, and works with Tabs to notify you who or what is coming and going.











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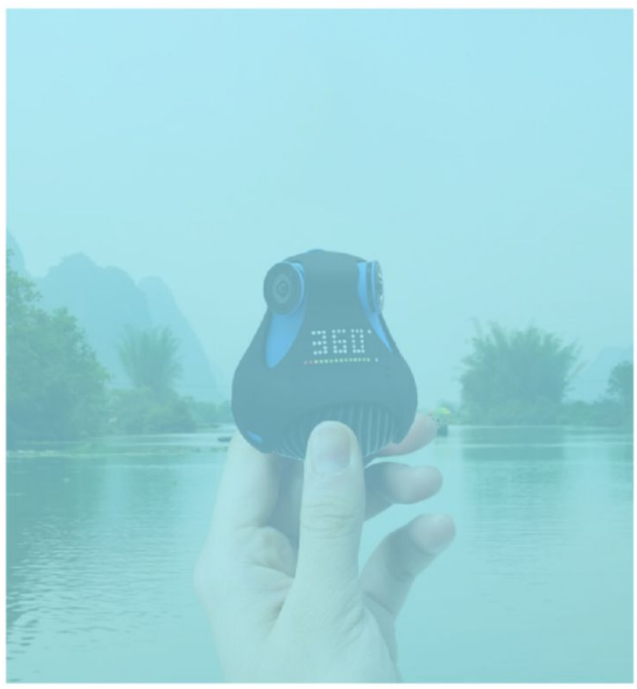
8

DROP

getdrop.co

Release: Fall 2014

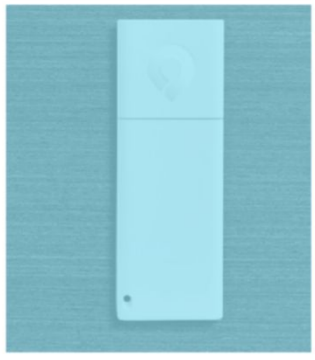
The Drop is an iPad-connected kitchen scale that helps you with almost all aspects of baking. Among other things, it assists in finding recipes, scaling them for the right number of servings, and sending alerts to your mobile device when it's time to take your confection out of the oven. Of course, what good would a connected kitchen device be if you couldn't share your culinary masterpieces on social media? Expect the Drop to cost about $90.














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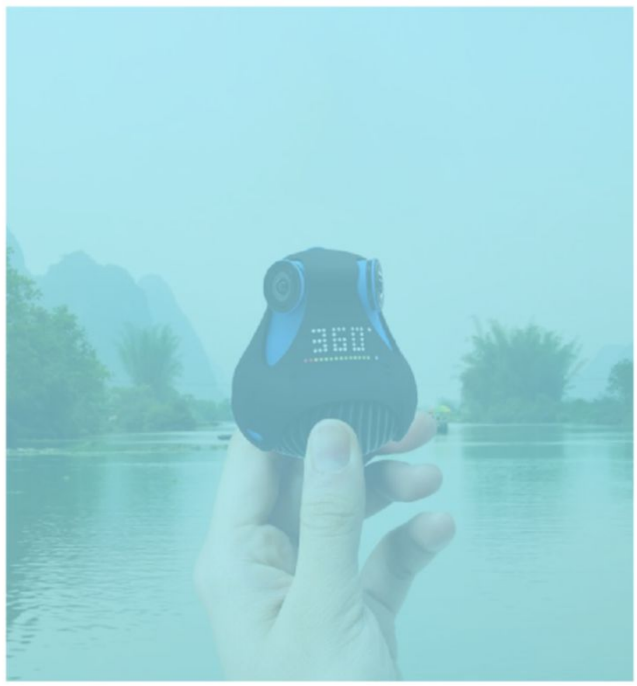
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LG G3

lg.com

Release: Summer 2014

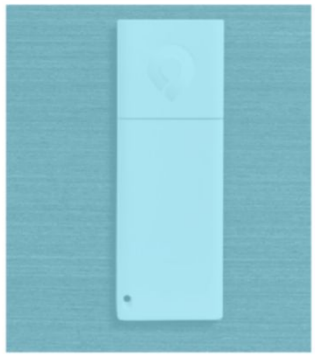
LG's high-end G3 sports a 5.5-inch screen that displays at an incredibly sharp 2,560-by-1,440 resolution. With impressive specs, including a quad-core 2.5GHz Snapdragon 801 processor, up to 3GB of RAM, and Android 4.4.2 KitKat, the G3 should have no problem running LG's relatively light user interface—or any power-hungry app, for that matter. The G3's body, which is characterized by super-slim bezels, is a little larger than the G2's, and the phone looks and feels more premium than the Samsung Galaxy S5. It should sell for around $200 on contract.















Hot Future Tech Releases

Wondering what's coming out in the world of technology, gadgets, and games? This calendar tells you when the best new stuff ships.

BY ANTONIO VILLAS-BOAS

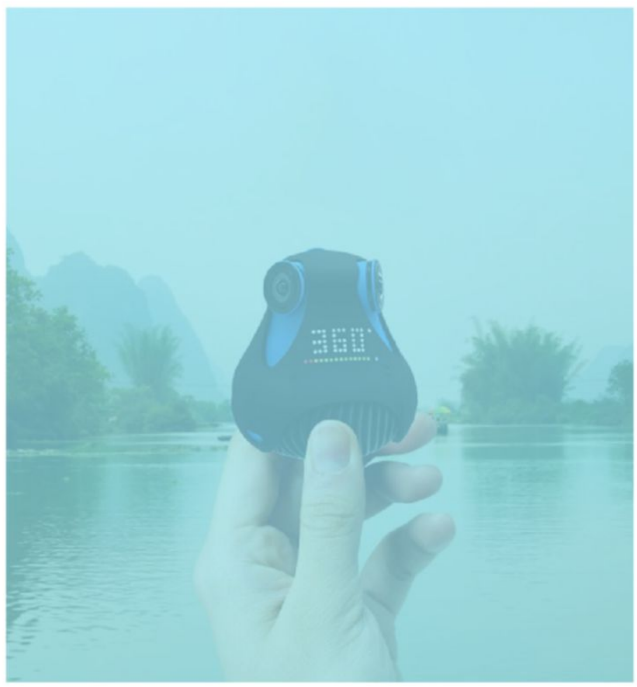
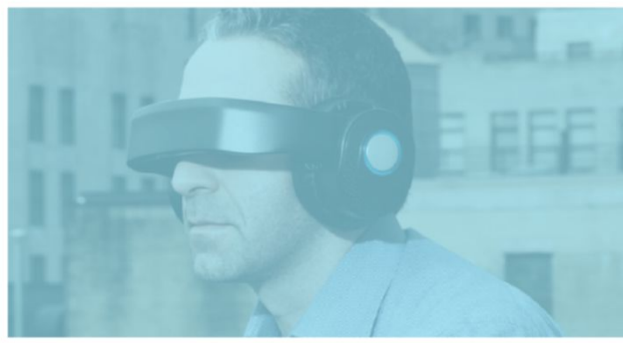
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WITHINGS AURA

withings.com

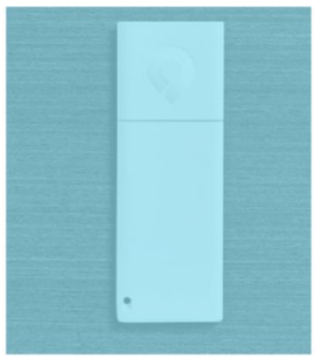
Release: Summer 2014

Backed by the science of sleep, the Withings Aura wants to help you fall into a restful slumber and calmly wake you up with a soothing colored LED that emanates from the bedside device. A thin sleep sensor connects to the device and fits under your mattress, which will thoroughly analyze your sleep better than any wearable could dream about (pun intended), including factors such as noise pollution, room temperature, light level, breathing, and body movements. The Aura will sell for $299.








Opinions

SASCHA SEGAN

SAMARA LYNN

TIM BAJARIN

Swift is a major strategic move toward programmer lock-in.

SASCHA SEGAN

APPLE'S SWIFT LANGUAGE CHANGES THE APP GAME

Apple's Swift Language Changes the App Game

Long ago, Apple wanted to make clear how its graphical computing system was different, easier, and better than every other OS. So it invented AppleScript.

Many of us geeky folk had been familiar with shell scripting, a way to tell an OS to execute a sequence of commands. But AppleScript made shell scripting look like you were banging your head on the keyboard: It was clear, elegant, and conversational, like telling your computer what to do rather than worshiping it in an ancient code. I wrote our college paper's first Web export routine in AppleScript.

Apple's new language for iOS and Mac programming, Swift, makes me think of the moment I discovered AppleScript. It purports to be C without all of the ()!:;!!:". The simplified syntax gives it an easier learning curve. More important, it's interactive and fun to use. You don't have to compile your projects and pump them through an emulator. You don't have to take a month's worth of classes and write down to the metal. You can write three lines of code in a "playground" and, well, play.

That's a potentially great place to be, and one that could cut into Android and Windows. I still wonder if Swift is capable of creating both world-class complex and simple apps, but Apple's existing Objective-C platform isn't going away. Swift is a purely positive addition to the iOS tool kit.



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

SWIFT LOCKS YOU IN

I am of the breed of programmer known as the "dilletantish idiot." My Excel VBA scripts send some of my English-major colleagues reeling in fear of their power while actual programmer friends just shake their unhappy heads at my follies. I want to write something in Swift.

Over the past few years, Mozilla, Microsoft, and others have championed a Web-based, cross-platform way of doing things. Web programming is highly interactive, and Web apps can run on a range of different platforms, a boon for smaller platforms like Firefox and Windows Phone.

Apple went the other direction, of course. The original iPhone only ran Web apps. Then iOS 2.0 brought in native apps, and the company has never looked back.

Every programmer Swift pulls away from an interactive, cross-platform system is a win for Apple. Every programmer Swift pulls away from Ruby or Python or JavaScript or Web apps is a win for Apple. Heck, that IDE is incredibly interactive; it could become a first programming system for kids.

Swift is a major strategic move toward programmer lock-in. It will convince people that iOS is fun and easy to program for, possibly creating a new, broader generation of iOS programmers. Their code will not be easily translatable to any other platform—not Android, not Windows Phone, not anything else out there. Swift brings back the iOS exclusive.

It's brilliant, enticing, highly competitive, and very Apple. Let's see what appears in the App Store now.

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Should Comcast's Public Hotspots Leave Users Cold?

Logically, Comcast's Xfinity Wi-Fi public hotspot rollout makes perfect sense. By using devices that customers already have, it can blanket municipalities and other areas with robust Wi-Fi. As our Internet dependency increases, we need more widespread and speedy connections.

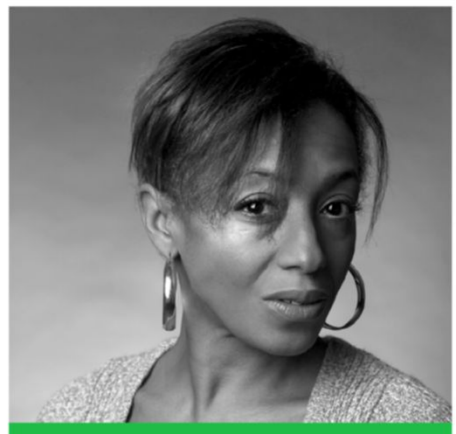
It's the perfect business model. Comcast gets a fairly cheap way to extend its network: by having its customers pay for the equipment!

Customers in select cities with Comcast-assigned wireless gateway modems have a primary, private wireless network and a secondary network. This second network is broadcast publically, and is available to those who are not even Comcast customers (on a time-limited basis or for a fee, however).

There are several concerns being raised about this service. Some are a bit ludicrous, but some are legitimate.

INCREASED SECURITY THREATS

Some Comcast users have expressed concern about their home networks being more vulnerable to security breaches. The truth is, even with a cable modem set to broadcast the public hotspot network, your home private network is unlikely to be any less or more secure than it already is.



PC Magazine lead networking analyst Smara Lynn has served as IT director at a major New York City health care facility and as a technology editor for the CRN Test Center.

In the FAQ section on its website about Xfinity Wi-Fi, Comcast states that the public wireless network is secured with 128-bit encryption. That means WPA/WPA2, which is the strongest wireless encryption method available. Of course, if you don't have a strong password, WPA2, or a firewall in place protecting your private network, you are at risk whether you have the Xfinity hotspot broadcasting or not.

A greater concern, however, is about physical security. People locate Comcast hotpots via an Xfinity app or through the Xfinity hotspot locator site. I would be concerned about my address being broadcast by the app or the website.

Comcast's vague statement on the matter is not particularly reassuring. "We do not list subscribers' addresses on the hotspot location map or in the Xfinity Wi-Fi app," it reads. "In the future we may use general indicators of Xfinity Wi-Fi Home Hotspot availability around a neighborhood, but only in a manner that assures the privacy of our customers."

There's a lot of marketing gobbledygook packed into that statement. If I were a customer opting into this program, I'd want Comcast to provide more specifics about any future updates to make sure my location remains private unless I give permission otherwise.

HIGHER ELECTRICITY BILLS

This one is not likely. Think of a wireless router that lets you set up a guest network (which is essentially what these Xfinity cable modems are doing). Your router's power output isn't significantly affected if you have a guest network enabled along with your regular, private wireless network. A cable modem uses a fixed amount of power, too.

SLOWER PERFORMANCE

This may be a legitimate concern, especially for areas that have lots of apartment buildings and multi-tenant dwellings within close proximity of one another. In my building, just about every apartment has a Wi-Fi router. Those routers are transmitting on the same channels for their 2.4 and 5GHz signals, leading to RF competition. If you take that scenario and give everyone in that apartment building another wireless network to broadcast, those networks are competing, too, and adding to interference.

Comcast doesn't go into any details about channels and bands on its FAQ page, but the company should be as clear as it can be about how adding these hotspot networks affects the performance of existing WLANs—especially in business use.

“The biggest misstep on Comcast’s part is turning on the Xfinity Hotspot option by default.”

DIMINISHED CUSTOMER RIGHTS

For some people, it just doesn't feel right that a huge company like Comcast is using its customer base to expand its wireless coverage. I get that. But Americans are some Wi-Fi-hungry people, and the demand is definitely there.

The biggest misstep on Comcast's part is turning on the Xfinity Hotpot option by default on the cable modem. That's hubris, essentially telling customers, “You know, we aren't even going to ask you if you want this feature—you'll just take it. That saves us the trouble of having to explain it to you.”

This reminds me of how maddening I find it when ISPs give you a cable modem that also can function as a wireless router, and they enable the wireless routing by default. Many

people are unaware that their cable modem can also function as a Wi-Fi router. So they buy a router—when they already have one on their home network. Having two routers performing the same functions on the network can wreak all kinds of performance havoc. I am sure this setup has left many users frustrated with their home networking performance.

Xfinity public hotspots are a good way to massively roll out high-speed Wi-Fi. The project will work best if Comcast and any other ISPs that jump on this bandwagon are as open and transparent as possible with their customers. Unfortunately, given recent news about cable companies astroturfing consumer groups to fight net neutrality, the chance of customers being treated with such honesty is questionable.

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Xfinity public hotspots are a good way to massively roll out high-speed Wi-Fi.

Web Subscriptions Are the Future of TV

Back in the early 1990s, I was asked to speak to some top executives of one of the major networks about the future of television. At that time, multimedia computing was the hot button and these execs were trying to see if they needed to support multimedia CDs as a potential distribution medium for some of their shows. Of course, at that time CDs did not have the capacity to record even a half-hour show and it would be many years before we moved up to DVDs as a medium for video distribution.

But during that meeting I told them that they needed to study various means for distributing their content and explained that once we could digitize all forms of content, the way they distributed their shows would have to change. Although at that time the Internet was considerably different from how it is today, our research had already shown that the move from analog to digital would be highly disruptive. We advised these execs that they needed to develop a dedicated research arm inside their company just to studying this analog-to-digital transition.

By the end of the 1990s, some of the networks had done just that and created special research teams to look at this opportunity. But any serious move toward distributing their shows over the Internet took a backseat to their battle with the cable networks and their rapidly expanding channel lineups.



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

Tim Bajarin

Of course, all of the major networks are now using the Web to deliver selected programs and are utilizing Apple, Amazon, and Google stores to give users direct downloads to many of their shows—and each month the selection improves. But if Dish Network has its way, we will soon be able to subscribe to a whole host of channels for over-the-air (OTA) Web delivery of TV shows, and it will be much easier to use the Web as a medium for TV show distribution.

A key reason that Dish Network could even do this is due to a new deal it's struck with Disney. According to a press release: "The extensive and expanded distribution agreement grants Dish rights to stream cleared linear and video-on-demand content from the ABC-owned broadcast stations, ABC Family, Disney Channel, ESPN and ESPN2, as part of an Internet delivered, IP-based multichannel offering." The release also quotes ESPN boss John Skipper: "We are creating opportunities to add new subscribers and introducing the value of a multichannel subscription to a small subset of broadband-only consumers." This fundamentally means that if DISH wanted to launch a Web TV service, Disney would let the company package its five most valuable channels as part of the offering.

But for a Web subscription to really work, Dish executives would need to acquire many more channels like USA, TNT, Comedy Central, and AMC, or at least the most popular channels and bundle those as a Web subscription of some type. How they would price this is not known yet, but I have to believe that they could undercut the cable networks by a lot and there are already millions of cord cutters who would jump at the chance to get these channels aggregated in a low-cost subscription model that could be accessed on

their TVs, laptops, tablets, and smartphones. The more important impact of this is that Dish could at least conceivably offer these channels à la carte, something that would shake up the cable industry big time. If DirecTV follows suit, Comcast and the other cable networks may have no choice but to do the same if they want to stay in business.

Personally this would not interest me, as I use my Slingbox to broadcast all of my shows to my devices already. Of course, I pay north of $200 per month for all of my cable channels, home phone, and Internet connection via Comcast's Triple Play offerings. But I am sure millions and millions of people would jump at something like this if they could get a good number of video channels over the Web aggregated for a decent fee. They would still not have access to local TV shows and most major sporting events via a Web TV service, but they could use a digital antenna at home for the local and broadcast shows to supplement any Web TV subscription.

There are some critical issues that will have to be ironed out if this is going to ever really work. Advertisers would need to be on board. The creators of these shows would have to become more open to licensing their content for OTA Web subscription services. And we'd need better broadband speeds, though even at 25Mbps this would work relatively well.

Dish's idea has a lot of merit, and with it we could be seeing a real sea change in how our video channels are distributed. I think it could begin to reshape the TV distribution landscape.

“We could be seeing a real sea change in how our video channels are distributed.”

Reviews

CONSUMER ELECTRONICS

Braven BRV-X

Canon PowerShot N100

Garmin Forerunner 15

Asus PadFone X (AT&T)

HARDWARE

Microsoft Surface Pro 3

Digital Storm Coridium

Acer H276HL

WobbleWorks 3Doodler

SOFTWARE & APPS

Sticky Password 7

Our Favorite Apps for July



Play Your Music Anywhere With This Rugged Speaker

PC MAGAZINE EDITORS' CHOICE

Braven's BRV-X portable Bluetooth speaker does an excellent job marrying the power you should expect from a $199.99 speaker with the functionality and ruggedness that make a sound system truly portable. It sounds far more powerful than most speakers its size, and its physical design is ideal for taking a bit of a beating on your next hike. Audio purists may not love the sculpted sound signature, but if you're looking for rugged, portable power out of your Bluetooth speaker, the BRV-X will not disappoint.

Braven BRV-X

$199.99

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DESIGN

The BRV-X seems quite large compared with its smaller sibling, the BRV-1, but at 2.9 by 9.1 by 3.7 inches (HWD) and 1.5 pounds, it's still practical for toting around. Make no mistake, the BRV-X is not a lightweight or pocket-friendly speaker, but it's perfect for stuffing in a suitcase, roomy backpack, or picnic bag. Its rugged, shockproof rubber exterior is IPX5 water-resistant, and rubber feet built into the bottom panel keep it from dancing across tabletops. It's available in black or gray.

The front panel is occupied by a speaker grille that hides two powerful drivers and a status LED. The bottom panel also has a grille that conceals a passive, but quite functional, bass radiator. Power, Bluetooth Pairing, Play/Pause, and Volume Up/Down controls run across the top of the speaker, and the volume controls work independently of those of your mobile device. The BRV-X can also be used as a speakerphone, and Braven claims the microphone helps keep down ambient noise, which is helpful for outdoor use.

Braven BRV-X

PROS Powerful audio performance with rich bass, crisp highs. Rugged, water-resistant design. Speakerphone functionality.

CONS Audio performance too sculpted for purists.



PLAYING ROUGH
The exterior of the Braven BRV-X is both water- and shock-resistant.

The back panel is protected from the elements by a screw-off cover that looks like a lens cap. It houses a connection for the included power adapter, a USB port for powering external devices, and a 3.5mm Aux input. The speaker comes bundled with a 3.5mm cable, but no USB cable.

There's also a battery indicator, a pinhole reset button, and a switch labeled Indoor/Outdoor. The switch doesn't simply make the system louder when you're in Outdoor mode; it reinforces frequencies (particularly higher ones) that often seem muted outdoors because they have fewer surfaces nearby off of which to reflect. The BRV-X can be heard from quite a distance in this mode, unlike many portable speakers its size that drop off at relatively short distances when outside and away from walls.

Braven estimates the battery life for the BRV-X at roughly 12 hours.



Braven estimates the battery life for the BRV-X at roughly 12 hours, but your results will depend on how loudly you play your music. The speaker will automatically shut off if it's on for longer than 30 minutes without an active Bluetooth pairing or audio

CARRY ON
The strap connection (shown at the right) makes it easy to take and mount the BRV-X anywhere you go.

being played via the Aux input. The pairing process with an iPhone 5s was simple and quick, requiring the Call/Answer button to be held for a few seconds. If you have an NFC-compatible device, you can automatically pair it by tapping it to the NFC logo on the back-right panel.

Two BRV-X speakers can optionally work as a stereo pair, but we could not test this feature (and found no complaints with a single speaker's audio performance). The system ships with the aforementioned cable and charger, along with international adapters for the charger, plus a strap and lanyard for more secure outdoor toting.

PERFORMANCE

Because the Outdoor mode is intended for wide-open listening spaces, we'll focus on the less-tweaked Indoor mode for the best comparison with similar Bluetooth speakers tested under similar conditions. On tracks with intense sub-bass content, like our test track, The Knife's "Silent Shout," the BRV-X delivers powerful low end that you wouldn't expect given its modest frame. At absolute top volumes, I noticed no distortion, though the speaker generates plenty of vibrational presence. At normal levels, the bass is intense and the audio is clean and clear.

On "Drover," Bill Callahan's baritone vocals are imbued with an extra rich, deep bass presence. It would sound over-the-top if there weren't also a healthy high-mid presence to deliver his vocals with plenty of crackling treble edge. The drums on this track can sound a bit intense in the low end at higher volumes, but at medium levels, the overall balance between lows and highs is ideal.

The kick drum loop on Jay-Z and Kanye West's "No Church in the Wild" gets



LISTENING AND CHARGING
A selection of simple connections and controls may be found on the BRV-X's protected rear panel.



plenty of high-mid presence that lets it easily cut through the dense mix, while the low frequency sustain remains quite substantial. The sub-bass synth hits that punctuate the beat are delivered with plenty of gusto; the BRV-X has one of the least passive of the passive bass radiators we've encountered on a speaker this size.

Classical tracks also benefit from the bass radiator's added low end. In the opening scene in John Adams' "The Gospel According to the Other Mary," lower-register instruments sound a bit more full and menacing than they would on a flat-response style speaker, but the vocals and higher-register instruments still command the spotlight. This is a very sculpted sound, with punchy mids, bright highs, and surprisingly powerful lows.

If you're looking for a less bass-boosted portable Bluetooth speaker, consider the Bose SoundLink Mini or the JBL Pulse; they're both sculpted, but seem a bit more focused on the mids and highs, while not completely ignoring the bass. If these options are out of your price range, consider the very portable Jabra Solemate Mini and the Panasonic SC-NT10, which, despite a significant drop-off in power, are still very functional and rugged.

For $200, the Braven BRV-X is worth every penny. Its audio is intense, its design is meant to withstand some nasty weather and minor abuse, and the Indoor/Outdoor switch is truly useful. Its thoughtful design and strong performance easily earn it our Editors' Choice award.

TIM GIDEON



Unique Features Energize Canon's Killer Compact

Canon PowerShot N100

$349.99

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PC MAGAZINE EDITORS' CHOICE

The PowerShot N100 is Canon's second model in the N series of connected compacts. It takes what was interesting about the PowerShot N—the Creative Shot mode, tilting display, and Wi-Fi connectivity—but drops the awkward zoom/shutter ring in favor of more traditional controls. When you take the N100's f/1.8 wide-angle lens and 12-megapixel 1/1.7-inch image sensor into account, you have a compact that is a highly capable imaging device.

DESIGN AND FEATURES

At 2.7 by 4.1 by 1.4 inches (HWD), the 10.2-ounce N100 is a bit taller than most compacts. It's bulkier, too, but

holding the N100 is comfortable, and shooters with larger hands can tilt the rear LCD out a bit and rest a thumb between it and the body. The N100 comes in either white or black.

The N100's main lens is a 24-120mm f/1.8-5.7 (35mm equivalent) zoom, which captures a lot of light at its widest angle, but its aperture narrows significantly when zoomed in. The zoom range is limited when compared with what you get from pocket compacts that use smaller 1/2.3-inch image sensors, but in exchange you get image quality that's on par with that of premium compacts at a price somewhere in the middle.

Canon abandoned the PowerShot N's square shape and control ring around the lens and instead went for traditional controls on the N100. The top plate houses a pop-up flash as well as the power button, a traditional zoom rocker/shutter combination, and the video record button.

On the rear, running along the right side of the LCD, you'll find a toggle switch to change shooting modes, a Star button to tag photos as favorites during image review, playback and menu buttons, plus a four-way controller that grants quick access to Exposure Compensation, macro focusing control, flash settings, and display settings. The Func./Set button at its center is used to access an overlay menu of controls when shooting, navigate through menus to set the self-timer (in Hybrid Auto or Dual Capture mode), select from a number of modes (Auto, Creative Shot, and more than a dozen scene settings), and adjust shooting settings. There are no manual controls for aperture or shutter speed; the N100 will default to shooting with a quick shutter speed if the drive mode is set to continuous with autofocus between shots, and in order to close down the lens' iris you can

Canon PowerShot N100

PROS Sharp f/1.8 lens. Larger-than-average image sensor. 3.6fps image capture. Solid image quality through ISO 1600. Tilting touch-screen display. Creative Shot mode. Rear camera Dual Capture mode. Wi-Fi.

CONS Pricey. No Raw shooting support. Lacks manual control modes. Controls limited in Creative Shot mode. Some barrel distortion. Limited zoom range.



boost the ISO. It's unfortunate that Canon opted not to provide direct control over either.

There's one more out-of-place control. A storybook icon at the top of the LCD launches the neat Story Highlights mode, which combines shots into a short movie, complete with Ken Burns zooming effects and a color filter you specify, or creates a video album from images that contain recognized faces.

In addition to the front lens, a second lens (3 megapixels, or 2,048-by-1,536 resolution) in the rear can capture the photographer's image. This is active when shooting in Dual Capture mode, which lets you put yourself into photos where you'd otherwise be absent, or Hybrid Auto mode. And when you're reviewing images you'll be able to view an automatically created Digest Movie—an MP4 video of the few seconds before each shot, from both the front and rear lenses. (You can turn off this feature if you don't want it to eat up space on your memory card.)

The Creative Shot mode captures a few shots of a scene and saves one without a filter, and an additional five with various filters and crops applied.

The Creative Shot mode captures a few shots of a scene and saves one without a filter, and an additional five with various filters and crops applied. The effects vary from cool to garish, but because your original shot is saved there's no harm in using it. The only real downside with this mode is that you can't adjust exposure compensation or enable macro focusing—two things that would give you just a little more control.



YOUR SHOT, YOUR WAY
The menus give the Canon PowerShot N100 plenty of options, but there are no manual controls for aperture or shutter speed.

The 3-inch rear display has a 922k-dot resolution and support for touch input. It's on a hinge, but it can only tilt to a 90-degree position, making it perpendicular to the rear of the camera. The display itself is one of the sharpest you'll find on any compact, and its touch interface is responsive. You can use it to swipe through images, but the real boon is the ability to tap an area of the display to focus, which really speeds up shooting and takes the guesswork out of what the N100 will focus on.

Wi-Fi is built in, and it's pretty easy to post N100 photos and videos to your favorite social network. You can copy them to your iOS or Android device via the free Canon CameraWindow application—it's just a matter of connecting your phone via NFC or the N100's Wi-Fi network. If you're near your home network or a hotspot you can post photos or videos directly to Facebook, Twitter, YouTube, or Flickr, though you'll first need to set up an account on the Canon Image Gateway service and pair with your N100. It's a painless process, but we'd like to see it eliminated, as on Samsung's Wi-Fi–enabled cameras.

It's also possible to use your phone or tablet as a remote control. A Live View feed streams from the N100 to your device's display, but you can only adjust the zoom, control the flash, set the self-timer, and fire the shutter. The final Wi-Fi feature is a GPS location logger. When enabled in the app, it keeps track of your movements. You can then add the data to images captured by the N100 when the log was active. You'll need to make sure that the camera's clock matches up with the time on your phone to get this to work properly.

PERFORMANCE AND CONCLUSIONS

The N100 starts and captures an in-focus photo in less than 1.3 seconds, it focuses and fires in a quick 0.1 second, and it can fire off photos continuously at 3.6fps with the focus either locked or confirmed between every shot.



CRISP SHOOTING
The N100's integrated f/1.8 lens takes sharp photos through ISO 1600. Just expect a little barrel distortion in certain scenarios.



I used Imatest to check the sharpness of the N100's lens. It exceeds the 1,800 lines per picture height we use to mark a photo as sharp throughout its zoom range; at its widest angle it manages 1,857 lines, and it improves to 2,191 lines at the midpoint of the zoom, before dropping back down to 1,924 lines at its telephoto extreme. The N100 doesn't support Raw image capture; you'll have to move up to a more serious pocket camera in order to capture images in that unprocessed format.

The lens does show some barrel distortion, which is generally not an issue with compact cameras as they correct for it automatically. At the widest angle there's 2.5 percent, but it diminishes as you zoom, showing about 1.9 percent at the midpoint of its range and a negligible 0.5 percent at the telephoto end. The distortion gives a noticeable outward curve to straight lines in your images, but can be corrected in software (such as Adobe Photoshop Lightroom).

Imatest also checks for noise, which can detract from image quality when the camera defaults to the higher ISO settings necessary for low-light image capture. The N100's relatively large image sensor and low pixel count work in its favor here; the camera keeps noise under 1.5 percent through ISO 1600, which is better than what you'll get from most compacts. Smudging of fine details begins at ISO 1600, but not so much that it detracts



The Canon PowerShot N100 is a big improvement over the PowerShot N.

from use on the Web or for modestly sized prints.

Video is recorded in MP4 format at up to 1080p30 quality. The footage is crisp with accurate colors, and though you can hear the whir of the lens moving in and out when zooming, it's not overwhelming. The N100 is quick to adjust focus as a scene changes, but it does show some evidence of rolling shutter when the lens is zoomed in. There's a micro HDMI port to connect to an HDTV, and a mini USB port for plugging into a computer. Canon includes an external wall charger for the battery, so if you opt to invest in an extra battery you can charge one without giving up use of the camera, and standard SD/SDHC/SDXC memory cards are supported.

The Canon PowerShot N100 is a big improvement over the PowerShot N thanks to a larger image sensor, a brighter lens, and a more conventional design. I could live without the rear camera, but it doesn't detract from the image quality that the N100 delivers, and some shooters may enjoy using the Dual Capture mode. If you're on a tighter budget, you're better off going with a slightly older premium compact, such as the Canon PowerShot S110, which has most of the PowerShot N100's features except for Creative Shot. But its image quality, snappy performance, integrated Wi-Fi, and a sharp touch-screen display are good enough for us to make the N100 our new Editors' Choice for compact cameras.

JIM FISHER



Like to Run? Here's the Activity Tracker You Need

PC MAGAZINE EDITORS' CHOICE

When runners ask me to name the best activity tracker for counting their daily steps, I usually counter with another question: "Do you also want pace, heart rate, lap times, and other running stats?" When they say yes, I now have a clear answer: Get the Garmin Forerunner 15. It's a proper runner's watch, complete with GPS and an optional heart rate monitor, but it also counts your daily steps and total miles traveled, even when you're just puttering around your home or office, and it's easy and intuitive to use. If that's the kind of runner's watch you're looking for, and you want to spend less than $200, the Forerunner 15 is the device to buy.

Garmin Forerunner 15

$169.99

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DESIGN AND SPECS

The Forerunner 15 comes in two sizes and several colors. The small watch is 1.58 by 2.05 by 0.62 inches (HWD), weighs a nearly imperceptible 1.3 ounces, has a display measuring 0.81 by 0.77 inch, and is available in black with green accent, teal with white, or violet with white. The large watch measures 1.79 by 2.25 by 0.62 inches with a 0.98-by-0.94-inch screen, weighs a scant 1.5 ounces, and comes in black with blue accent or red with black. But the Forerunner 15 looks like a sporty sport watch no matter which color or size you choose; if you plan to wear it 24/7 to count your steps, the style could be off-putting.

The screen is inset slightly from the bezel, but protected with a flush piece of clear, hard plastic. Four buttons sit in each of the corners of the watch and have enough give that I wouldn't worry about them jamming up over time, as some watch buttons do.

In the box, you get the watch, a USB charging cradle, and a compatible Garmin chest-strap heart rate monitor if you opted to bundle one with your purchase. The battery lasts about five weeks when in watch mode, and about 8 hours when you're using the GPS to record activity.

The watch's default screen shows the time, battery level, and one line of text that changes as you press the bottom-left button, cycling through the date; total steps for the day; your steps goal; distance traveled so far; calories burned; and a reminder to "Move!", which appears when you've sat idle for too long.

As a consummate button-masher, I have to say that the Forerunner 15 screens are extraordinarily easy to navigate. Tiny icons (a backward arrow, for example, or a running figure) next to the buttons help remind you what they do. The language used on the menus is clear as well, which may seem like a minor

Garmin Forerunner 15

PROS Expertly designed, well-priced runner's watch. Includes step tracking for daily activity monitoring. Clear display. Battery lasts long, is rechargeable. Includes GPS. Waterproof up to 164 feet. Simple navigation. Offers rich data analysis via website. Optional heart rate monitor.

CONS Overtly sporty design means you might not want to wear it 24/7. Doesn't track sleep. Can't sync directly with phones.



point, but you'd be surprised at how often this kind of user interface is designed poorly.

The clasp is what you'd expect: adjustable with an extra strap for holding the loose end of the band in place. Overall, the watch itself is a bit thick, particularly for petite people, but not terribly so.

One other big plus is that the Forerunner 15 is waterproof up to 164 feet (50 meters).

ON THE ROAD

Halfway through my first two-mile jaunt with GPS tracking, the Forerunner beeped to let me know I was striding at 10 minutes, 18 seconds, per mile. During mile two, I nearly maintained that pace at 10:28 per mile. Before you laugh at my slowness, let me at least say that I'm an avid walker and cyclist. The Forerunner can't track bicycling, but it did inform me that my record in terms of distance walked was about 8 miles. Not too shabby.

All those details are recorded and kept in the History section of watch itself for several days, but they're also accessible from the Garmin Connect website and mobile app, where you can really dive into your data. Unlike the Garmin Vivofit and some other models in the Forerunner series, the Forerunner 15 does not sync directly with the mobile app for iOS and Android. Rather, you have to sync with your Mac or Windows computer via the USB charging cable and upload your data to the Connect Web account, which then pushes the information to the Connect app.

I ran a few more times and took a couple of long walks with the GPS enabled. Each time I had more or less the same results. The GPS needed about 30 seconds or so to initialize, but the Forerunner's screen kept me informed with a progress bar while it did so I wouldn't set out prematurely.

The heart rate monitor is the typical chest-strap variety, known to be reliable. This type is fine, but not





as cutting-edge as the new wristband-style monitors. One example is the MIO Link, a cool monitor that has an indicator light that tells you your heart rate zones every so often by flashing a different color. Or consider the Basis Carbon Steel Edition, a watch-shaped activity tracker with a built-in monitor that can read your heart rate all day and night.

The Garmin Connect Web account is deep. The collapsible left menu alone has 17 options. You can manually track sleep, weight, body fat, and much more. Garmin's site is geared more toward training and fitness than medical health, especially when compared with Withings' and Fitbit's, which include fields (and, in some cases, additional connected devices) for tracking glucose readouts and blood pressure. With Garmin, however, you can enroll in premade training plans to help you complete a 10K or a marathon, a benefit you certainly don't get with Withings or Fitbit.

FORERUNNER 15 IS THE FRONT-RUNNER

GPS-enabled runners' watches have been on the market for a long time. They're often expensive and only worthwhile if you run a lot. Activity trackers or smart pedometers, on the other hand, have really only come into their own in the last three years. The Garmin Forerunner 15 is the first device that pairs the functionality of the two extremely well without sacrificing any of the core data collection that an average runner needs, such as pace and lap time. Hard-core runners probably don't need a step counter and should look at some of the other options in the Forerunner line. As a device that bridges the gap between activity trackers and runners' watches, the Garmin Forerunner 15 is our Editors' Choice.

JILL DUFFY



Asus' PadFone X Makes Your Smartphone a Tablet

Asus PadFone X
(AT&T)

$199 (with two-year contract)

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Asus has been trying to nail down the modular mobile device for some time, but the PadFone X is the first iteration of the company's tablet-smartphone hybrid to reach the U.S. Was it worth the wait? Yes, but with qualifications. As a smartphone, the PadFone X is capable, but unexciting; as a tablet, it's clunky and has performance issues. That said, the device is a steal on AT&T—$199 (with contract) gets you both the 5-inch PadFone X and the 9-inch PadFone Station. The shared data connection and combinable batteries help mitigate functional shortcomings of either device alone. Still, if all you need is a new phone, there are better standalone options.

DESIGN, DOCK, AND CALL QUALITY

Form follows function for the nondescript, rather utilitarian PadFone X. The rounded, soft-touch plastic back fits comfortably in the hand and an angular, faux-metal band facilitates docking, but it lacks distinction or character. At 5.67 by 2.85 by 0.39 inches (HWD), it's the same width as Samsung's Galaxy S5 and a touch thicker than the HTC One (M8); it weighs 5.29 ounces. On the right side are buttons for Volume and Power, but because the latter is situated too high it's difficult to reach conveniently with your thumb. There's no visible notch along the edges, but with some uncomfortable prying at the micro USB port, the back cover does peel off for access to the SIM and microSD card slots, and the non-removable 2,300mAh battery. In my tests, the PadFone X delivered continuous talk time of 10 hours, 15 minutes.

The PadFone Station measures 9.86 by 6.78 by 0.46 inches and weighs 1.13 pounds. The protruding docking mechanism dominates the back, but makes for easy transitions from phone to tablet—the PadFone slides easily in and out, and rubber teeth along the edges help keep the union secure. The whole package looks pretty clunky and has an unbalanced weight distribution, making it feel heavier than it is, and the oversized bezels don't help with the already cheap feel. There's a micro USB port on the left that can simultaneously charge the docking station and the phone—the dock has its own built-in 4,990mAh battery. Two front-facing speakers flank the display and sound better than average, but mostly by virtue of their position.

There are two displays to consider here: a 5-inch, 1080p one on the smartphone and a 9-inch, 1,920-by-1,200-pixel one on the docking station. Both are bright and sharp, and feature wide viewing angles.

Asus PadFone X (AT&T)

PROS Tablet dock included in base price. Nice full-HD display on phone, tablet. Good overall performance. Quick, easy transition from phone to tablet.

CONS Unexciting smartphone design, clunky as a tablet. Performance lag in tablet mode.





TWO, TWO, TWO DEVICES IN ONE
Asus' PadFone X offers unparalleled convenience, but its tablet-phone combo can be a bit on the clunky side.

Asus also sells an optional Bluetooth keyboard dock for $99. It's similar in design to Asus' Transformer line of keyboard docks, but instead of a physical port, the PadFone keyboard connects wirelessly and a sturdy hinge holds the tablet in place at any angle. The dock is made from sturdy aluminum and the full QWERTY keyboard is comfortable to type on, if on the small side. I understand it needs to be heavy enough to balance out the PadFone, but 1.7 pounds by itself is pushing it.

The PadFone X supports AT&T's GSM (800/900/1,800/1,900MHz) and LTE (700/1,700/1,900MHz) networks. Call quality was good in my tests, with a punchy earpiece that made it easy to carry on conversations outdoors in noisy environments. Transmissions through the microphone were easy to understand, but sounded somewhat muted and gave my voice a nasal quality. Noise cancellation worked well, but louder chatter produced some distracting background artifacts.

Also on board are dual-band 802.11a/b/g/n/ac Wi-Fi, GPS, NFC, and Bluetooth 4.0. The PadFone X connected to our 5GHz networks without issue and paired easily with an Era by Jawbone Bluetooth headset. There's also support for wireless charging on the Power Matters Alliance (PMA) standard, which includes systems like Duracell's Powermat.

PERFORMANCE AND ANDROID

Powering the PadFone X is a quad-core 2.3GHz Qualcomm Snapdragon 800 SoC with 2GB RAM, which resides entirely in the smartphone. The PadFone X

actually performed comparably to Snapdragon 801 devices like the GS5 in most benchmarks; media-heavy websites loaded quickly and games like Asphalt 8 played smoothly.

There is, however, a noticeable delay introduced to touch input once the PadFone is docked. Scrolling in Chrome requires long and deliberate swipes to move even just a few lines down a website. Launching apps routinely takes multiple taps. And audio for YouTube videos will typically fall out of sync. It's not unbearable, but it can be frustrating.

The PadFone X runs Android 4.4.2 with an Asus twist. There are tools for tweaking the sound signature and display color temperature to your liking, and power management tools for scaling back the processor and background data to preserve battery life. The biggest customizations are the changes necessary to accommodate the PadFone's split personality. And although Asus has made it quick and painless to physically switch between modes, the software hurdles aren't quite as smooth. Stock Asus apps like the Dialer, Messages, and Email transition relatively smoothly between the two—change modes and the app reorients itself to accommodate the new screen, but third-party apps are less seamless. A pop-up alerts you that the app isn't compatible with switching modes and you'll be prompted to close the app, restart it, or add it to the Dynamic Display list. Apps added to that list are supposed to be preserved from mode to mode. It's not the most elegant solution, and really didn't make much of a difference. Simply restarting the app achieved the same effect as far as I could tell.



ROCKY RELATIONSHIP
The transition from phone to tablet is not always smooth on the PadFone X, and you may notice input delays when using the tablet.

Of the 16GB of internal storage, 10GB is available out of the box. AT&T added its usual array of preloads, and apps like Yellow Pages, Famigo, and Wild Tangent games round out the pointless, non-removable bloat. Even worse, AT&T insists on foisting its Browser Bar onto every phone it sells. Seriously, this bar is not only without purpose, but digging into the dedicated settings page reveals some more questionable features: It's added to the stock browser by default, tries to latch onto Chrome at every opportunity, and collects "anonymous usage data" by default. You can't remove it, but I highly suggest disabling it.

CAMERA AND CONCLUSIONS

In bright outdoor lighting, where most smartphone cameras excel, the PadFone X's 13-megapixel rear-facing camera took photos that almost invariably ended up overexposed, and shooting toward the sun produced a ton of lens flare. Indoors and in low light, details appeared smudged by overaggressive noise reduction, and color accuracy was off, giving white tones a yellow hue. This is all in Auto mode, though—Asus includes plenty of camera controls that should appeal to photographers. I coaxed out some quality shots using these controls, but doing so took far too much effort. Video tops out at 1080p and has the same exposure issues, though it generally looks sharp in good lighting.

Device convergence is attractive in theory, but in practice, the added convenience often comes with compromise. With the PadFone X, that takes the





form of lag on the tablet side, and some jarring transitions between phone and tablet on the software side. But I'm willing to give Asus and AT&T a pass for two reasons: One, I suspect that some of these issues can be tightened up with software revving; and $199 for both the smartphone and tablet dock is an unbelievable deal. You could allocate $200 for a tablet and grab a smartphone for free on contract, but no free phone is going to be able to match the PadFone X, and you'd be hard-pressed to find a solid large-screen tablet for that price.

The fact is, though, the people most likely to be attracted to the PadFone concept probably also already own a tablet. And as a smartphone alone, the PadFone X is not quite on the same level as the Galaxy S5 or HTC One (M8). The GS5 is faster, lasts longer, and has a better camera. The One is the most beautiful phone on the market and has better overall performance as well. Either of those options is better for anyone who already owns a modern tablet, but if you're in the market for a tablet and smartphone upgrade, the PadFone X is a good way to go.

EUGENE KIM



Microsoft Surface Pro 3

$1,299 (as tested)

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New Surface Is Bigger, Better, Not Good Enough

Touted by Microsoft as the single-device replacement for a laptop and a tablet, the Surface Pro 3 is only partially successful as the ultimate mobile computer. Sure, this "thinnest Intel Core PC" is a much better laptop replacement than previous Windows 8 slate tablets, but its larger chassis and display and added weight also make it more uncomfortable to use. Plus, you need to buy additional accessories to make it work like a laptop, which adds more bulk and increases the already-high price. Some features are improved, but other problems still remain. The Surface Pro 3 isn't exactly the ultimate melding of laptop and tablet, at least not in its current iteration.

DESIGN AND FEATURES

At 8 by 11.5 by 0.36 inches (HWD), the Surface Pro 3 is a shade larger than the Surface Pro 2 (7 by 11 by 0.53 inches)—just enough to accommodate its 10.6-

inch display. The tablet feels more balanced in the hand than the Surface Pro 2 and some other tablets, such as the Lenovo IdeaPad Miix 10.

The Surface Pro 3 weighs 1.75 pounds, but that's just for the slate tablet alone. The weight increases to 2.44 pounds if you factor in the included Surface Pen and the Type Cover ($129.99). That's about three-quarters of a pound more than Apple's iPad Air, and a little more than a half-pound lighter than the 13-inch MacBook Air. Not bad, but that's pushing the limits of an everyday mobile companion you carry everywhere.

The adjustable kickstand lets you tilt the tablet back to a comfortable angle (anywhere from 22 to 150 degrees) when you're sitting down with the Surface Pro 3 on your lap. The action on the hinge takes a little



effort to change angles, but that's likely to loosen up the longer you use it. This is a more secure mechanism than you'll find on tablets that simply slot into their keyboards without a positive lock. That said, the Surface Pro 3 is just a bit too large to sit on some laps with the cover installed. That and the fact that the kickstand can still dig into your legs is just a problem inherent in the Surface design. Is it more comfortable

Microsoft Surface Pro 3

PROS Excellent high-resolution display. Ten-finger multitouch support. Infinitely adjustable, full-friction kickstand. Pressure-sensitive stylus included.

CONS Heavy, bulky for a slate tablet. Type Cover costs $130 extra. Integrated pen storage is flimsy. Only one USB 3.0 port. Kickstand can be uncomfortable when used in lap. Doesn't work with last-generation Surface accessories. Performance not better than that of the previous iteration.

I GET A KICK OUT OF YOU

The Surface Pro 3's kickstand is adjustable to almost any angle for working at a desk, but expect it to make lap use uncomfortable.



than the Surface Pro 2? Perhaps, but it's still nowhere near as comfortable to use on your lap as a traditional clamshell laptop.

The excellent 12-inch, 2,160-by-1,440-resolution ten-point touch-screen display is made of Gorilla Glass. It's a step up from the 1,920-by-1,080-resolution screen you got on the Surface Pro 2, and the larger display is bright and clear, with good scaling of the Windows 8 interface. Colors pop, sample images looked vibrant and lifelike, and 1080p HD videos from YouTube and Netflix displayed crisp visuals and smooth animation. Sound from the speakers emanates from two slits cut between the screen's glass and the magnesium outer bezel, and aims right at your ears if you're using the tablet on a table. Stereo separation is very good, and the speakers play at a reasonably loud level in a small room, with no distortion. The built-in rear 5-megapixel and front-facing 1080p webcams show smooth-enough animation for Skype, and are adequate for quick snapshots. Make sure your subjects are well-lit, though, because low-light shots from the rear camera are a bit noisy and show diminished detail in their darker areas.

Connectors are limited to one USB 3.0, one Mini DisplayPort, headset, and power. There's also a microSD card slot for expansion. The new power adapter has a spade-shaped plug on the end, rather than the flat, magnetic plug seen on the first two iterations of the Surface Pro. This means that you'll have to buy new adapters and accessories if you're planning to upgrade from an older Surface tablet.

The Surface Pen, made by N-trig, is chunkier than the stylus that was bundled with the last model, and you can no longer clip it to the charging port. You're

clearly meant to keep this in your shirt pocket like a real pen. There's storage in the Type Cover, but it's just a flimsy loop that will likely tear at some point. Microsoft seems to have anticipated this, as it offers replacement pen loops for $4.99. Extra pens go for $49.99 each.

The pen's top-mounted button feels like what you'll find on a traditional ballpoint pen. When you click, it automatically wakes the tablet and opens OneNote on a new blank document. Clearly, Microsoft designed the system with note-taking in mind. The Surface Pen glides easily on the screen, with only a minor visible lag in drawing if you move the pen too fast. The line fills in almost before you can lift the pen. Thanks to the optically bonded glass, the pen tip perfectly meets the line on your drawing on the screen. On older pen-based systems, you'd see a gap between the stylus tip and any pixels you were drawing on screen. The pen has two buttons, which can function as erase and select in OneNote, or as other functions, such as right-click, while navigating Windows 8.1. Aside from OneNote, the Surface Pro 3 comes with the standard set of Microsoft applications, including Fresh Paint, Office Trial, Skype, and a handful of free games including Solitaire and Sudoku. A one-year warranty is standard for Surface tablets.



The blue Type Cover we received with our test tablet (black, red, or purple versions are also available) guides itself and snaps in just like all the other Surface Type Covers we've used, though this one is physically larger. The new cover wakes the system



UNDER SEPARATE (TYPE) COVER
The Surface Pro 3's useful Type Cover comes in a variety of colors, but buying it will set you back a steep $129.99.



when you open it, and the one-piece touchpad is a huge improvement over the tiny one used on older Surface tablet covers.

Key feel and travel on the new Touch Cover is much like on the last version. The additional magnetic latch between the tablet and the cover helps stability, and has the added benefit of raising the typing angle to something more traditional. The chassis (finally!) has indents on both sides, so lefties and righties alike can easily extend the kickstand.

PERFORMANCE

Our test system came equipped with an Intel Core i5-4300U processor, 8GB of DDR3L memory, and a 256GB SSD. Even though the Surface Pro 3 has a much higher-resolution screen, its benchmark results on PCMark 7 (5,170), Handbrake (1 minute, 14 seconds), CineBench (2.82), Adobe Photoshop CS6 (4 minutes, 33 seconds), and 3D game tests are similar to those of the Surface Pro 2. The Surface Pro 3 is a very good performer, and has the power to handle tasks like photo and video editing. The high PCMark 7 score shows that it will be a long time before the system starts to feel slow. Just be sure that you really need the larger screen and the Surface Pen, as you're essentially paying hundreds of dollars for them over the Surface Pro 2.

“The Surface Pro 3 is a very good performer, and has the power to handle tasks like photo and video editing.”



Battery life is very good. The Surface Pro 3 lasted 8 hours, 55 minutes, on our standard test, a definite improvement over the Surface Pro 2's 7:19. This is enough for most of a workday, though the 13-inch MacBook Air is still the champ, scoring an astounding 15 hours, 51 minutes, on the same test.

So has Microsoft finally created the ultimate one-device replacement for both your tablet and your laptop? Not really. As a laptop, the Microsoft Surface Pro 3 works well, with a sturdier keyboard cover, but it's still not as comfortable to use in your lap as a traditional clamshell laptop, and you still have to purchase the keyboard cover separately, adding $130 to the overall price of the system. Photos and videos look wonderful on the high-resolution screen, but the tablet is simply too heavy and bulky to carry around single-handed for long periods. Tablets like the iPad Air, our Editors' Choice for large-screen tablets, and the Surface Pro 2, our top choice for Windows-based slate tablets (which will continue to be sold), work better as devices that you hold in your hands all day. The fact that the Core-i5–equipped Surface Pro 2 delivers almost the same performance and is $300 less expensive is a major mark against the Surface Pro 3. You could buy a premium ultraportable, such as Apple's 11-inch MacBook Air, and still have enough left over for an iPad mini for the same amount of money as the Surface Pro 3 we tested.

JOEL SANTO DOMINGO



This Super-Fast Dual-GPU Desktop Will Up Your Game

PC MAGAZINE EDITORS' CHOICE

Digital Storm Coridium

$7,779 (as tested)

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Everybody wants to be the best, especially in PC gaming, where performance commands premium prices and boutique vendors race to build systems with the hottest hardware every time a new part is released. The latest entry is the Digital Storm Coridium, a premium-priced high-end gaming desktop that pushes the envelope further than any system before. AMD's cutting-edge dual-GPU video card, the Radeon R9 295X2, is the latest ammunition in the ongoing battle for faster, more powerful gaming rigs, and the Coridium boasts two of

the beasts, plus an overclocked six-core Intel Core i7 processor. The result is ridiculous power—enough to enjoy gaming on multiple 4K monitors—but it comes at a ridiculous price.

DESIGN AND FEATURES

The Coridium's chassis is a Corsair Obsidian Series 450D, which features a steel body, a brushed-aluminum front panel, and a large acrylic side window for showing off what's under the hood. The whole thing measures 19.44 by 8.26 by 19.56 inches (HWD), putting it squarely in the midtower category, and not so big as to overcrowd a desk. For this build, Digital Storm has slightly modified the front panel, filling the two drive bays with a tray-loading 12x Blu-ray combo drive, and the front of a reservoir for the company's own HydroLux liquid cooling system. Also on the front of the case are a Power button, a Reset button, two USB 3.0 ports, and headphone and microphone jacks.

On the rear of the tower, you'll find plenty of connections, with nine USB ports (four USB 3.0, five USB 2.0), one dedicated port for BIOS flash, and two USB-eSATA combination ports. There's a PS/2 port for older gaming peripherals, and a FireWire 400 port, along with Gigabit Ethernet, S/PDIF for digital surround sound, and other standard audio ports. Two DVI-D and eight Mini DisplayPort jacks come by way of the video cards.

Open up the left side of the case and you'll find an Asus Sabertooth X79 motherboard, set up for overclocking and outfitted with an Intel Core i7-4930K overclocked to 4.6GHz. Installed on it are the video cards and 16GB of RAM (four 4GB sticks of 1,866MHz Corsair Vengeance Pro, and four more RAM slots are still available). Two identical-looking Samsung EVDO solid-state drives (SSDs) are tucked away in the right side of the case: One is 250GB and serves as the boot drive, the other is 1TB and is used for storage.

Digital Storm Coridium

PROS Unstoppable graphics performance from dual AMD Radeon R9 295X2 graphics cards. Overclocked six-core processor. Liquid cooling throughout.

CONS Expensive. Limited room for upgrades.



All of this high-powered hardware generates a lot of heat and demands a lot of power. The video cards have built-in liquid cooling, so each card has tubing and a radiator to contend with, in addition to the overclocked processor, which is cooled with the HydroLux. This results in a mess of tubing that will complicate any maintenance work or upgrades inside the case. Everything is powered by a 1,500-watt Silverstone power supply.

PERFORMANCE AND CONCLUSION

Graphics performance is unsurprisingly the highlight of the Coridium, and the system put every competitor to shame in our gaming tests. In Aliens vs. Predator at 1,366-by-768 resolution and low detail settings, the Coridium shattered records with a category-leading 641 frames per second (fps), and reached 302fps when dialed up to 1,920 by 1,080 with full details. In Heaven, the Coridium produced 291fps at baseline settings, and 245fps at 1,920 by 1,080 and details cranked up. These results put it in the upper echelon of top-tier systems. And at full 4K resolution the Coridium will still play any game, at maximum settings and full resolution, and offer impressive frame rates while doing it.







AMD Radeon R9 295X2

$1,499

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EDITORS' CHOICE

PROS Incredible cooler keeps GPU temperature low. Superb 4K performance.

CONS Expensive. Requires beefy power supply.

The dual-GPU AMD Radeon R9 295X2 combines ease of setup, excellent thermals, and quiet operation. You'll need a hefty power supply (at least 500 watts, and capable of supplying 45 amps on the first 12-volt rail) and bank account balance, but if you have those you can't currently buy faster single-card gaming graphics.

—Joel Hruska



Those who want to use all this power for something other than gaming won't have to worry. The Coridium's CineBench score of 13.88 puts it ahead of almost every competing system, as does its Handbrake completion time of 20 seconds. Performance wasn't consistent across all multimedia applications, however. In Photoshop CS6, the Coridium completed our test in 4 minutes, 46 seconds—nowhere near the 2:41 we saw from a Falcon Northwest Mach V outfitted with three Nvidia Titan cards or the 2:30 of the Maingear Epic Rush X79.

The Digital Storm Coridium is far from affordable, and even with overclocking and first-rate components, it doesn't quite offer the best general-use performance in every case. But it pumps out more frames at higher resolutions than any other machine we've tested. If you want the very best 4K gaming performance, nothing tops the Coridium, our new Editors' Choice for high-end gaming desktops.

BRIAN WESTOVER



A Big-Screen Monitor That Doesn't Cost Big Money

Acer H276HL

$249.99

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PC MAGAZINE EDITORS' CHOICE

Whether you're working with multipage documents, surfing the Web, or playing the latest first-person shooter, computing is always better on a big-screen monitor. The cost of all that extra screen real estate has traditionally been prohibitive for users on a budget, however. Not anymore. The Acer H276HL is a 27-inch monitor based on In-Plane Switching (IPS) panel technology that provides solid all-around performance and stylish aesthetics for just under $250. Features are limited and the screen is somewhat reflective, but at this price those are worthwhile sacrifices.

DESIGN AND FEATURES

The H276HL's sleek design belies its affordable price. The 1,920-by-1,080 panel sits inside a bezel-free cabinet that is only 1.3 inches thick and has a matte-black textured finish with a thin band of glossy-black trim around the edge. The 11-pound cabinet lacks VESA mounting holes, but is supported by a textured black base. The stand provides tilt adjustability, but not height, swivel, or pivot adjustments. The screen has a glossy coating that helps give colors extra pop, but its reflective properties can be distracting, especially when the monitor is displaying a dark background.

On the back of the cabinet are HDMI, DVI, and VGA video ports, an audio port, and a headphone jack. You won't find any USB ports, a DisplayPort input, or a webcam, but the HDMI port doubles as a Mobile High-definition Link (MHL) port and will display content from a compatible smartphone or tablet while charging it (though an HDMI-to-MHL cable is not included). The H276HL also has a pair of 1.5-watt speakers that aren't very strong and lack bass; you'd be better off with a decent set of desktop speakers for watching movies or playing games.

There are five function buttons and a power switch mounted below the lower bezel. Pressing any function button brings up an on-screen menu with labels for each button. From this menu you can select one of five picture presets (Standard, Eco, User, Graphics, and Movie), adjust speaker volume, select an input source, or enter the Main Menu. From there, you can adjust Brightness, Contrast, and Color Temperature settings, as well as Focus, Clock, and Screen Position settings for when you're using an analog signal.

The H276HL comes with a three-year warranty on parts, labor, and backlight. It also comes with HDMI, DVI, VGA, and audio cables, a resource CD, and a printed user guide.

Acer H276HL

PROS Affordable. Solid performance. Sleek design.

CONS Limited feature set. Reflective screen.



THE THIN MONITOR
The Acer H276HL's cabinet measures just 1.3 inches thick; the display also weighs only 11 pounds.



PERFORMANCE

The H276HL showed surprisingly accurate colors for a low-cost monitor. Reds and blues were on target, but greens were just a bit off, which is not uncommon in low-end and midrange monitors. The fine shadow detail is a result of the panel's ability to display all shades of gray, which was apparent on the DisplayMate 64-Step Gray-Scale test. Granted, the H276HL's gray-scale performance can't compare with that of a high-end IPS monitor like the NEC MultiSync PA242W-BK, but it's very good for a low-cost display. IPS monitors are known for their wide viewing angles and the H276HL is no different. Colors remained true, and the panel remained bright when viewed from every angle.

The H276HL's 5ms (gray-to-gray) pixel response did an adequate job of handling fast-action video while playing Aliens vs. Predator, but blurring artifacts did pop up from time to time. (Only hard-core gamers are likely to notice this.) The H276HL used a respectable 24 watts of power during testing while set to the Standard picture preset and 22 watts while set to the Eco preset.

CONCLUSION

What the Acer H276HL lacks in features, it more than makes up for in bang for the buck. Its 27-inch IPS panel offers rich, accurate colors and better-than-average gray-scale performance for a monitor in the $250 price range. Moreover, its bezel-free design and slim cabinet make it look more expensive than it is. It can't match the performance or pixel count of its high-resolution sibling, the Acer K272HUL, but it is $200 cheaper and is an outstanding value. All that is why it earns our Editors' Choice for affordable big-screen monitors.

JOHN R. DELANEY

Create Objects Anywhere With This 3D-Printing Pen

WobbleWorks 3Doodler

$99

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The 3Doodler is an unusual device that its creators at WobbleWorks bill as the world's first 3D-printing pen. That's as apt a description as any, as the 3Doodler lets you create rigid three-dimensional art from strands of quickly hardening liquid plastic. It isn't easy to master, but it is fun, and it's capable of making credible art.

ANATOMY OF A 3D PEN

At 7.4 inches long and 1.5 inches at its widest point, the 3Doodler resembles a fat soldering iron, with a metal tip that heats up when you plug in the power cord. At 4.1 ounces, the device is a comfortable weight for its size; the included wall-wart-style power supply adds another 5 ounces. It also comes with 50 sticks of either PLA or ABS plastic, as well as a brief user guide that explains the basics of the pen's operation (though not how to doodle with it).

The hollow tip serves the same function as a 3D printer's extruder. When you insert a plastic stick into the back of the 3Doodler, it's drawn



into a chamber and heated to the melting point. On top of the pen are Fast and Slow buttons; when you press one of them, the molten—and rapidly solidifying—plastic comes out of the tip of the device. A cooling fan, located beneath a small grille near the top of the pen, keeps the 3Doodler from overheating.

Using the 3Doodler is a bit like 3D printing without the printer, but instead of extruding plastic, layer by layer, to create an object based on instructions in a 3D file, the 3Doodler leaves the creating to your brain and hand. The fact that the plastic cools and rigidifies almost immediately after extrusion lets you, in effect, draw vertically in plastic. The objects you create won't be as solid as those from a 3D printer, but—with a bit of practice—they'll hold together, and they can be intricately structured.

USING THE 3DOODLER

Getting the 3Doodler up and running is simple enough. Once you plug it in, a red light on the side of the device goes on. A slide switch on the pen's side lets you select the type of plastic you're using (PLA and ABS melt at different temperatures). When the tip is hot, you can then load plastic into the back of the 3Doodler, inserting a stick far enough so that it's gripped by the pen and is slowly pulled into it when you press the Fast button. You press it until the tip starts to extrude plastic, and you're ready to doodle.

You need a surface for the plastic to adhere to. Paper works well, and you can pull the object off cleanly when the plastic is cool. The first step in building an object is putting down a two-dimensional base. For instance, to build a cube, you would first draw a square. To do this, you gently press the 3Doodler's tip to the paper and press the Fast button as you trace out a square. The 3Doodler may stop in mid-print when the extruder's temperature drops below a certain point; when it

WobbleWorks 3Doodler

PROS Fun to use. Good help resources, videos, stencils available online.

CONS Awkward to grip. Plastic may feed unevenly. Hot ABS plastic emitted a burnt-plastic odor in our tests. No stand for the device when not in use.



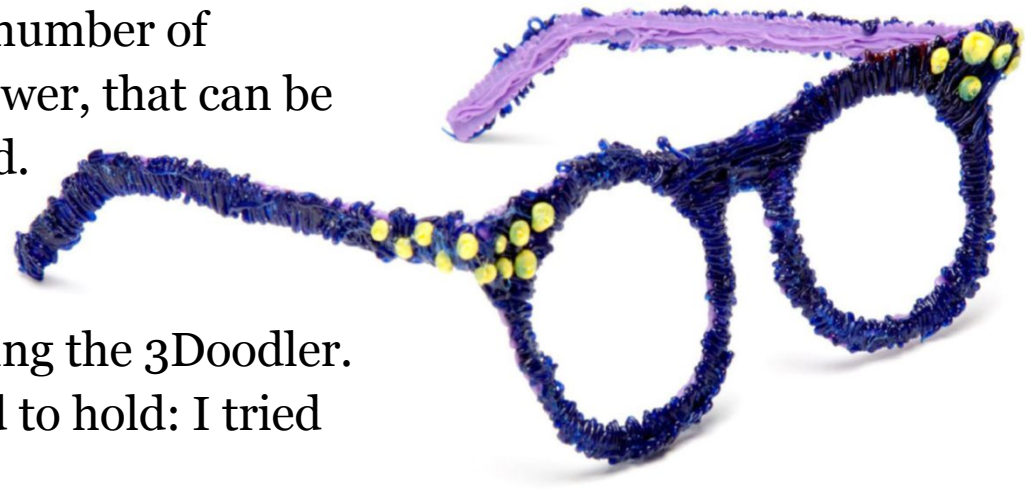


heats up again, you can resume drawing.

To draw vertically—say, the edges of the cube—you switch to the Slow setting, touch the tip to one of the corners of the square you've made, and slowly draw the pen upward, being sure to keep the emerging plastic strand taut as you do so. The bottom of the strand will dry and quickly harden. When you've reached the desired height, release the Slow button and pull the pen free. The strand should stand as a column. When you've added columns, you can then bridge them with additional plastic strands, and you can add more plastic for sides and the top.

Another approach is to draw all six faces of the cube in two dimensions on a piece of paper with the 3Doodler, peel the sides off the paper, and then assemble them, "gluing" them together with seams of hot plastic. On the 3Doodler site are a number of stencils of objects, such as the Eiffel Tower, that can be printed out, traced over, and assembled.





TESTING THE 3DOODLER

I encountered several issues when testing the 3Doodler. First off, the pen is somewhat awkward to hold: I tried

several grips before I found one that was reasonably comfortable. Also, the tip frequently cooled down enough so that printing would briefly stop while I was in the middle of drawing a line, so I had to hold the pen still until it heated up again. The plastic sticks didn't always feed smoothly into the heating chamber; occasionally they required several nudges before they would take. Dried plastic tended to form globs at the pen's tip, which could interfere with drawing. One handy tool to have on hand is a pair of tweezers, to remove any hardened plastic from the tip.

Even without these issues, there is a learning curve with the 3Doodler. I've dabbled in visual art, and 3Doodling was initially frustrating: Just drawing a line in the air was a challenge. But after a couple of hours, I noticed definite progress. My not-so-great pyramids had become half-decent pyramids. I tried building both freehand objects and working from the site's stencils. Above all, 3Doodling is fun, and I look forward to trying to master this device.

Which type of plastic should you use? We did all our testing with ABS, the same kind of plastic that Legos are made from. It has a higher melting point than PLA and is more flexible, whereas PLA can be brittle when bent and can snap. But ABS can exude a burnt-plastic smell when it's hot, and you have to work with the 3Doodler right under your nose. If ABS fumes bother you, you should use the pen in a well-ventilated area, or stick with PLA.

One thing this product could use is a stand to keep the tip elevated and the device in place when you're not doodling. Once, the 3Doodler rolled off the bench and into my lap; fortunately the tip was not hot at the time. A good safety feature is that it will power (and cool) down after five minutes of idleness.

MIGHTIER THAN THE SWORD
The bulky 3Doodler can be a little tricky to use, but it can create fun objects once you've gotten the hang of it.





READY, SET, DRAW
The 3Doodler comes with 50 sticks of PLA or ABS plastic, in a number of vibrant colors that can give your doodles some extra flair.

CONCLUSION

Lest you think the 3Doodler is a mere toy, in skilled hands it is capable of making impressive works of art. A number of creations made with the 3Doodler recently graced the window display of the New York Museum of Modern Art's design store. That said, I'm not likely to ever produce gallery-worthy art with the 3Doodler, nor are most people who take it up. I can attest to two things, however. Practice makes better, and it won't be long until doodling gets easier. And using the 3Doodler is fun. WobbleWorks still has a few kinks to work out for smoother operation, but this is a good first product from the company. Whether you get the 3Doodler to doodle or to try to create some serious art in an unusual medium, it's bound to be an enjoyable (if at times frustrating) experience.

Overall, is the 3Doodler worth the $99? If you're artistically inclined and enjoy experimenting with different media, it is. Just don't expect to create objects with the ease you see in 3Doodler's videos right off the bat. You also can't create objects with high-resolution detail like you can with a 3D printer. Early adopters are going to want to give this serious consideration; otherwise, you might be better off waiting for a new iteration.

TONY HOFFMAN



Password Management For All Your Devices

If you're looking for a password manager that will work with all your devices and sync data among them automatically, Sticky Password 7 could be what you want. Supporting Windows, Android, iOS, BlackBerry, Kindle Fire, and Nokia X, it's incredibly thorough, and it lets you store 15 passwords for free (though a $29 desktop edition, with no device syncing, is also available). Sticky Password is not without its limitations, but it's a powerful way to improve security on your computer, phone, and tablet—all at the same time, and for one price.

Sticky Password 7

Free to $12 per year (cloud)

$29 (desktop)

●●●●○

GETTING STARTED

Installing Sticky Password 7 on your PC starts with creating a StickyAccount and a strong StickyPass password, which you'll need each time you install the software on a new device, and a master password you use to log in. During installation, Sticky Password offers to import any bookmarks and passwords you may have stored in a supported browser (see the list on the next page)—it also suppresses the browser's password-capture feature. (Our Editors' Choice products, LastPass and Dashlane, actively remove the passwords stored insecurely in the browser.)

If you're switching to Sticky Password from LastPass, RoboForm Everywhere 7, or KeePass, you can import your existing passwords. You can also import passwords exported by another instance of Sticky Password, which is useful if you've chosen the no-sync desktop edition.

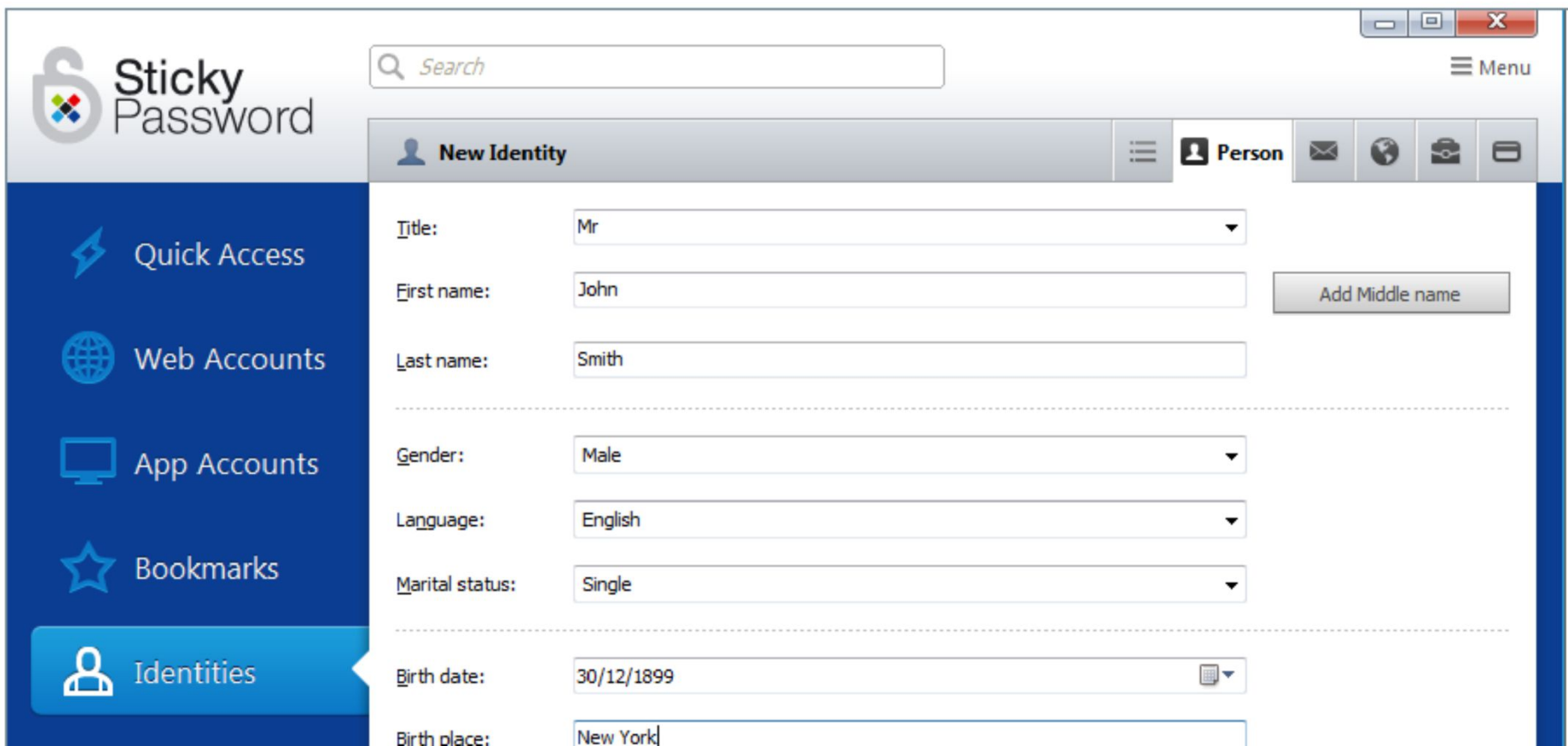
USING STICKY PASSWORD

As you surf the Web and connect with secure sites, the browser plug-in captures and offers to save your credentials. You can edit the entry's name and assign it to a group, though you can't create a new group at this stage the way you can with LastPass. When you revisit the site, Sticky Password automatically fills in the stored

Sticky Password 7

PROS Syncs passwords, bookmarks across multiple devices. Unusually effective at capturing login credentials. Reports weakest passwords. Online console manages trusted devices. Can authenticate via USB, Bluetooth. Fills in Web forms. Portable edition.

CONS Only reports weakest passwords. Password generator's default settings create weak passwords. No online access to passwords. USB/Bluetooth authentication not two-factor.

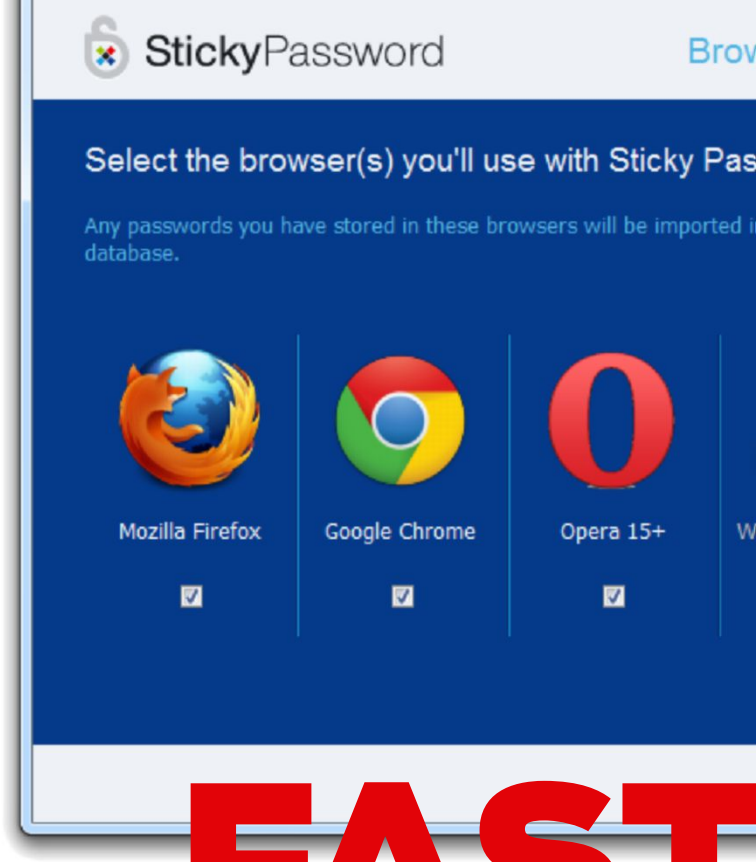


credentials. If you've saved more than one account for the site, a pop-up window lets you choose. You can also click the product's browser button and select from a menu of all your saved logins. In testing, I found that Sticky Password did an unusually good job of capturing login credentials, easily handling the bankofamerica.com two-page SiteKey login that baffles LastPass and Intuitive Password, or even pages with two password fields rather than a username and password.

You can also use Sticky Password to enter credentials from applications that require a password. When you click the button to add a new secure application, Sticky Password lists the applications it can handle for sure. On my test system, that list included only Outlook and Yahoo Messenger. Once you've entered your username and password, you can launch these apps from Sticky Password.

When you click in the password field while setting up a new account, Sticky Password pops up an offer to generate a strong password. You can also launch the password generator from the browser button's menu. Choose a length from 4 to 99 characters, select the character sets you want (uppercase letters, lowercase letters, digits, and punctuation), and click Generate.

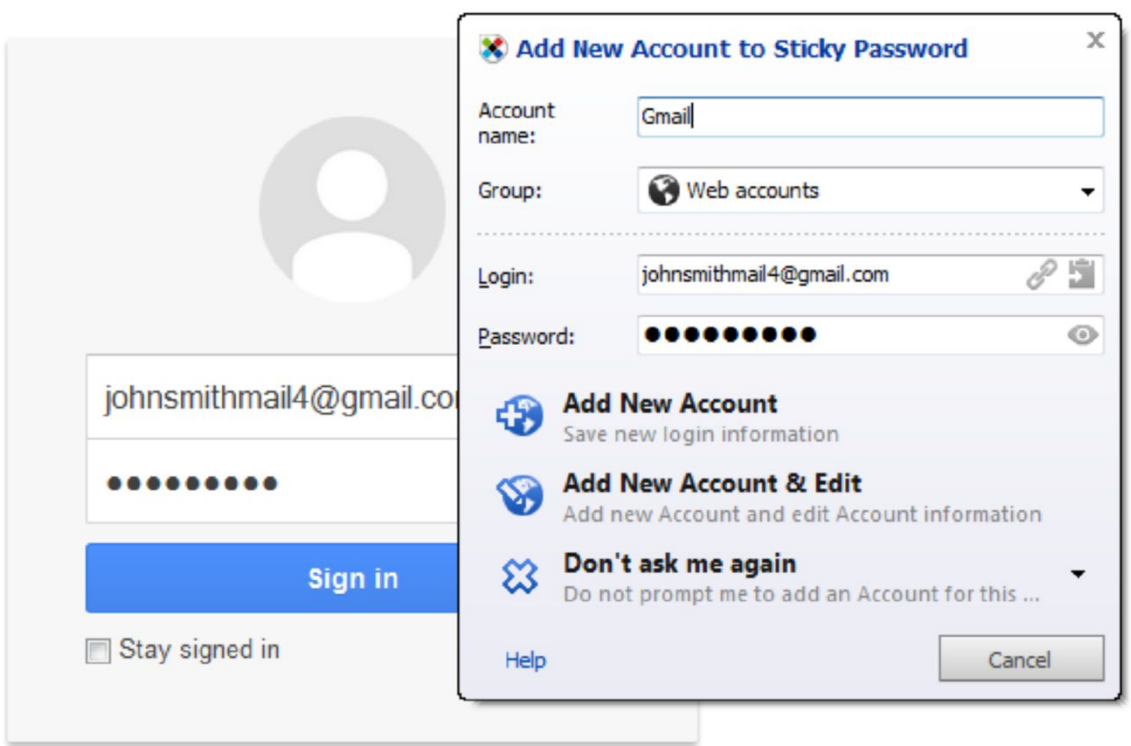
The password generator rates each generated password's strength, and flags it as Low, Normal, Enhanced, or High. Using the default settings, you get



FAST FACT

BROWSERS SUPPORTED BY STICKY PASSWORD 7 INCLUDE:

Internet Explorer
Firefox
Chrome
Opera
SeaMonkey
Pale Moon
Comodo Dragon



eight-character passwords with no punctuation. I strongly advise you to enable use of punctuation and set the length to at least 12 characters. After all, you don't have to remember the generated passwords.

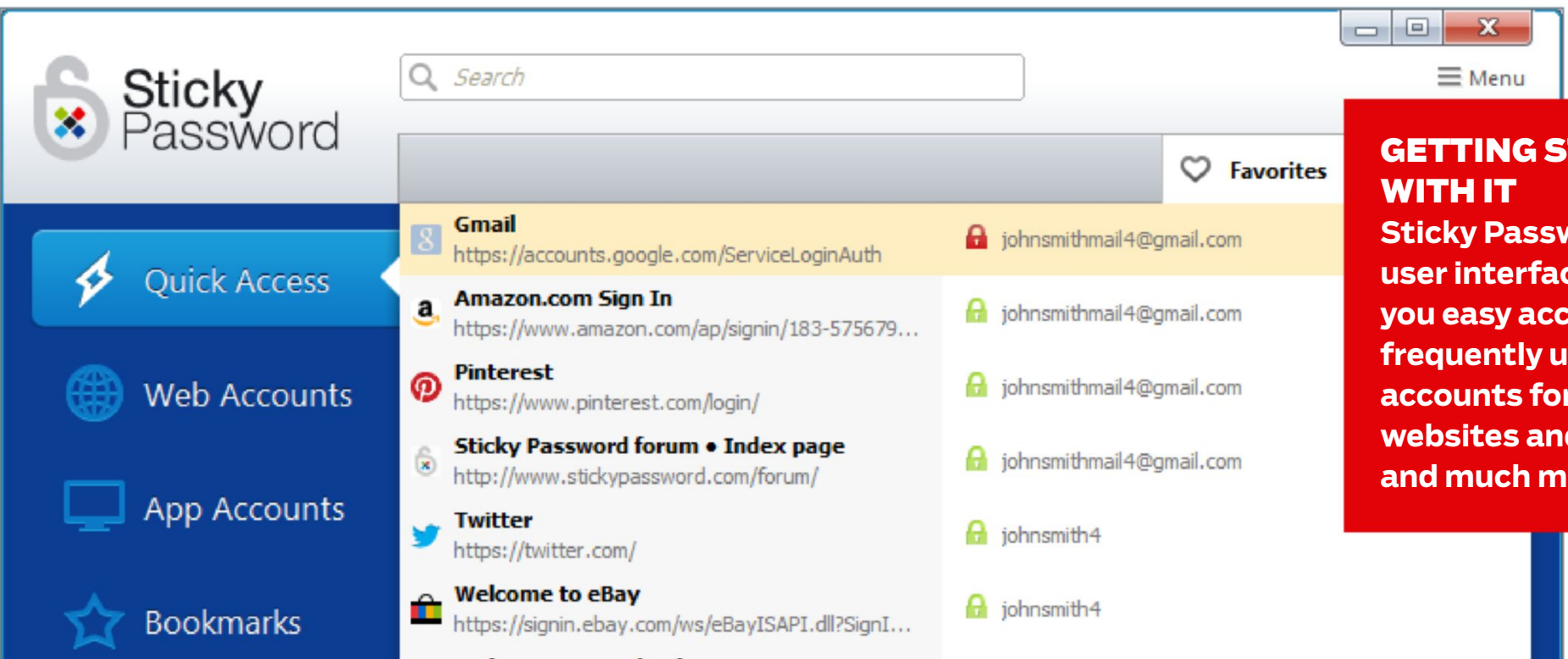
To check the strength of your existing passwords, click the Quick Access tab and click the button labeled "Turn warnings on." You'll see a list of all saved sites with a password strength rated "Low." I'd prefer a full report on the strength of all passwords, like you get with LastPass and Dashlane. As it is, a six-character all-alphabetic password like "bnXSpe" can receive a Normal rating, meaning it won't show up in the warning list.

CONFIGURATION OPTIONS

From your StickyAccount online console, you can manage your license keys and trusted devices, set up a form of two-factor authorization (requiring a one-time PIN sent to your registered email address), configure Sticky Password to stop accepting any new devices, wipe out all of your personal data, or delete your account entirely.

By default, your master password is required every time you log in to Sticky Password. You can configure the product so that, instead, the presence of a particular USB drive or Bluetooth device authorizes your access. Note that this isn't two-factor authentication, as the USB or Bluetooth authentication replaces the master password.

Although you can't access your passwords online by logging into your StickyAccount, you can create a portable USB-based edition of the program, with all of your current passwords included. The portable edition looks just like the normal Sticky Password, except that in place of the "Connected" notice it reads "Portable Edition." You can use the USB-based tool to log in to your saved sites, though any new logins will be stored only on the USB drive, not synced with other installations.



GETTING STICKY WITH IT
Sticky Password 7's user interface gives you easy access to frequently used accounts for websites and apps, and much more.

You can define any number of identities in Sticky Password. These are collections of personal information for filling in Web forms. Elements include personal details, snail-mail address, online contact information, and business details, as well as a finance page that can store credit cards and bank accounts. Sticky Password allows multiple credit cards and bank accounts.

SPECIAL FEATURES

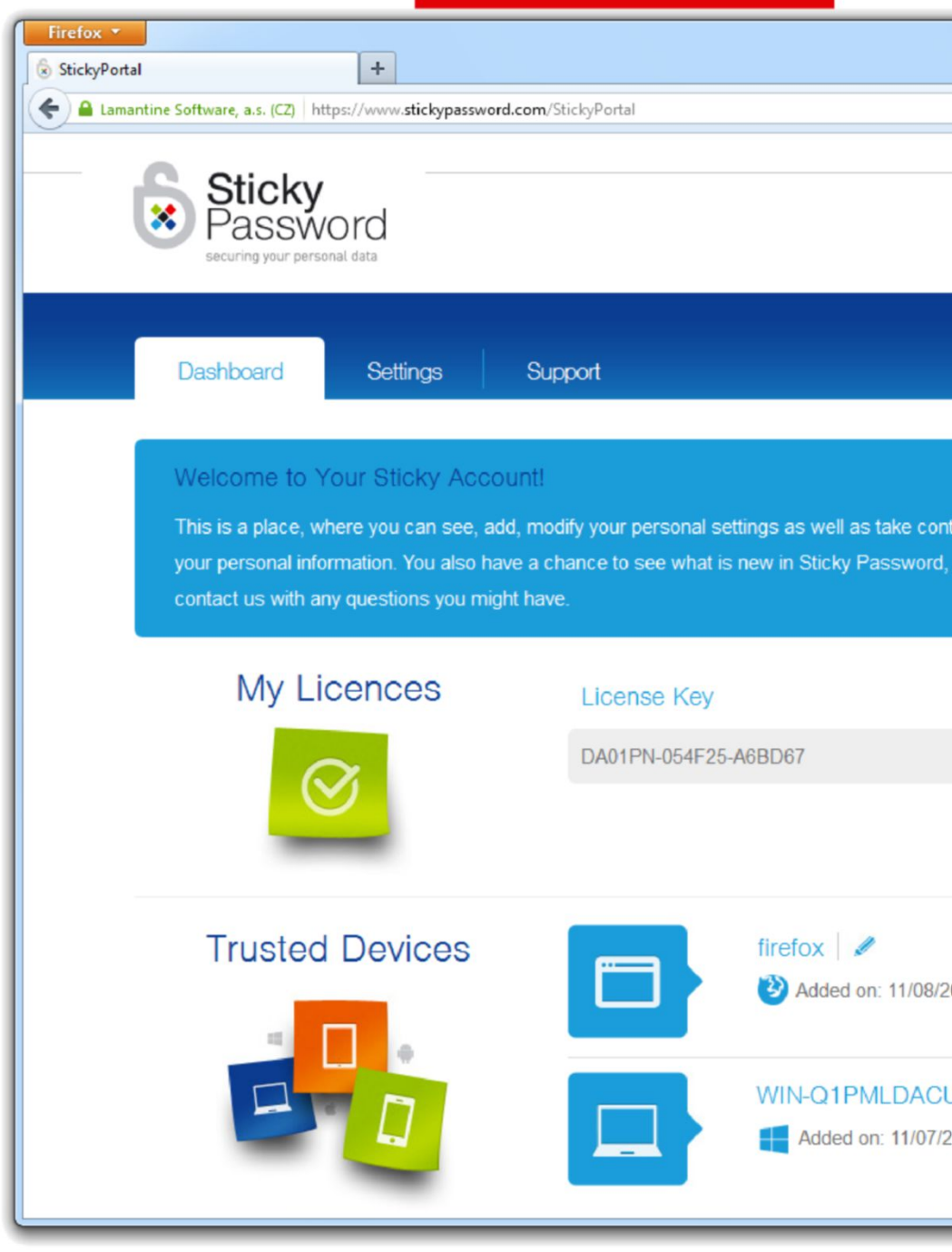
Like LastPass and Dashlane, Sticky Password can also capture data that you've already entered in a Web form. When it detects that you're submitting a form, it offers to add the fields it recognizes to an identity entry.

When Sticky Password recognizes that you've navigated to a Web form, it puts a red border around the fields that it can fill. Just click the browser button and choose the desired identity. It won't necessarily fill in all the fields, so be sure to double-check any that don't have a red border.

Bookmarks that Sticky Password imports during installation become available on all of your devices, which is certainly handy; and I recommend using Sticky Password for managing all of your bookmarks.

A secure memo is a formatted text document that Sticky Password stores and syncs, along with your passwords and identity data. Ten predefined templates list the likely fields you'd want to save for data types including driver's licenses, passports, and credit cards. (These memos aren't used for filling in forms, however.) You can edit the memo any way you like, or you can create a new one from scratch.

TAKE IT ALL INTO ACCOUNT
You can manage all your license keys, trusted devices, and do a lot more from the StickyAccount online console.



MOBILE EDITIONS

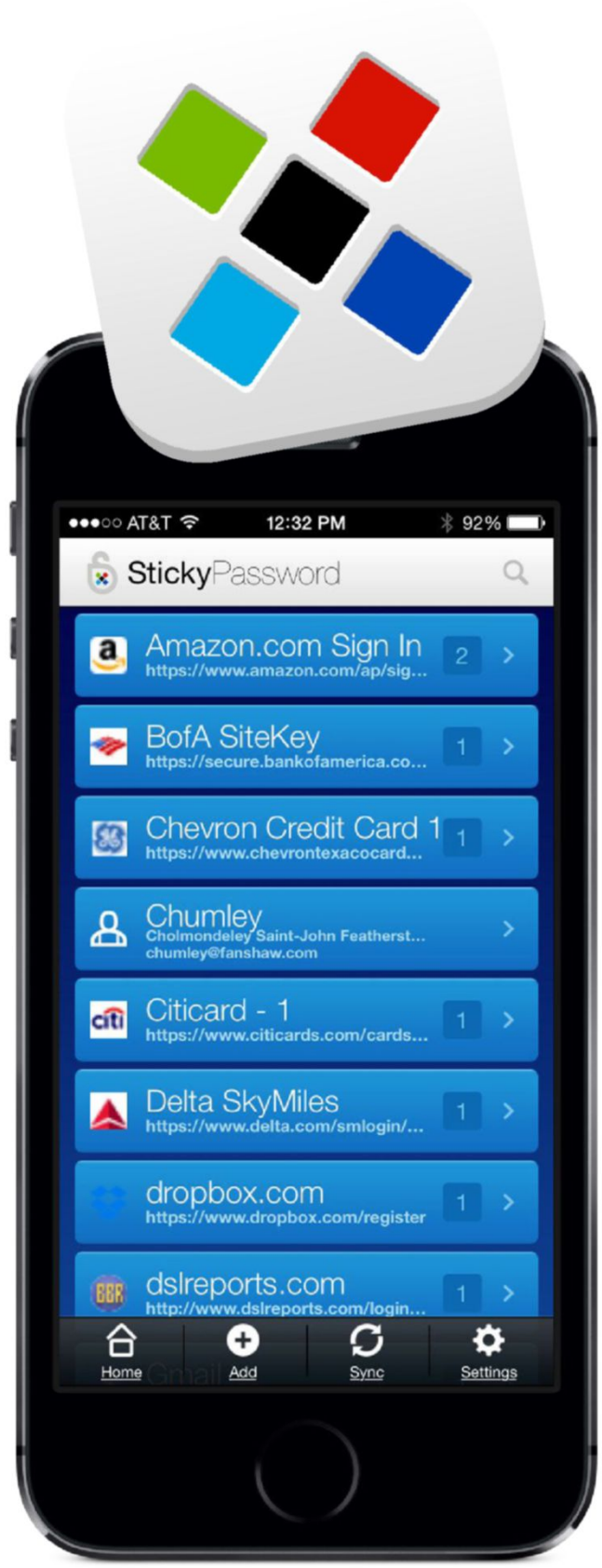
Sticky Password cleverly folds together portions of its user interface to fit the tablet or smartphone form factor. After authorizing the mobile version with your StickyPass and logging in with your master password, you have full access to all of the same data as in the desktop edition. But there are some new options, such as the ability to hide groups so you see all your accounts in a simple alphabetical list.

When you go to launch one of your saved logins, you get a choice. You can use the Sticky Password browser with AutoFill, or you can use another Web browser and copy and paste the credentials. If you browse to a site with saved credentials within this browser, you'll be able to AutoFill just as if you'd launched it directly from the program.

A VERY GOOD CHOICE

Sticky Password 7 is definitely an effective password manager, with just a few minor issues. The password generator's default settings create passwords that just aren't very secure. There's no reason to generate anything but seriously tough passwords, as the program will remember them for you. Along the same lines, Sticky Password checks your account passwords and reports on the weakest ones, but I'd like to see more thorough reporting. And requiring two-factor authentication to access the password manager would up the security even more. With a little tuning, Sticky Password could join LastPass 3.0 Premium and Dashlane 2.0 in the Editors' Choice winner's circle. But as it is, it's almost as good.

NEIL J. RUBENKING



STICKY ANYWHERE

Sticky Password works on all your mobile devices, too, so you always have access to your full collection of passwords.

Our Favorite Apps



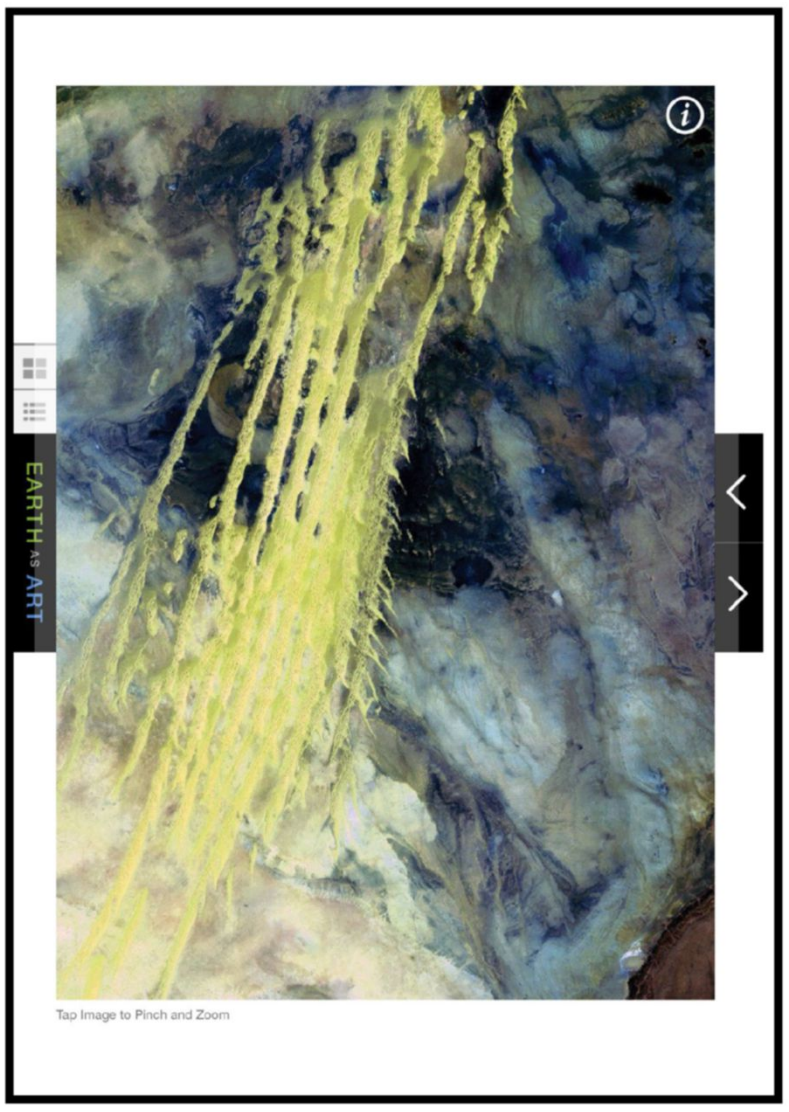
Hearthstone: Heroes of Warcraft iPad Free

EDITORS' CHOICE ●●●●◐

You don't need to be a fan of World of Warcraft or collectible card games to enjoy Hearthstone: Heroes of Warcraft. This fast-paced, lighthearted fantasy game set in the Warcraft universe sends you flipping cards depicting creatures and spells to deplete your opponent's supply of life points. Hearthstone has a gorgeous design, and is both strategically complex and simple enough for even casual players to enjoy. You can spend money on additional card packs if you want, but even if you stick with the free options Hearthstone is too much fun by half. Deal yourself in!

Our Favorite Apps



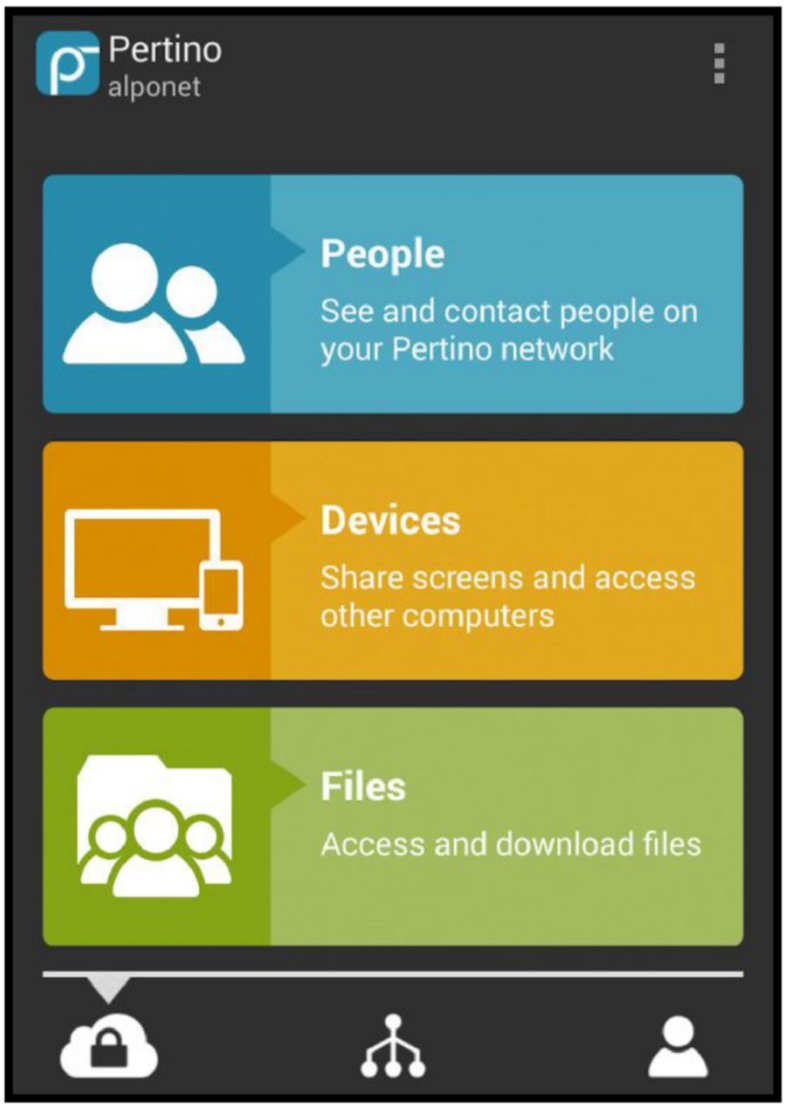


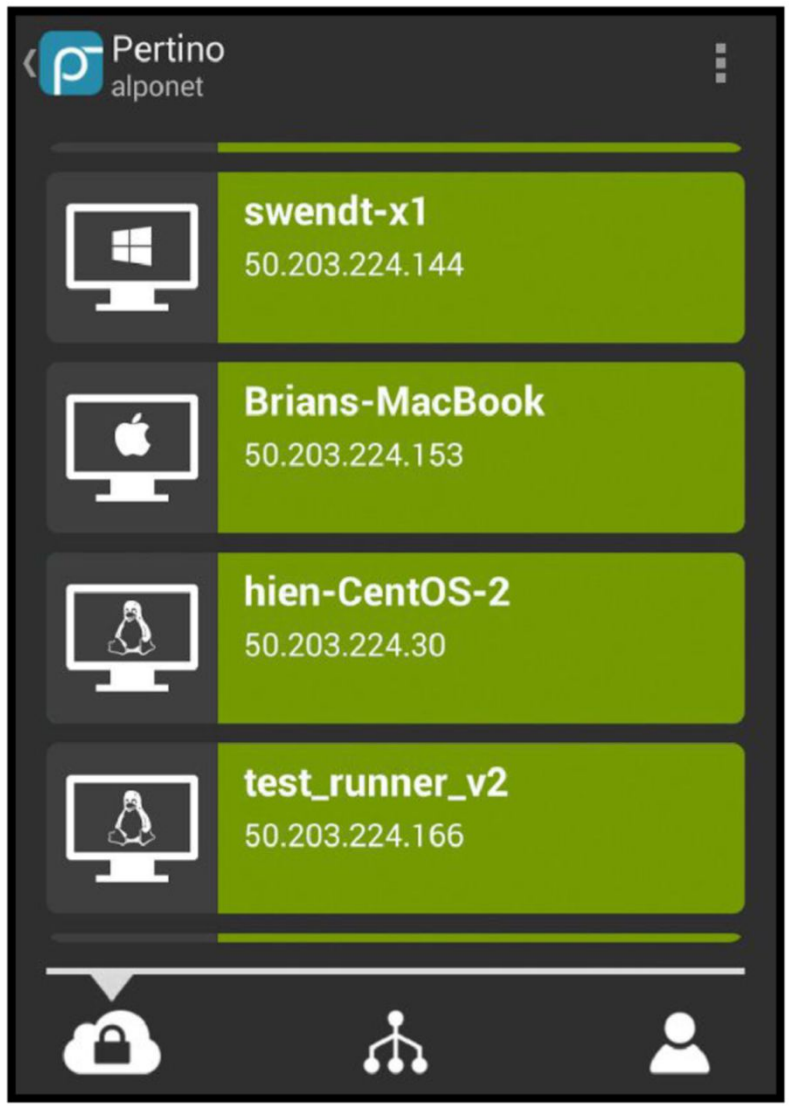
NASA Earth as Art iOS Free

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You've seen all manner of amazing space photos from NASA, but some of the space agency's most extraordinary images are actually of Earth itself. The free NASA Earth as Art app celebrates the variety and spectacle of our home world, as seen from the perspectives of five Earth-orbiting satellites. Although each image is captioned with detailed descriptive text, the real focus is the sheer beauty of the landscapes, many of which may look unearthly but are as terrestrial as they come.

Our Favorite Apps





Pertino Android, iOS Free

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This powerful networking-as-a-service solution lets you quickly configure a network in the cloud made up of physical computers, servers, virtual machines, and mobile devices. Anything that's connected to the Internet you can virtually network and share, no matter where you, the devices, or the people with whom you want to share them are located. Pertino requires a good working knowledge of network shares and permissions, but its vast range of support options means even novice users will be able to get the guidance they need.

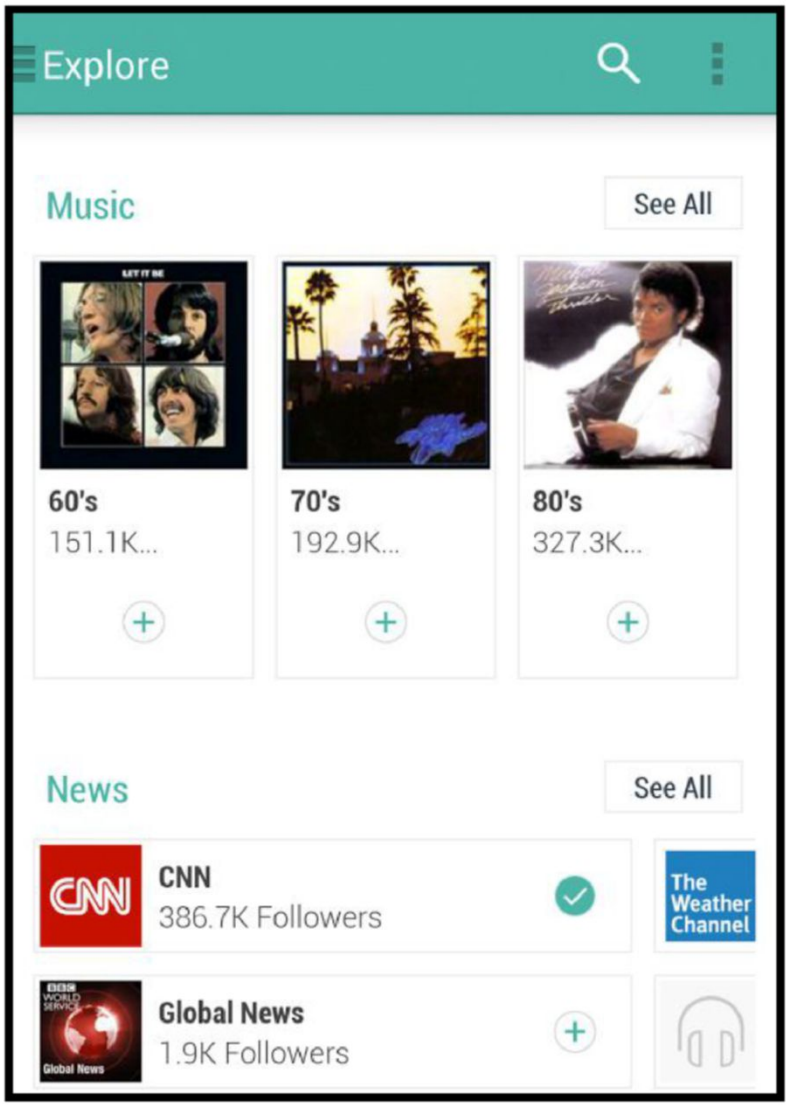


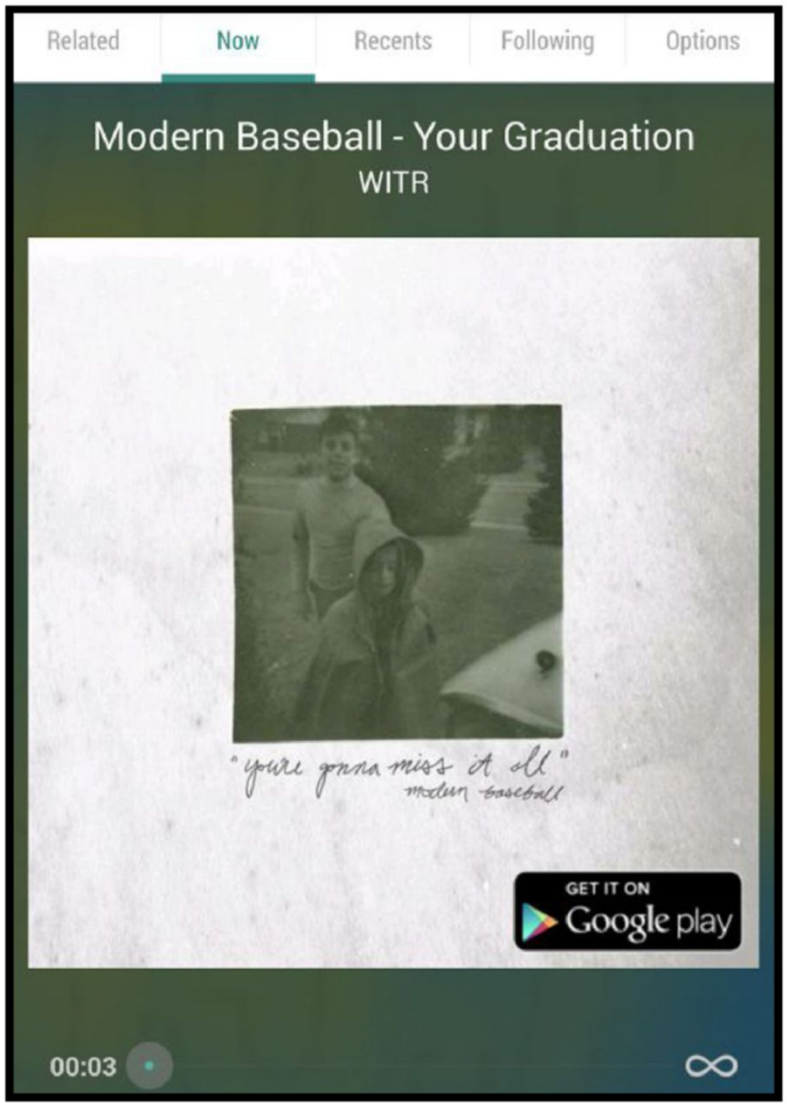






Our Favorite Apps





TuneIn Radio Pro

iPad, Android, Windows Phone

$3.99

EDITORS' CHOICE ●●●●○

The go-to app for many mobile radio fans has been revamped to add listener profiles, sharing features, personalized content, and a fresh design. Amid all the changes, however, TuneIn Radio Pro maintains much of its core functionality. You can still fire up more than 100,000 global AM and FM stations, rewind live radio, record programming, and more. The new social elements seem more forced than useful in an app that already excelled in radio discovery, but TuneIn Radio remains a terrific radio app.

Features

FASTEST MOBILE NETWORKS 2014



FASTEST MOBILE NETWORKS

Which carrier is the best for fast mobile data where you live? We hit 30 U.S. cities to test speeds on AT&T, Sprint, T-Mobile, and Verizon Wireless. Here's what we found.

BY SASCHA SEGAN AND
THE *PC MAGAZINE* STAFF

For our fifth year of Fastest Mobile Networks testing, we brought in a slew of new partners and asked our readers to run their own tests, supplementing our 80,000 cycles of drive testing over 30 cities and thousands of miles. We found that AT&T, T-Mobile, and Verizon, at least, are mostly over the LTE hump in major cities. Sprint still has a way to go before it delivers a truly competitive experience.

T-Mobile provided the year's big surprise, with a powerful showing where it won half of our cities outright. The carrier's performance in the nation's biggest cities was reliably great, although we saw it decline in Indiana, Ohio, and North Carolina, where the carrier is spectrum-constrained.

But when we left those major metros, often T-Mobile's LTE network would completely drop off the map. Our out-of-metro results, as we drove past cities like Kalamazoo, Macon, and Yuma, showed very little availability of either Sprint's or T-Mobile's LTE networks. Verizon's system, on the other hand, stayed admirably strong.

Although AT&T won last year's prize, this year Verizon really stepped things up with XLTE. That's the company's term for LTE running on AWS 1,700MHz spectrum as well as its previously used 700MHz spectrum. The 700MHz gives Verizon terrific rural coverage, and XLTE boosts speeds in major cities like New York and Boston in a huge way.

Why Drive Tests Matter

We put our cars on the road because drive testing is the only way to separate network performance from device performance. This year, we chose LG G2 phones to test LTE, because they're available on all the major carriers and support all of the fastest networks.

When we compared our drive testing with our crowdsourced results, we saw dramatic differences in

WHAT WE TESTED

This is *Fastest* Mobile Networks, so we're focusing on data speed and reliability. We didn't test call quality, dropped calls, or coverage. Mobile networks are constantly changing, and almost always for the better. And because speeds vary based on tower location, network load, the device used, and even the weather, we can't predict performance in a specific location; rather, we're giving a snapshot of a few days' worth of usage in several locations across a metro area.

performance between phones, especially between older and newer devices that support different strains of LTE.

Testing multiple networks in the same place at the same time also matters. Speed tests are generally slower indoors, so if you test one network inside and one outside, it may not be a fair fight. By driving around with multiple devices, you get the best comparison.

Where We Tested

For the first time, all four wireless carriers had LTE in almost all 30 of our test cities, the exception being Sprint in Denver. We drove to the same 30 major cities we traveled to in 2012 (and with only one change from 2013), evenly spread across six regions of the country.

Outside of our 30 cities, our drivers traveled on a mix of interstate and U.S. highways and stopped in smaller cities along the way. The data we collected contributed to a "suburban/rural" score for each of our six regions.

Sensorly provided us with more than 80,000 tests performed everywhere from Aberdeen, SD, to Zanesville, OH. Because seven-eighths of those tests were on Sprint and T-Mobile, we couldn't use those tests to compare carriers, though we pulled out some really interesting comparisons between the hundreds of devices Sensorly's users tested with. Most important, we discovered that if you're a Sprint or Verizon user, you probably need a new phone.



Northeast
Boston, MA
New York, NY
Philadelphia, PA
Baltimore, MD
Washington, D.C.

Southeast
Raleigh, NC
Charlotte, NC
Atlanta, GA
Miami, FL
Jacksonville, FL

North Central
Detroit, MI
Chicago, IL
Indianapolis, IN
St. Louis, MO
Kansas City, MO

South Central
Memphis, TN
New Orleans, LA
Dallas, TX
Houston, TX
Austin, TX

Northwest
Seattle, WA
Portland, OR
San Francisco, CA
Salt Lake City, UT
Denver, CO

Southwest
Las Vegas, NV
Los Angeles, CA
San Diego, CA
Phoenix, AZ
Tucson, AZ

How We Tested

To test America's mobile networks, we used field-test software from network testing firm Sensorly, loaded onto Android-powered smartphones.

This year, we used LG G2 phones for seven of the networks we tested—all but the old Verizon CDMA network. Because the Verizon LG G2 cannot be set to CDMA-only mode, we had to use LG Vortex phones for that network.

We loaded the phones into three 2014 Ford C-Max Hybrid cars, equipped with power inverters so the phones could run all day long.

Sensorly's software ran several tests every three minutes: a ping to test network latency, multithreaded HTTP upload and download tests including separate "time-to-first-byte" measures, and the download of a 1MB webpage containing 70 elements.

We tested mostly during business hours, during a period from May 1 to May 23, 2014; we visited different cities on different days. In each city, our drivers stopped in ten to 12 locations for at least 15 minutes (five test cycles) each. We also collected data while moving, both within and between cities. We ended up with about 90,000 test cycles across our 30 cities, which ultimately amounted to a 70MB Excel 2010 spreadsheet.

This year, we also asked our readers and Sensorly's users to contribute crowdsourced results based on Sensorly's consumer app for Android and iOS devices. Because we got too few AT&T and Verizon results from the crowd, we couldn't fold crowdsourced results into our final numbers, but we offered them to our partners and used them to discover some interesting differences between the top mobile phone models.



2014 FORD C-MAX HYBRID

PC Magazine **used three 2014 Ford C-Max Hybrid cars to drive around the country and test mobile Internet speeds. The C-Max pairs a gasoline engine with an electronically controlled continuously variable transmission, and includes a regenerative braking system. It also sports a full dashboard of connected features, from GPS to hands-free calling and more.**

The *PC Magazine* Speed Score

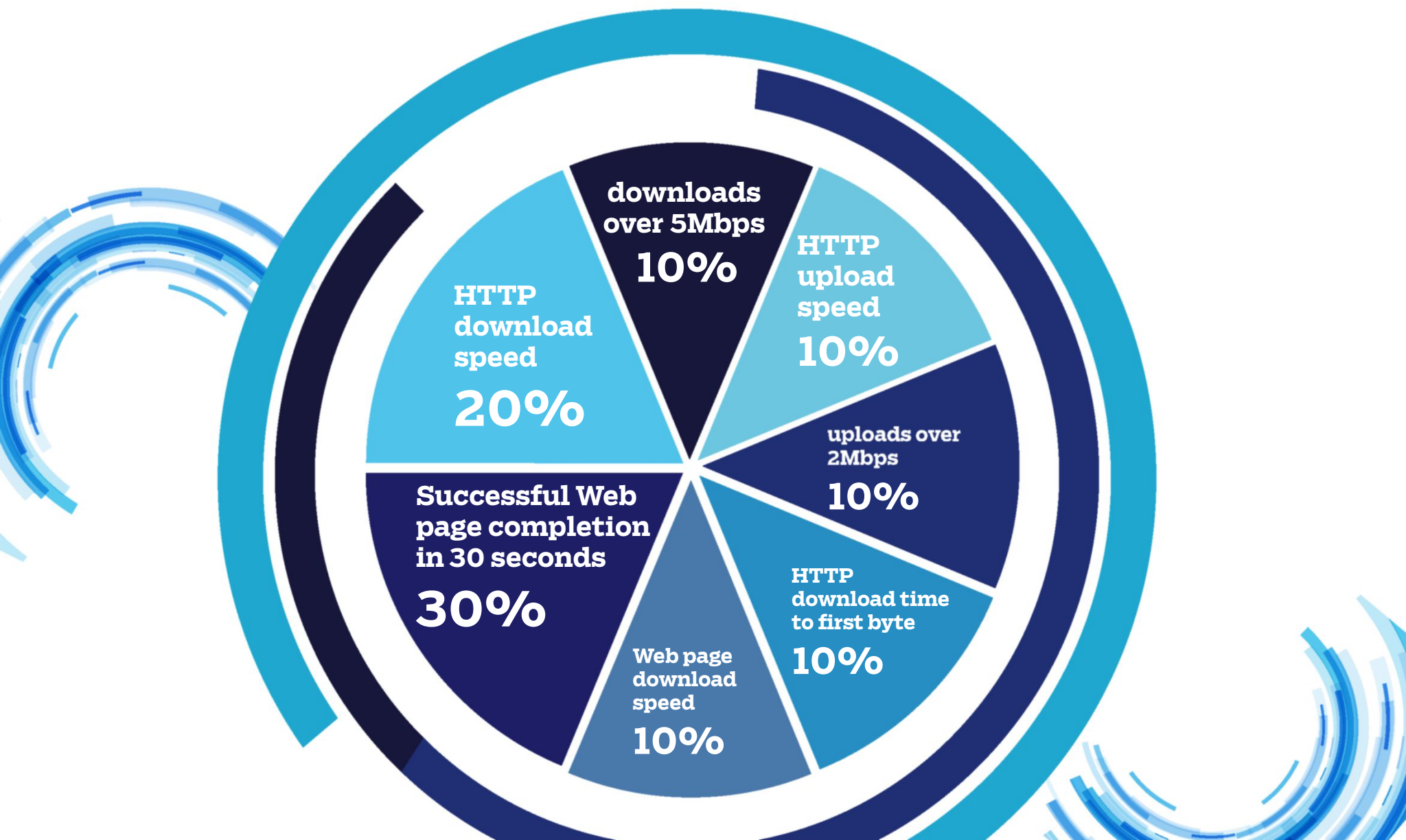
Our speed score this year, as in previous years, is a weighted average balancing 70 percent speed and 30 percent network reliability.

This year, we added a new speed measurement. Verizon and AT&T have both said that LTE networks should deliver 5 to 12Mbps down and 2 to 5Mbps up, so we're holding them to it. In consultation with Sensorly, we've decided that 3G networks should offer 1.5-5Mbps down and 0.5-2Mbps up. So we've established minimum download and upload thresholds: the percentage of tests exceeding 5Mbps/1.5Mbps down on LTE/3G and 2Mbps/0.5Mbps up on LTE/3G.

The "webpage completion" metric needs some explanation. A Web test is counted as unsuccessful if the 1MB page doesn't download in 30 seconds or if an LTE device drops to 3G. So that number wraps together both network drops and stalled downloads for an overall picture of network reliability.

The regional and national scores are the averages of the cities and suburban/rural areas in each region, with a 16.6 percent (one-sixth of the total score) penalty for each city a carrier has no coverage in.

Average speeds are calculated by each of the ten stationary tests making up one-twelfth of the average, and the total of all mobile tests in a city making up one-sixth of the average. For suburban/rural areas, we just took an average of all tests.



Why You Need a New Phone

For Fastest Mobile Networks this year, we asked Sensorly's crowd and our readers to contribute their own test results. And they did: We received results from 822 metro areas and 323 different devices.

We couldn't include the crowdsourced results in our main data because of a funny disparity: Sprint and T-Mobile users were far more likely to help out than AT&T and Verizon subscribers. More than 70,000 tests came from Sprint and T-Mobile, but only 11,000 tests came from the two larger carriers.

But we pulled out some fascinating differences between individual phones, measured on the same carrier in the same metro area. Here are the top four things you need to know. Most notably, if you're on Sprint or Verizon, you probably want a new phone.

Spark Makes a Huge Difference for Sprint

If you have a Sprint phone and you want decent network performance, you need access to Spark, Sprint's enhanced LTE network. We compared the Spark-powered LG G2 phone in two Spark cities with the non-Spark iPhone 5 and Samsung Galaxy S3, and Spark connectivity doubles the speeds. That iPhone 5 in Fort Lauderdale, in fact, delivered slower speeds than AT&T's or T-Mobile's 3G networks. Sprint customers, go get a Spark phone right now.

XLTE Really Helps Verizon

If you're a Verizon subscriber, you don't need an XLTE phone, but you want one. We compared the XLTE-powered Samsung Galaxy S4 and S5 with the non-XLTE S3. Although all three delivered decent LTE speeds averaging over 10Mbps down, we saw a 50 percent speed bump on the XLTE devices across all the Verizon cities we tested. If you're online enough, that's worth going out to get a new phone.



HOLD THE PHONES
PC Magazine **used two phones from LG for Fastest Mobile Network testing this year: the Vortex (top) and the G2.**



iPhones and Android Match Speeds

Apple and Google may sling around competing speed claims, but we didn't see a noticeable difference in network speeds between the latest iPhones and Android devices. Comparing the two platforms on T-Mobile in New York and Los Angeles, we found that the iPhone 5c and 5s performed just about as well as the Samsung Galaxy S4 and S5, and the HTC One (M8). Pick your operating system based on comfort, security, customizability, and apps, but don't worry too much about modem performance.

T-Mo Says "Oh, No" In Ohio

We were very impressed with T-Mobile's LTE speeds in most of the country's largest cities, but the carrier still has some pinches and gaps. When you drive outside major metro areas, for instance, T-Mobile's LTE network falls away more often than we'd like. The carrier also appears to be pinched in Ohio and Indiana. When we compared our crowdsourced tests in Cincinnati and Dayton with those in the nation's three largest cities, we saw the difference. The people at T-Mobile say they're working on it.



FASTEST MOBILE NETWORKS

AND THE WINNERS ARE...

National Overall Winner
VERIZON WIRELESS LTE

Verizon Wireless has the fastest nationwide LTE network. The key there is the word "nationwide." T-Mobile's LTE network also performed very well in many cities, but Verizon's broad national coverage outside our 30 major cities ended up making the difference and granting the nation's largest carrier the crown.

	AT&T	Sprint	T-Mobile	★ Verizon
PCMag.com Mobile Speed Index				
Good / Average / Slow	73 /100	49 /100	85 /100	90 /100
Download & Upload Performance				
Average Download Speed	11.9 Mbps	6.8 Mbps	16.8 Mbps	19.6 Mbps
Maximum Download Speed	62.9 Mbps	54 Mbps	63.5 Mbps	84.3 Mbps
Average Upload Speed	6.3 Mbps	3.3 Mbps	9.7 Mbps	9.3 Mbps
Maximum Upload Speed	21.6 Mbps	14 Mbps	30.2 Mbps	44.3 Mbps
Time to First Byte (In Milliseconds)	234 ms	233 ms	209 ms	215 ms
Webpage Download				
Average Web Download Speed	3.3 Mbps	1.6 Mbps	4.7 Mbps	3.9 Mbps
Webpage Completion	90%	64%	90%	97%

Northeast Region Winner
VERIZON WIRELESS LTE

Verizon dramatically boosted speeds in the Northeast this year with the addition of its new XLTE spectrum, making it the outright winner in four of our five cities in the region, and a close second in the fifth. From Boston to Washington D.C., Verizon is back to ruling the roost.

	AT&T	Sprint	T-Mobile	★ Verizon
PCMag.com Mobile Speed Index				
Good / Average / Slow	68 /100	49 /100	91 /100	94 /100
Download & Upload Performance				
Average Download Speed	10.2 Mbps	5.8 Mbps	16.6 Mbps	24 Mbps
Maximum Download Speed	56.3 Mbps	24.6 Mbps	58.6 Mbps	79.9 Mbps
Average Upload Speed	4.6 Mbps	2.8 Mbps	13.8 Mbps	11.9 Mbps
Maximum Upload Speed	19.1 Mbps	6.8 Mbps	21.5 Mbps	37.5 Mbps
Time to First Byte (In Milliseconds)	245 ms	205 ms	215 ms	218 ms
Webpage Download				
Average Web Download Speed	3.6 Mbps	2.3 Mbps	5.5 Mbps	4.7 Mbps
Webpage Completion	86%	58%	92%	98%

Southeast Region Winner
VERIZON WIRELESS LTE

The Southeast was a competitive region this year: Verizon won three awards, and AT&T and T-Mobile each won two. Verizon's most impressive performance was in reliability, with our Verizon LTE phone consistently and quickly completing webpage downloads on the LTE network from the Carolinas all the way down to Florida.

	AT&T	Sprint	T-Mobile	★ Verizon
PCMag.com Mobile Speed Index				
Good / Average / Slow	85 /100	56 /100	85 /100	97 /100
Download & Upload Performance				
Average Download Speed	14.6 Mbps	8.8 Mbps	15.6 Mbps	20.4 Mbps
Maximum Download Speed	59.9 Mbps	54 Mbps	63.5 Mbps	77.6 Mbps
Average Upload Speed	9.5 Mbps	2.9 Mbps	8.1 Mbps	11.8 Mbps
Maximum Upload Speed	21.4 Mbps	14 Mbps	27 Mbps	43.8 Mbps
Time to First Byte (In Milliseconds)	231 ms	216 ms	190 ms	219 ms
Webpage Download				
Average Web Download Speed	3.7 Mbps	2.1 Mbps	4.6 Mbps	4.1 Mbps
Webpage Completion	96%	72%	90%	99%

North Central Region Winner
VERIZON WIRELESS LTE

Verizon's consistent LTE coverage through rural Michigan, Illinois, and Missouri made the difference in this competitive region. The carrier's fast new XLTE spectrum also made a big difference in Chicago, the region's largest city, boosting download speeds as high as 80Mbps.

	AT&T	Sprint	T-Mobile	★ Verizon
PCMag.com Mobile Speed Index				
Good / Average / Slow	80 /100	50 /100	86 /100	96 /100
Download & Upload Performance				
Average Download Speed	12.9 Mbps	5.6 Mbps	17.1 Mbps	21.7 Mbps
Maximum Download Speed	51.5 Mbps	26.2 Mbps	54.2 Mbps	80.4 Mbps
Average Upload Speed	5.8 Mbps	3.1 Mbps	8.8 Mbps	8.3 Mbps
Maximum Upload Speed	20.4 Mbps	8.8 Mbps	30.2 Mbps	44.3 Mbps
Time to First Byte (In Milliseconds)	231 ms	242 ms	195 ms	220 ms
Webpage Download				
Average Web Download Speed	3.7 Mbps	1.4 Mbps	5.2 Mbps	4.3 Mbps
Webpage Completion	90%	78%	88%	98%

South Central Region Winner
VERIZON WIRELESS LTE

As in other regions, both AT&T and T-Mobile showed their strengths through the five cities in this region, but Verizon delivered the best mix of in-city speeds and suburban/rural consistency to nab the overall award.

	AT&T	Sprint	T-Mobile	★ Verizon
PCMag.com Mobile Speed Index				
Good / Average / Slow	87 /100	59 /100	89 /100	98 /100
Download & Upload Performance				
Average Download Speed	12.2 Mbps	7.5 Mbps	15.8 Mbps	18.7 Mbps
Maximum Download Speed	62.1 Mbps	27 Mbps	47.6 Mbps	65.9 Mbps
Average Upload Speed	8.3 Mbps	2.8 Mbps	8.8 Mbps	8.4 Mbps
Maximum Upload Speed	21.6 Mbps	8.2 Mbps	23.1 Mbps	25.2 Mbps
Time to First Byte (In Milliseconds)	216 ms	227 ms	191 ms	206 ms
Webpage Download				
Average Web Download Speed	3.5 Mbps	1.4 Mbps	4.8 Mbps	4.2 Mbps
Webpage Completion	98%	80%	92%	98%

Northwest Region Winner
VERIZON WIRELESS LTE & T-MOBILE

T-Mobile won four out of the five cities in the Northwest, but suffered a penalty for its poor rural LTE coverage, letting Verizon pull ahead and tie according to our rules. Which network you should choose depends on how often you head out of town.

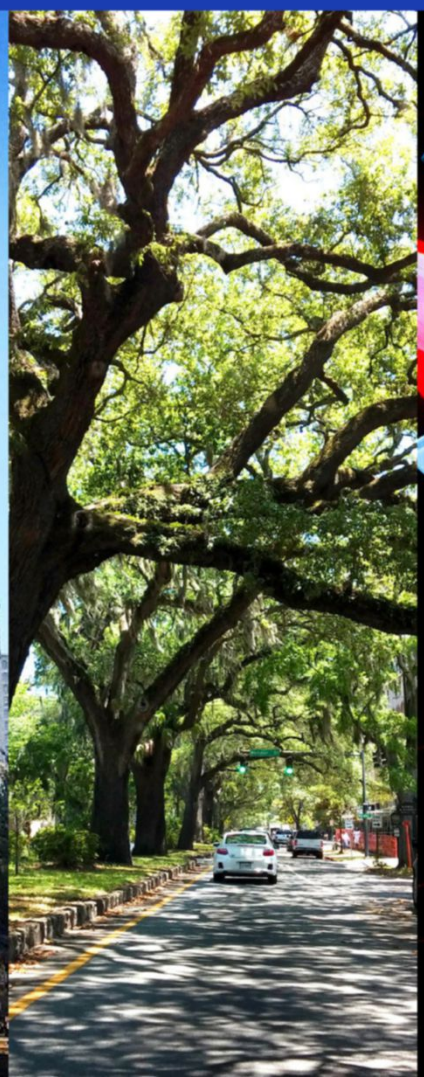
	AT&T	Sprint	★ T-Mobile	★ Verizon
PCMag.com Mobile Speed Index				
Good / Average / Slow	77 /100	49 /100	94 /100	94 /100
Download & Upload Performance				
Average Download Speed	10.7 Mbps	8 Mbps	19.2 Mbps	18.9 Mbps
Maximum Download Speed	62.9 Mbps	31 Mbps	54.1 Mbps	84.3 Mbps
Average Upload Speed	4.2 Mbps	4.2 Mbps	8.8 Mbps	7.6 Mbps
Maximum Upload Speed	20.8 Mbps	9.1 Mbps	23.1 Mbps	39.4 Mbps
Time to First Byte (In Milliseconds)	245 ms	243 ms	216 ms	233 ms
Webpage Download				
Average Web Download Speed	2.7 Mbps	1.5 Mbps	4.1 Mbps	2.8 Mbps
Webpage Completion	96%	47%	93%	99%

Southwest Region Winner
VERIZON WIRELESS

This one was a tight decision between T-Mobile and Verizon. T-Mobile took the desert states; Verizon did a little better in California. Ultimately, Verizon's superior LTE performance as we drove between cities made the difference for the Southwest win.

	AT&T	Sprint	T-Mobile	★ Verizon
PCMag.com Mobile Speed Index				
Good Average Slow	77 /100	49 /100	92 /100	94 /100
Download & Upload Performance				
Average Download Speed	11 Mbps	6.8 Mbps	16 Mbps	14.9 Mbps
Maximum Download Speed	58 Mbps	26.8 Mbps	52.7 Mbps	80.8 Mbps
Average Upload Speed	4.8 Mbps	3.3 Mbps	10.4 Mbps	6.8 Mbps
Maximum Upload Speed	21.3 Mbps	6.8 Mbps	26.1 Mbps	29.3 Mbps
Time to First Byte (In Milliseconds)	237 ms	265 ms	249 ms	197 ms
Webpage Download				
Average Web Download Speed	2.5 Mbps	1.1 Mbps	3.8 Mbps	3.2 Mbps
Webpage Completion	76%	45%	84%	92%



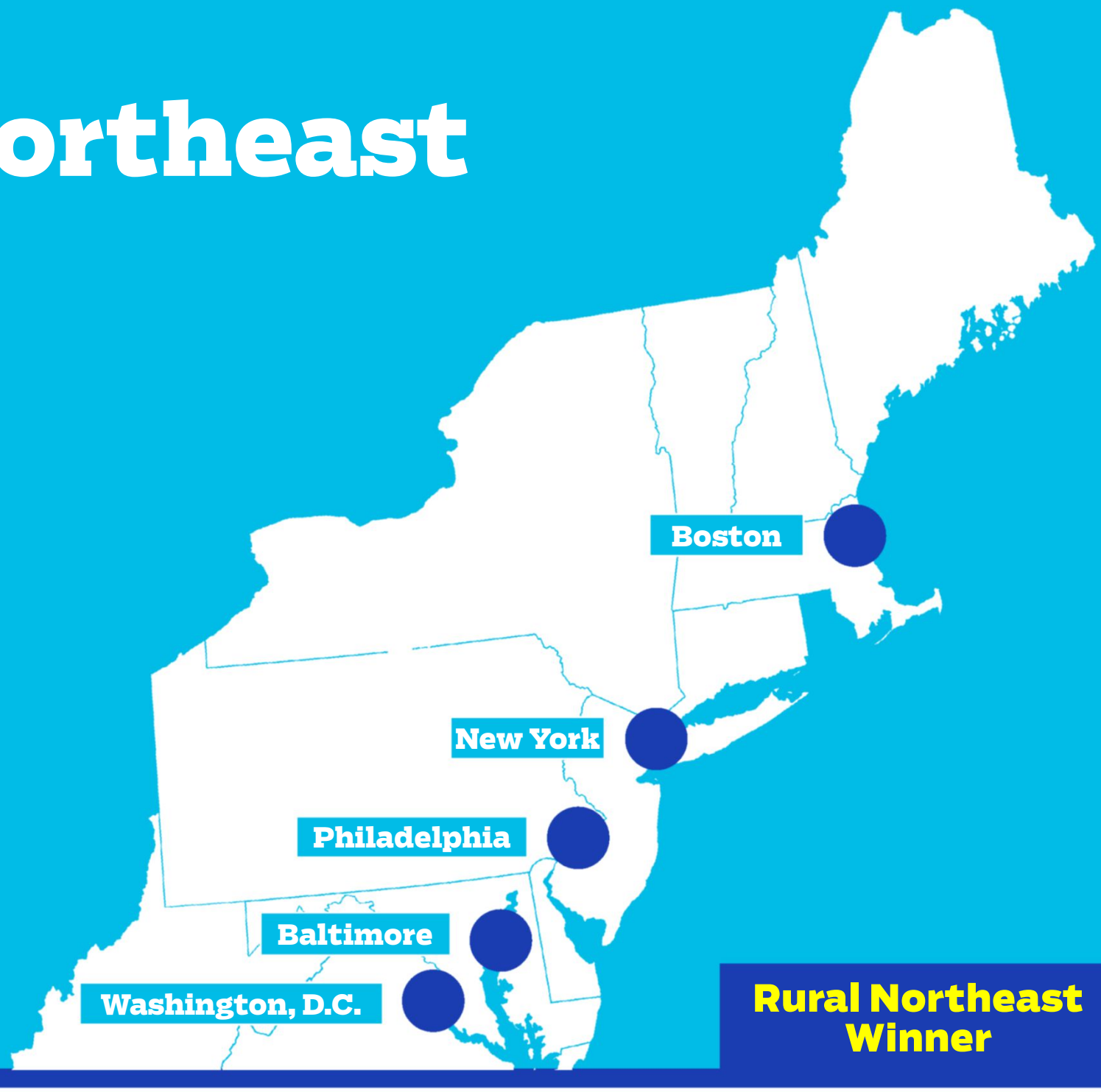








Northeast



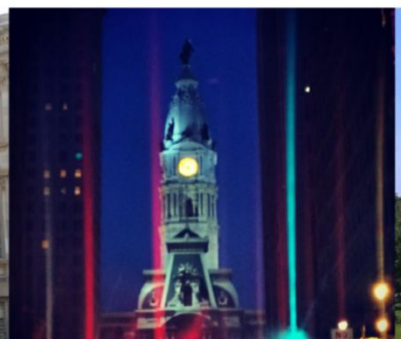
Rural Northeast Winner

Rural/Suburban Winner AT&T LTE

Route: From Boston to Worcester, MA; Hartford, CT; and Bridgeport, CT; and then down the I-95 corridor from New York City to Washington, D.C.

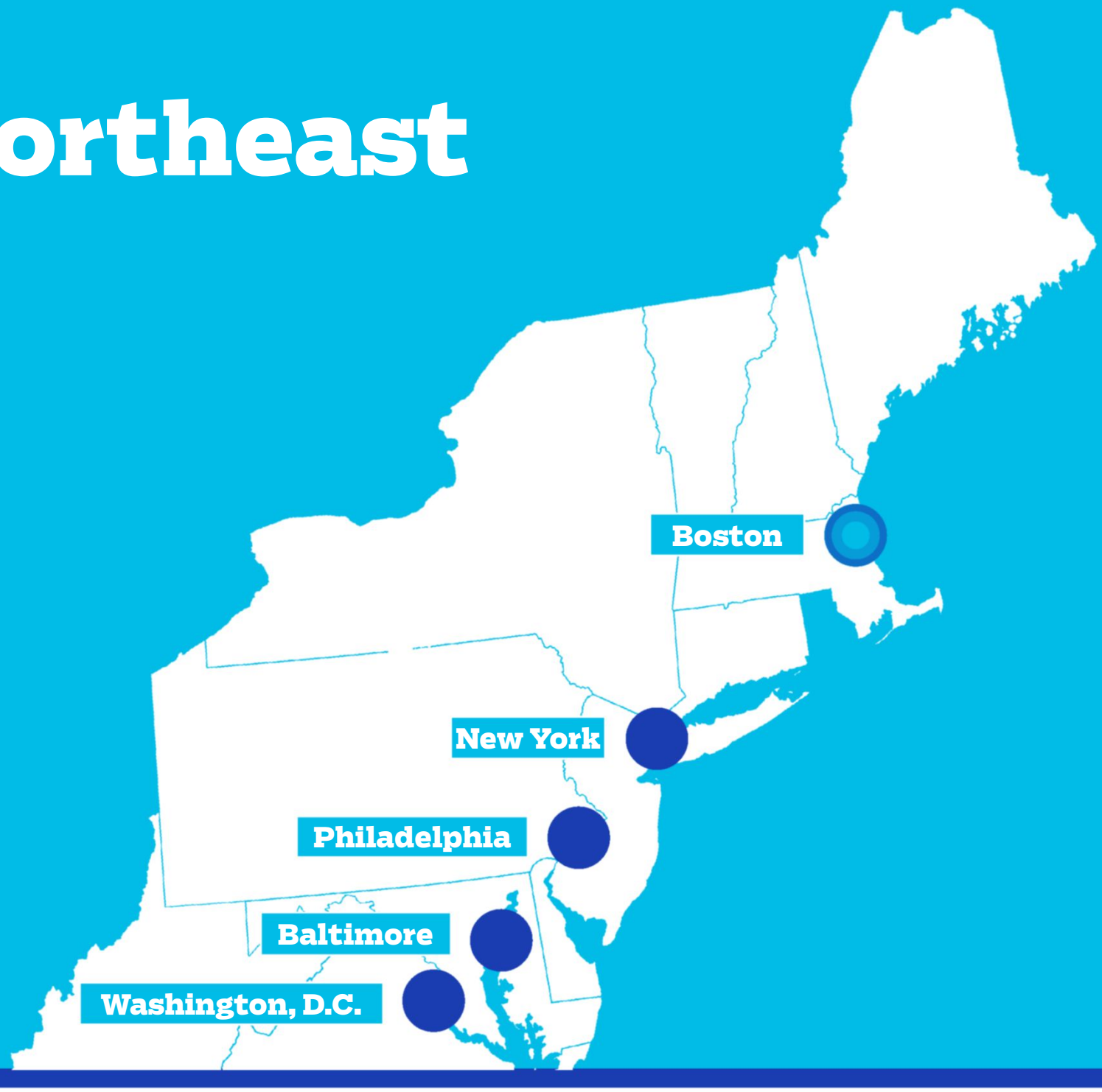
LTE networks had a tendency to drop out between cities, so we disqualified any network with under 30 percent availability on the long drive. In the Northeast, that was only Sprint, which had particularly weak coverage in Connecticut and Maryland. AT&T and Verizon both had admirable LTE coverage along our route. Verizon's coverage was actually the best, but AT&T's LTE speeds were slightly faster; AT&T also deserves the win here because its 3G fallback network is considerably faster than Verizon's. Although T-Mobile's speeds were admirable, its mainly metro build-out strategy meant big LTE gaps in western Massachusetts, northern Connecticut, and some New York suburbs.





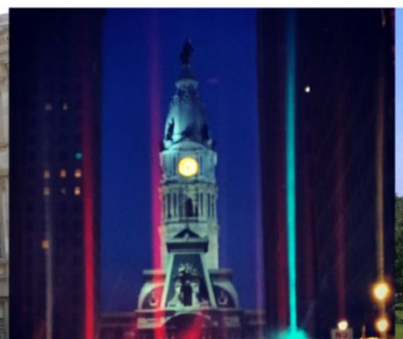
Northeast



Boston, MA VERIZON WIRELESS LTE

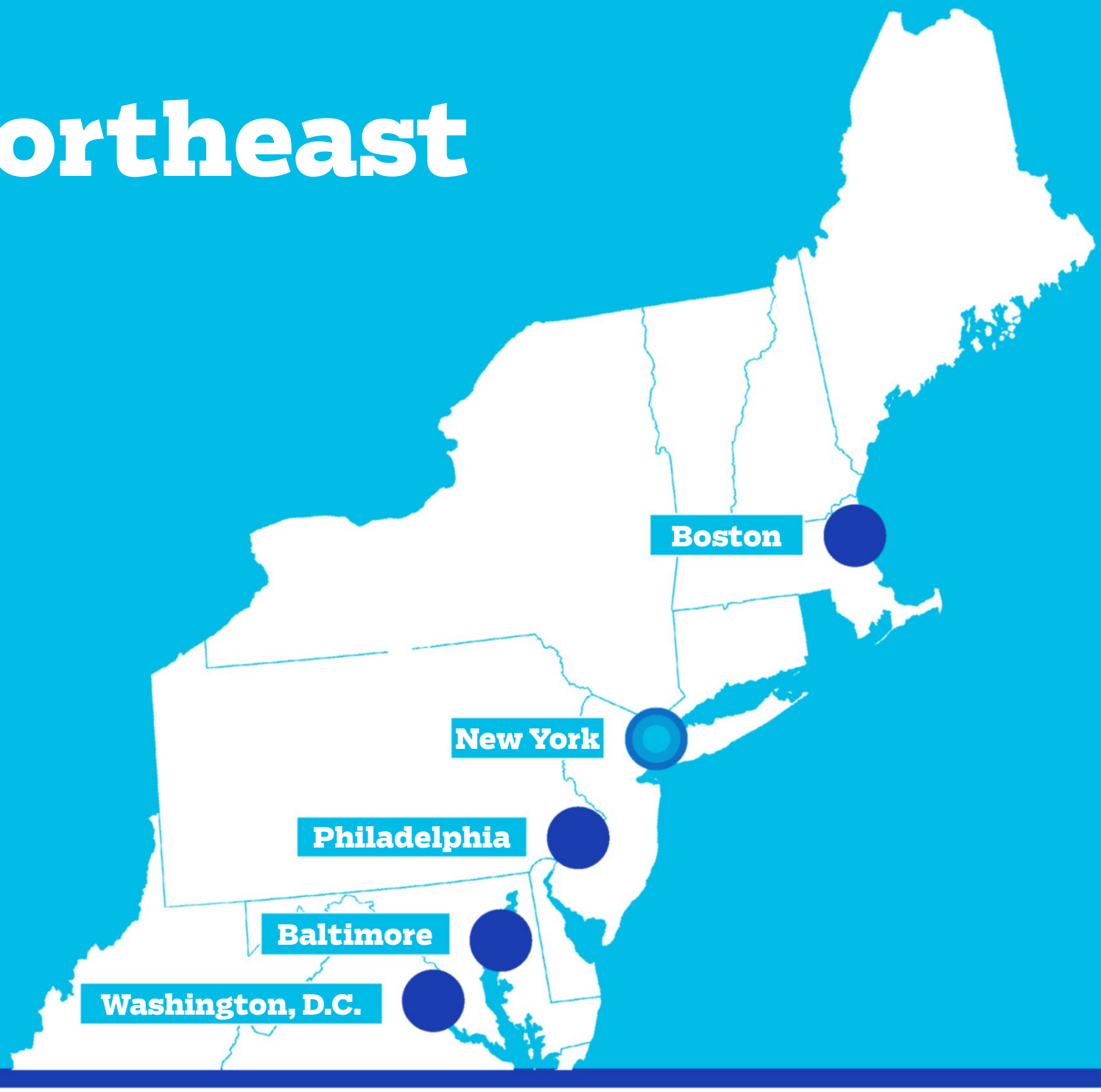
This one was tight. T-Mobile has been pouring money into ex-MetroPCS cities in the Northeast, with the result of pretty consistent LTE coverage across Boston at solid speeds over our 5Mbps “good” threshold. But Verizon’s coverage is even better, and though its speeds varied more widely, it was faster more often. That makes Verizon our overall (narrow) pick for Boston. AT&T saw a precipitous drop in Boston speeds between 2013 and 2014, a natural outcome of adding a lot of LTE devices but no new LTE spectrum. This is one city where carrier aggregation will make a positive difference for AT&T subscribers in 2015.



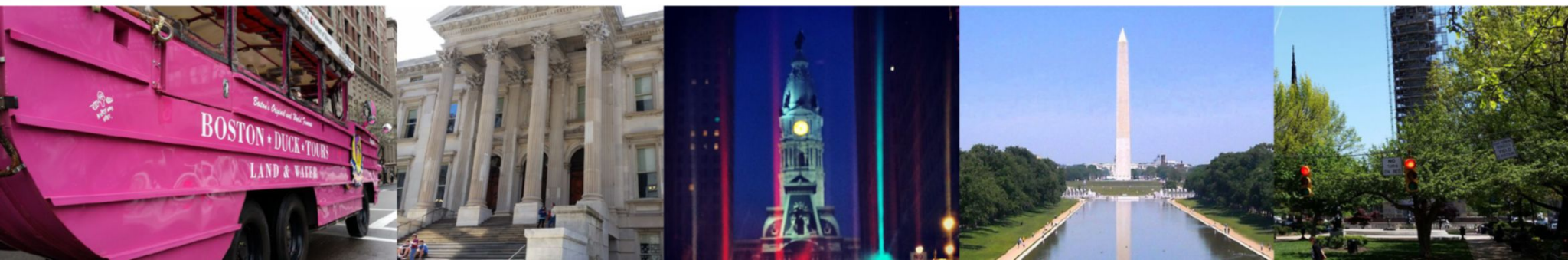


Northeast

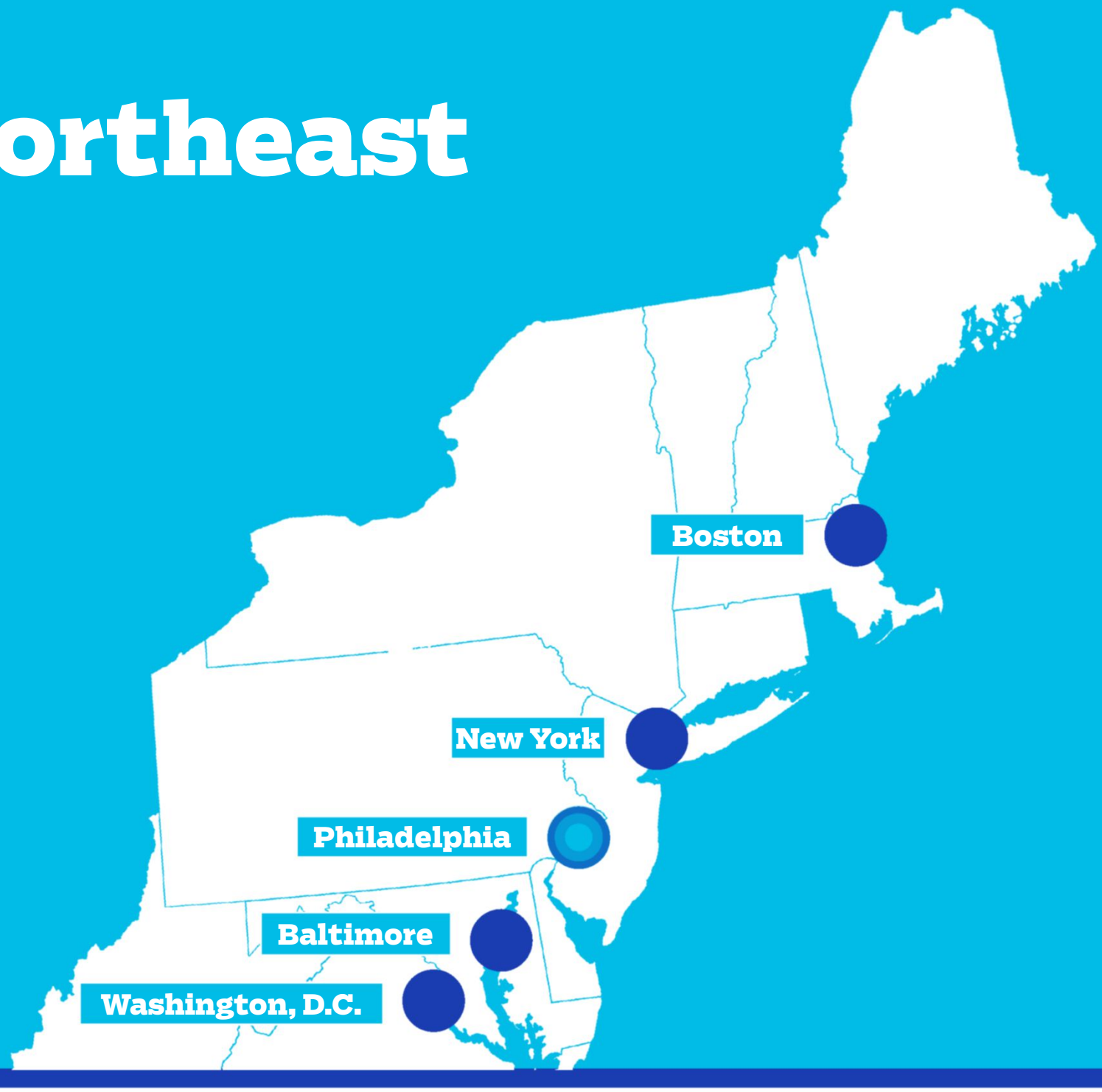


New York, NY VERIZON WIRELESS LTE

AT&T, T-Mobile, and Verizon all showed solid consistency across Manhattan, Brooklyn, and Queens, showing that the days of dropped connections are ending in the nation's biggest city. New York is Verizon's hometown, and it appears to have taken its troubles there seriously: Average download speeds tripled between last year and this year. If you don't have an XLTE-capable phone, go get one right now. This is a prestige market for T-Mobile and Verizon, both of whom have a lot of spectrum to play with, so both delivered impressive speeds. Low Sprint Web completion results showed how our phone was waggling between 3G and LTE for our entire test run, with some of those LTE test results at 3G speeds. We only saw solid Spark speeds in Greenwich Village. Turning to our crowdsourced results, we also found some Spark speeds along Tremont Avenue in the Bronx, but not down by Yankee Stadium.

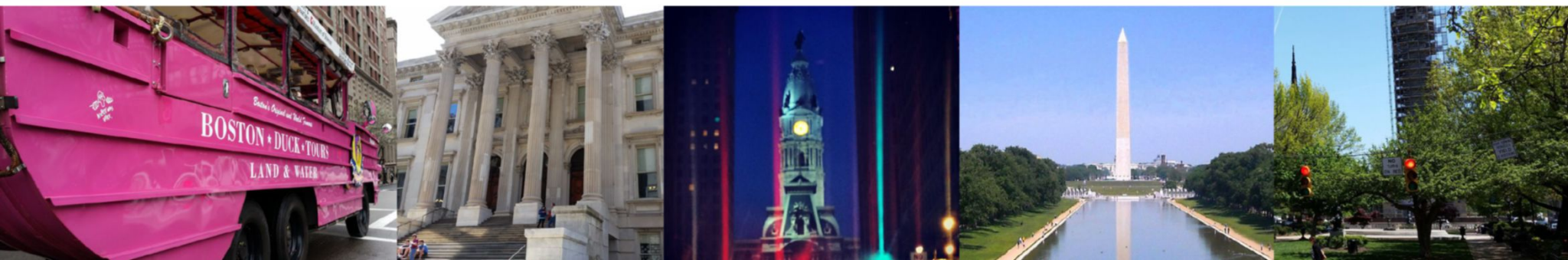


Northeast

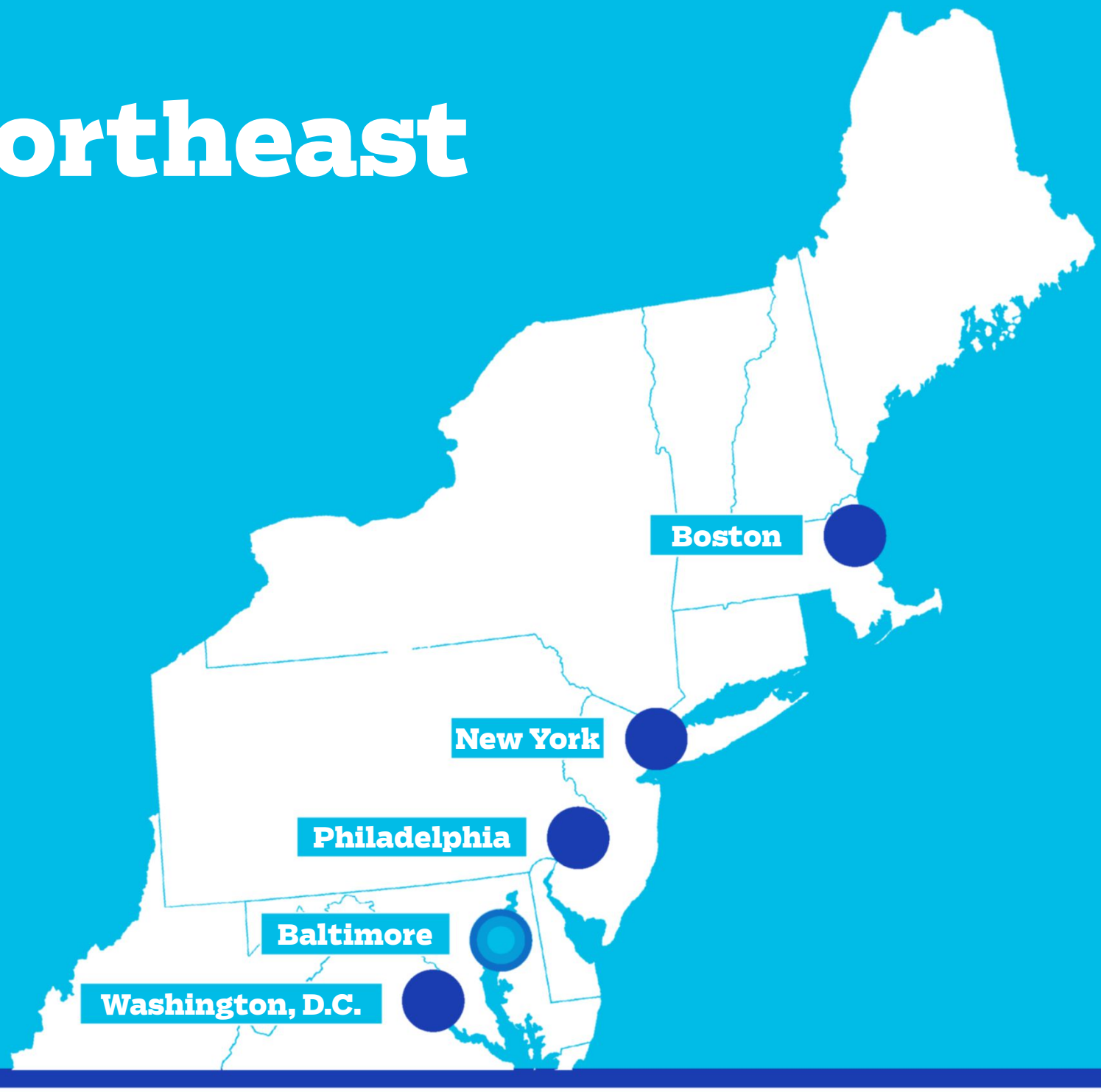


Philadelphia, PA VERIZON WIRELESS LTE

Verizon wins Philadelphia largely on the back of the fastest average and peak download speeds. The company's XLTE upgrade boosted average download speeds from 10.3 to 19.6Mbps, outpacing the other carriers' efforts. We were impressed by the reliability results we saw from Verizon, AT&T, and T-Mobile, though, all of which covered Philadelphia without dropping LTE signal. Our fastest result was a 65Mbps down on Verizon in South Philly by the Eagles stadium—stadiums tend to have pretty powerful systems set up, and we got lucky stopping there on a non-game day. Though AT&T, T-Mobile, and Verizon all delivered speeds that could probably beat your home Comcast connection, that's still no reason for the Philadelphia giant to be able to merge with Time Warner—remember that as soon as you hook up an actual PC, all of the wireless carriers slap down restrictive data caps.



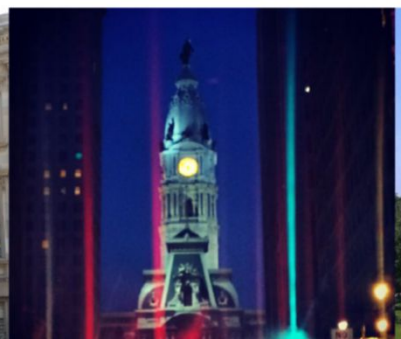
Northeast



Baltimore, MD VERIZON WIRELESS LTE

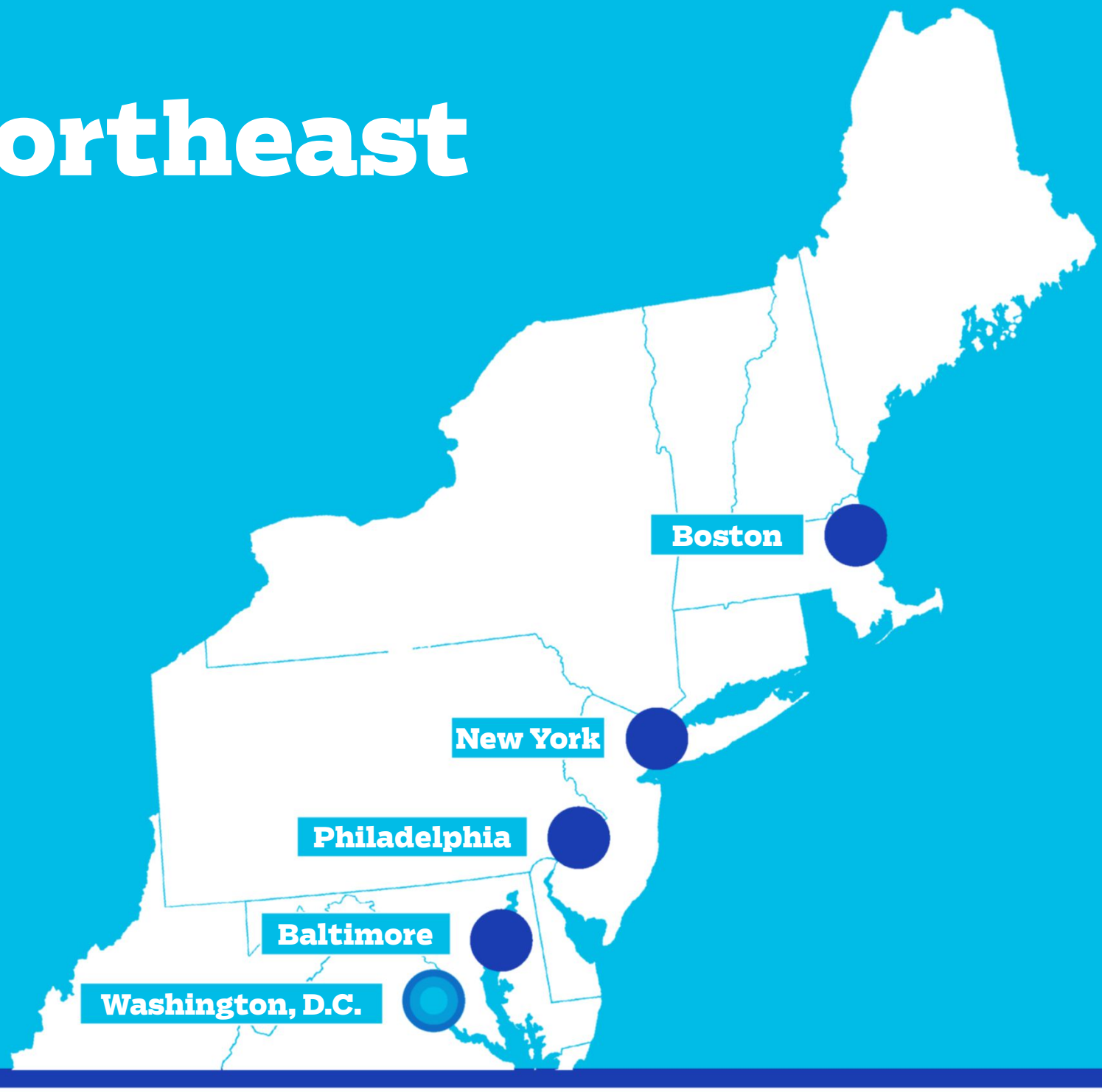
Do you know about Baltimore's proud wireless history? For years, Baltimore was where carriers would test new technologies because of its complex mix of hills, water, and high- and low-rise neighborhoods. That makes Baltimore a tough town for wireless, and we saw that in wobbly networks across the board. Baltimore was the first place Sprint launched its 4G WiMAX network, which is one reason I'm sad to see Sprint's slow performance here: We only got bona-fide Spark speeds at three of our test locations: at Monument and Howard, at Druid Lake, and out in the Baltimore County suburbs. Verizon, on the other hand, delivered blazing XLTE speeds more consistently. It still had its ups and downs—North Avenue and Howard was a slow spot, for instance—but they were balanced out by crazy speeds elsewhere, like a run of 50Mbps downloads at Union Square Park in West Baltimore. Overall, Verizon had the best LTE experience in a difficult city for network design.





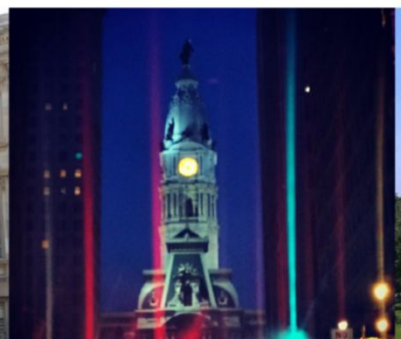
Northeast



Washington, D.C. T-MOBILE LTE

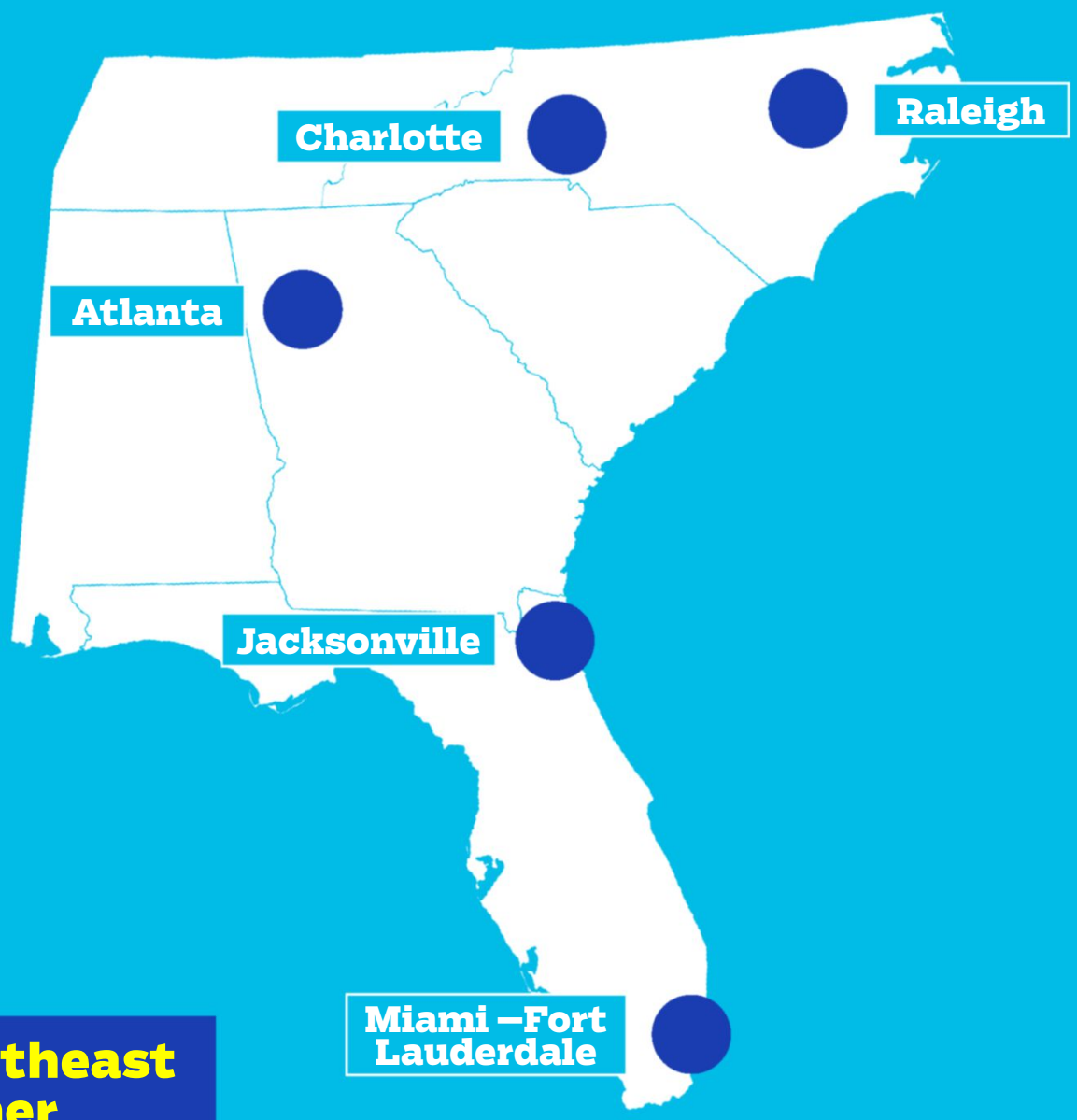
T-Mobile's new LTE network won our Washington, D.C. tests by offering significantly higher upload speeds than its next competitor, Verizon Wireless LTE. And although Verizon delivered higher peak speeds, T-Mobile's speeds were more consistently above our 5Mbps download threshold for a true LTE experience. Both Sprint and Verizon saw dramatic improvements in Washington over the past year. Even without Spark, Sprint speeds jumped from an average of around 4 to nearly 8Mbps, and the addition of XLTE spectrum helped Verizon speeds nearly double. T-Mobile's overall performance won the day, though.





Southeast



Rural Southeast Winner

Rural/Suburban Winner VERIZON WIRELESS LTE

Route: I-95 through Virginia and part of North Carolina, as well as I-75 and I-16 from Atlanta through Macon to Savannah, and then back on I-95 through Florida.

As we saw in other rural regions, nobody else can compete with the broad reach of Verizon Wireless' LTE network right now. Take AT&T. Yes, it had LTE in cities like Savannah, Daytona Beach, and Port St. Lucie, but our AT&T 4G phone regularly dropped to 3G in between them. And T-Mobile? Forget about it. 2G speeds left us stranded in 2002 heading south from Savannah. If you want LTE along these corridors, Verizon's your choice.

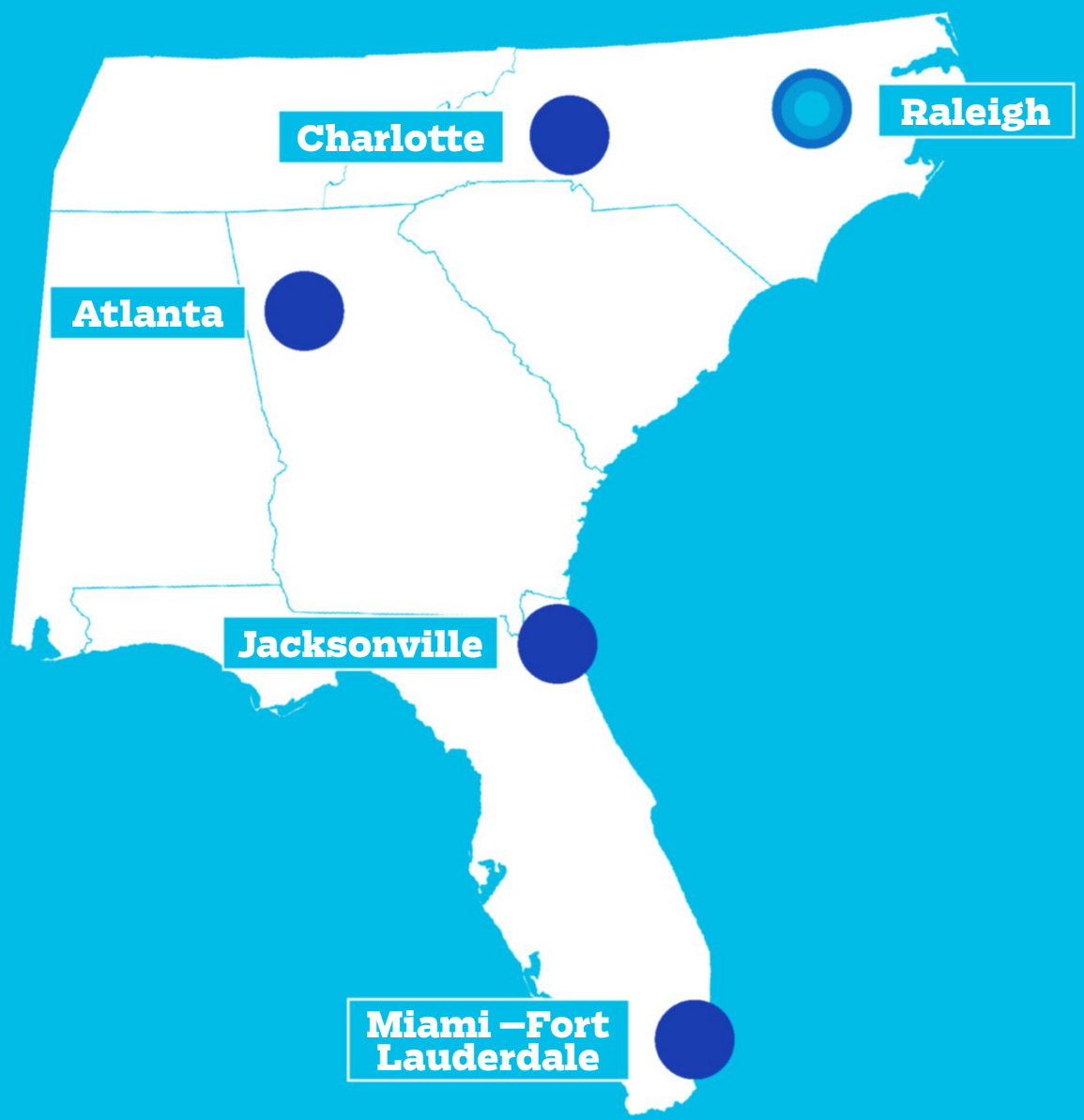








Southeast



Raleigh, NC AT&T LTE

AT&T dominated our North Carolina cities. In both Raleigh and Charlotte, AT&T offered the best upload and download speeds with excellent reliability, making it our overall North Carolina choice. All three of the other networks acted as if they were spectrum-constrained in Raleigh. Sprint's Spark-less performance was pretty weak, Verizon didn't look XLTE-equipped, and T-Mobile had disappointing top speeds. If you're looking for a low-cost carrier in North Carolina, consider Cricket; now owned by AT&T, it's using the excellent AT&T LTE network and should have winning performance.

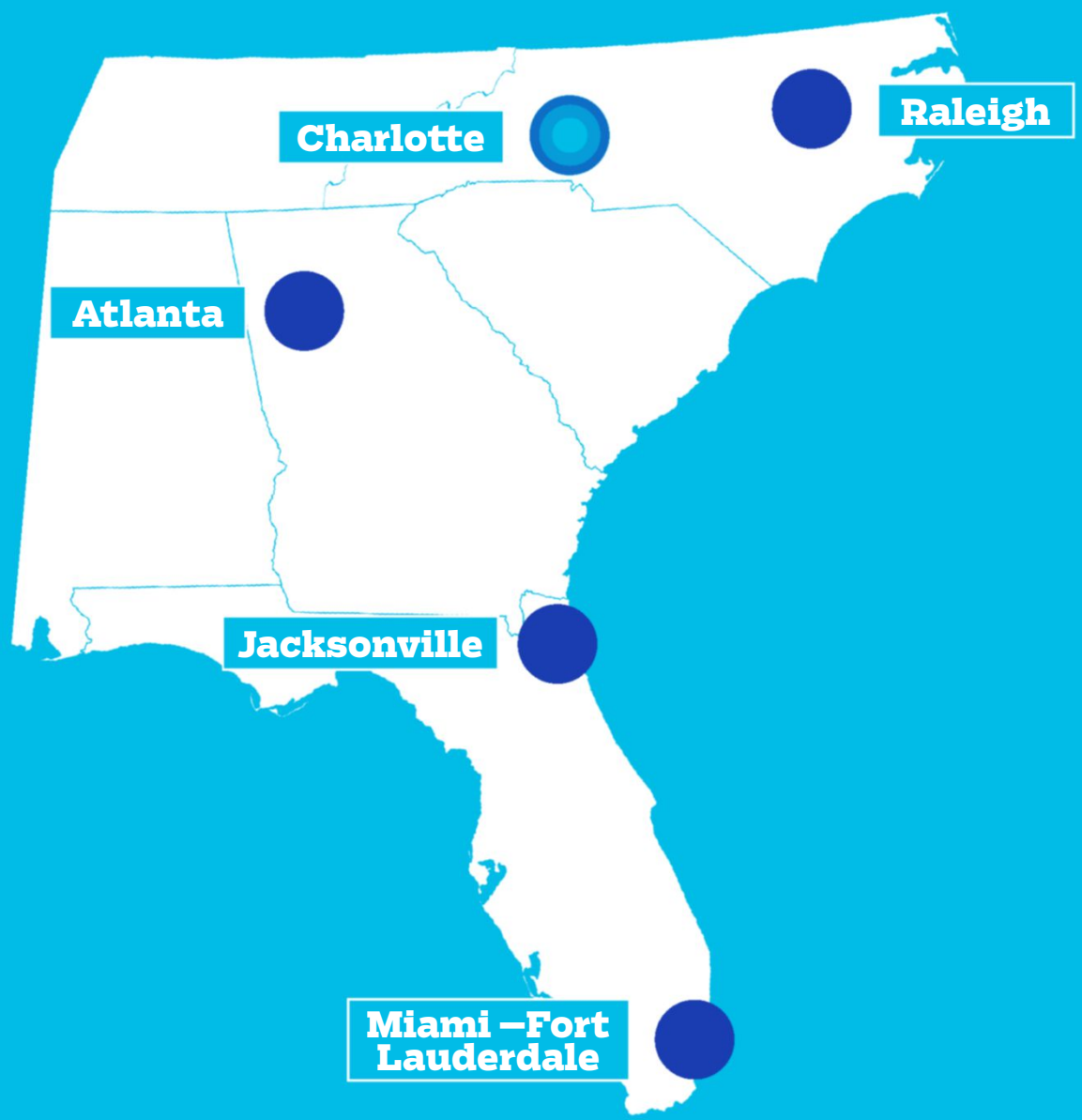








Southeast



Charlotte, NC AT&T LTE

AT&T dominated both of our North Carolina cities. In Raleigh and Charlotte alike, AT&T offered the best upload and download speeds with excellent reliability, making it our overall choice for the state. Charlotte was more competitive than Raleigh, with both AT&T and Verizon turning in perfect Web completion scores and Sprint Spark finally showing up to play. AT&T performed especially well in the Myers Park and South Park neighborhoods, with speeds in the 50-60Mbps range. If you're looking for a low-cost carrier in North Carolina, consider Cricket; now owned by AT&T, it's using the excellent AT&T LTE network and should have the same winning performance.

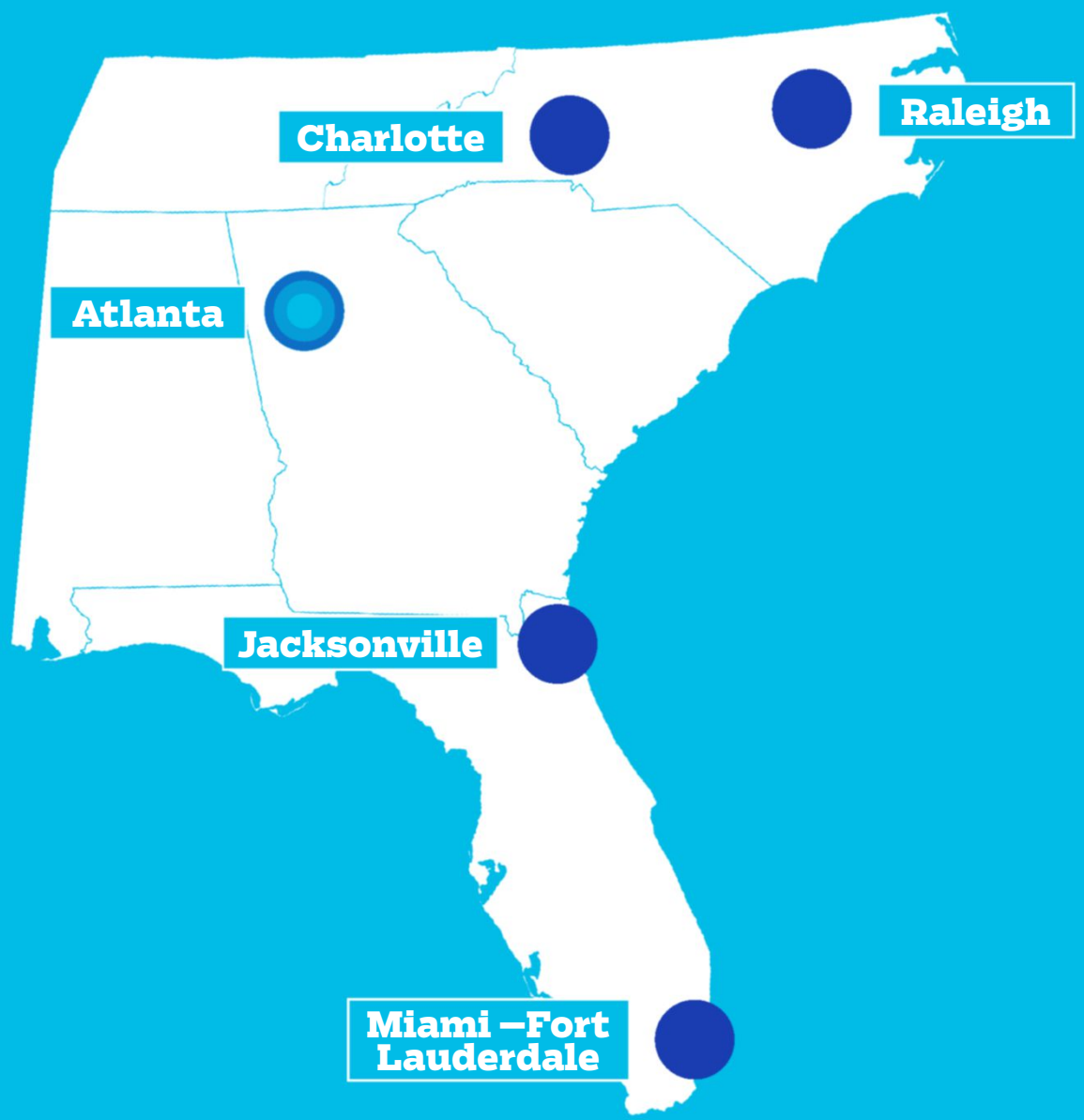








Southeast



Atlanta, GA VERIZON WIRELESS LTE

Verizon's new XLTE spectrum really made the difference in Atlanta, giving Big Red the fastest upload and download speeds by a long shot. It's pretty evenly distributed throughout the city, too; we saw stunning upload speeds upwards of 30Mbps downtown, in Buckhead, Little Five Points, and at Turner Field. Verizon's LTE network also had the best overall availability of the four LTE networks across our 11 test sites. T-Mobile, Sprint, and AT&T all have their pros and cons here. T-Mobile was the second-fastest network, but AT&T offered slightly better availability. Sprint, meanwhile, was even more impressively reliable, but quite slow for an LTE network.

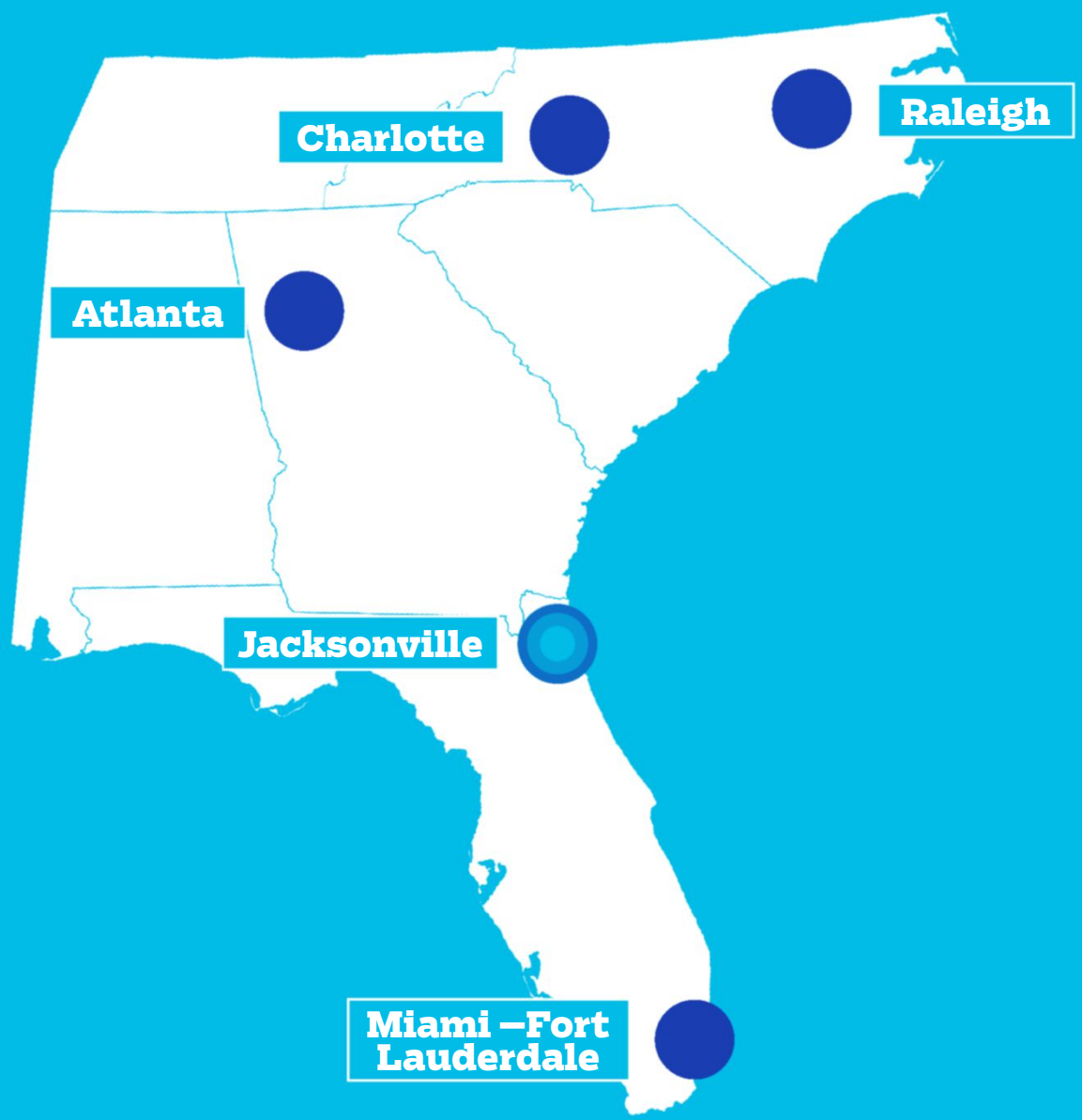








Southeast



Jacksonville, FL T-MOBILE LTE

Another near-tie. T-Mobile brought slightly higher speeds, and Verizon LTE delivered considerably better reliability; our 70/30 balance between speed and reliability threw the prize to T-Mobile, which also has a faster 3G backup network than Verizon does. Jacksonville was a fast city all around, with Sprint turning in one of its better Spark performances (although it still struggled with coverage) and AT&T LTE also offering a solid balance of speed and reliability. Although we didn't see the crazy peak speeds in Jacksonville that we saw elsewhere, the carriers had consistently fast connections across the metro area.

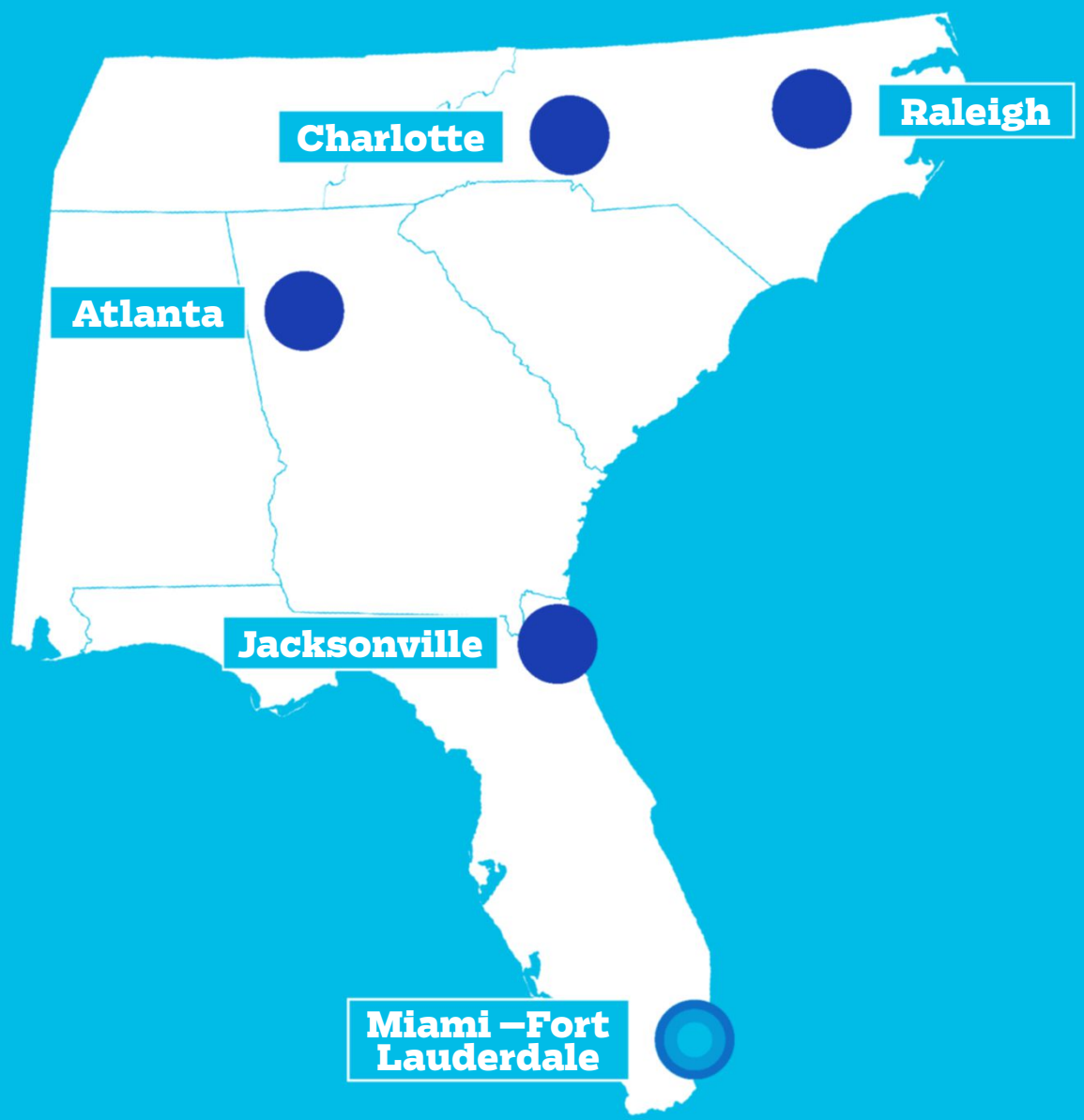








Southeast



Miami /Fort Lauderdale, FL VERIZON WIRELESS LTE

Verizon dominated in South Florida, and if you can afford it, it should be your choice. Fastest downloads, fastest uploads, best reliability. It'll serve you well. But I have to call out Sprint Spark here, because in South Florida we finally started to see the speeds we're expecting from Sprint's new higher-speed system. Sprint outpaced AT&T and pulled wicked 50Mbps speeds at a site near S Miami Avenue and SE 15th Road. If we see those kinds of speeds from Sprint nationwide next year, it'll be a whole new ballgame. T-Mobile still took second place thanks to better reliability and better upload performance than Sprint, though.

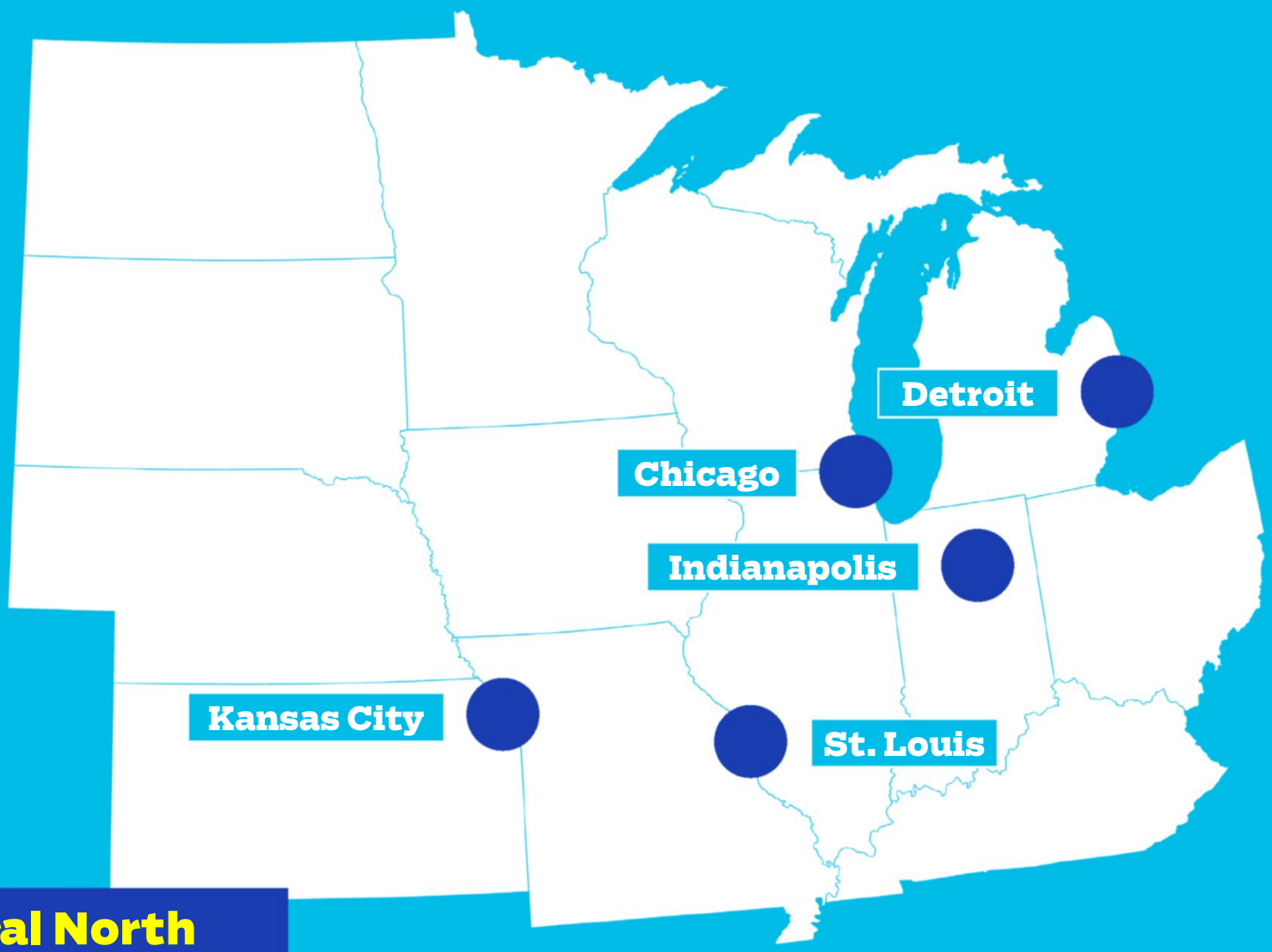








North Central



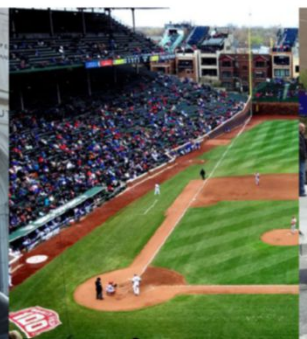
Rural North Central Winner

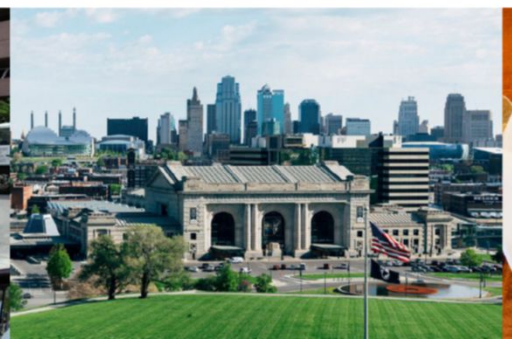
Rural/Suburban Winner VERIZON WIRELESS LTE

Route: The I-94 corridor across Michigan, I-65 between Chicago and Indianapolis, I-70 across Illinois and Missouri, and a diagonal from Kansas City down to Springfield, MO.

Neither AT&T, Sprint, nor T-Mobile offered more than 30 percent Web completion on their LTE networks, so they were disqualified. Verizon, on the other hand, had almost 90 percent LTE reliability, showing that the company's promises of a nationwide LTE network are pretty solid across this region. Verizon's LTE blows away any of its 3G competitors on speed, so let's just take a closer look at some of the other networks. T-Mobile's performance was just just awful; it dropped to 2G across much of Missouri. Sprint had much better reliability, but its 3G network is painfully slow. The best second choice? AT&T, which maintained a pretty slow HSPA link across our drive, but at least it wasn't 2G.







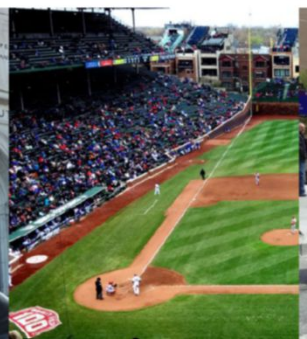

North Central

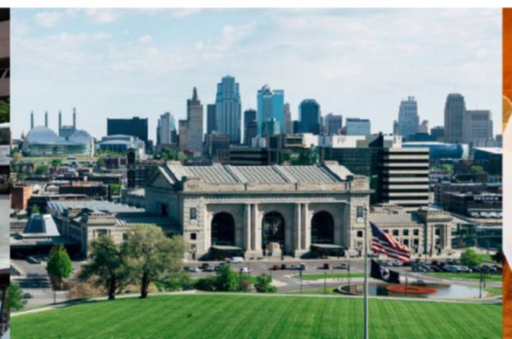


Detroit, MI T-MOBILE LTE

Consistency won the day for T-Mobile's LTE network in Detroit. It outpaced Verizon by delivering 93 percent of its downloads over 12Mbps, a stellar result for people looking for true 4G performance from their 4G network. That said, it did drop to 3G in Grosse Point. Verizon did pretty well here, too—the XLTE effect is evident from Big Red's speeds increasing 50 percent from 2013, and Verizon's LTE network never dropped, although it slowed down sometimes. The fastest spot in town? We saw over 70Mbps on Verizon on Warren Avenue off Schaefer Road. Sprint's 4G network in Detroit shows how badly the company needs its Spark upgrade. It wasn't actually noticeably slower than last year; it had lousy performance both years.







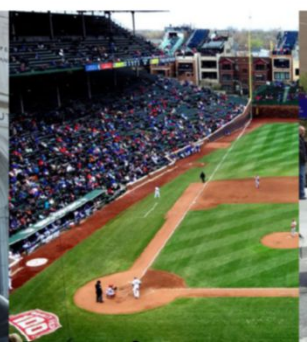

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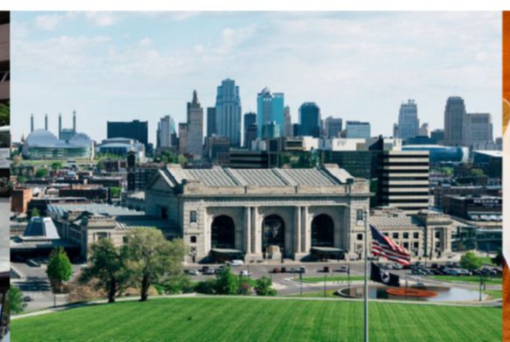


Chicago, IL VERIZON WIRELESS LTE

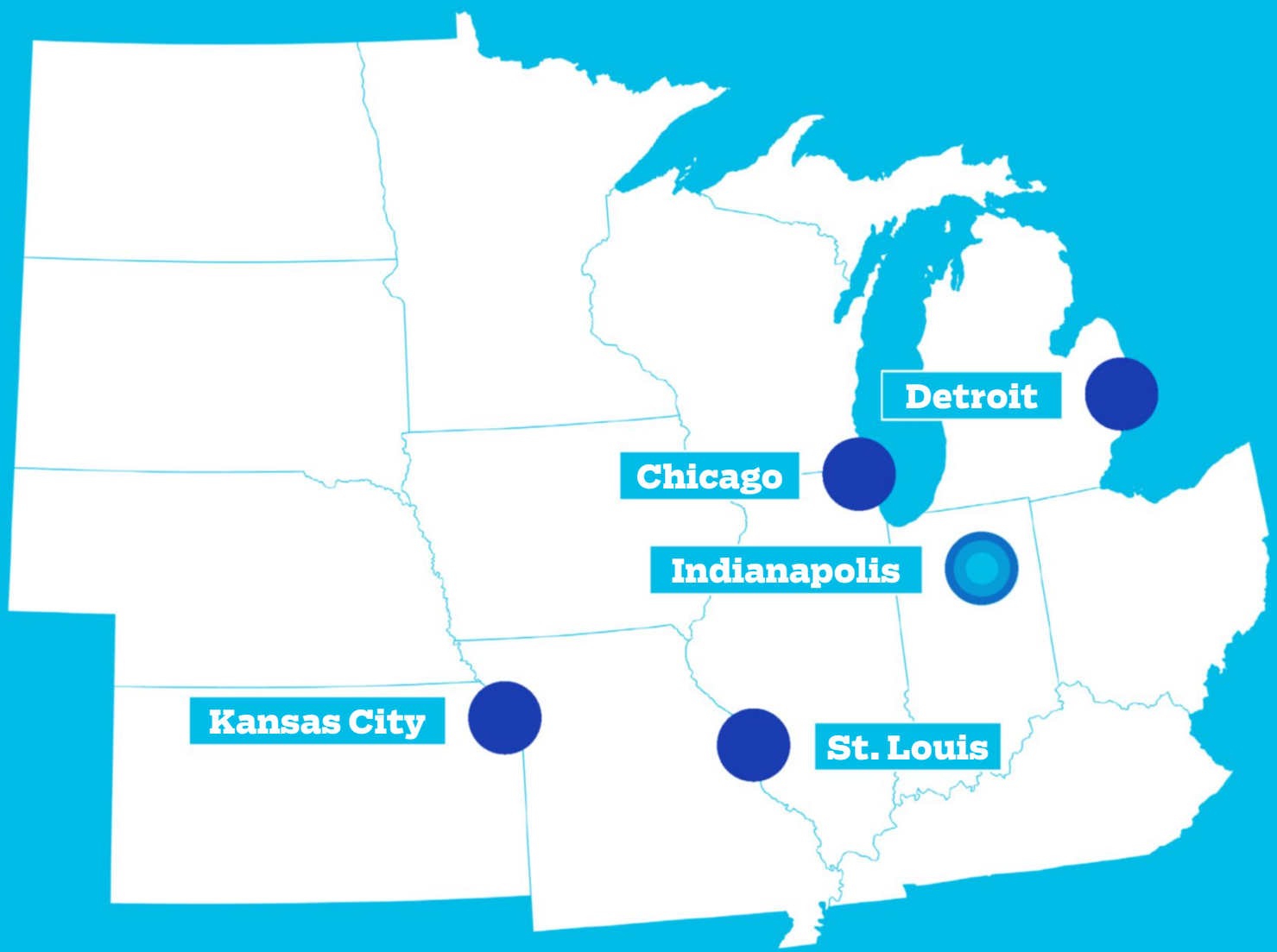
Consistently fast speeds and just plain terrific LTE coverage make Verizon Wireless our winner in Chicago this year. T-Mobile also performed very well, delivering LTE speeds over our minimum threshold even more consistently (Verizon had one slow spot by Midway Airport). But Verizon turned in absolutely crazy peak speeds, such as 80Mbps down on the Illinois Institute of Technology campus. AT&T's Chicago speeds are slower than last year's, but they're still pretty solid. The big blue carrier fell behind scrappy T-Mobile with the reliability of its 3G network, though, as we saw scattered stalled webpage downloads all over the city. Hey, where's that Sprint Spark? As we saw in other cities, Sprint was dragged down by inconsistent Spark coverage. Navy Pier? Sparky. Wrigley Field? Sparky. Irving Park by the cemeteries? Sparky. Elsewhere? Not so sparky. That's Sprint's challenge right now.





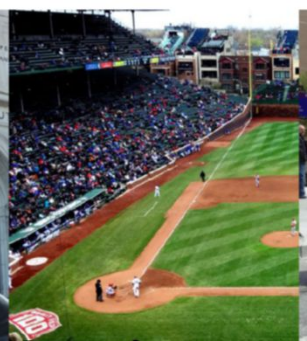

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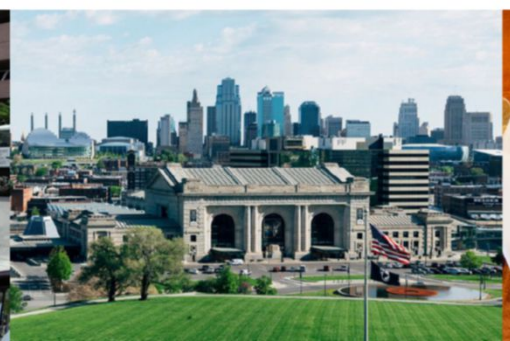


Indianapolis, IN AT&T 4G LTE

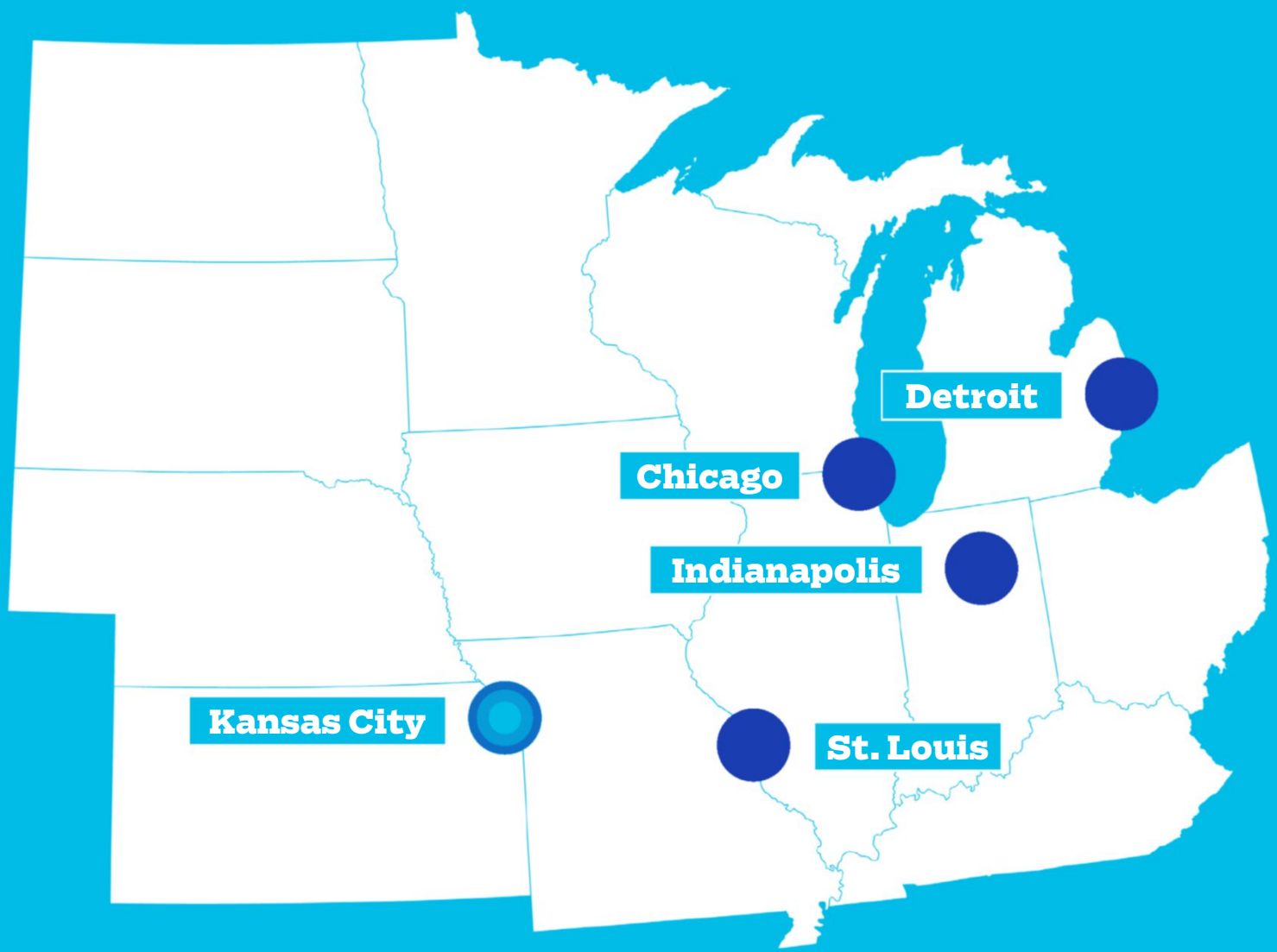
AT&T's speeds in Indy improved from 2013, and consistently fast speeds with solid reliability make it our winner in Indiana. Verizon Wireless came a close second with higher peak speeds and even better reliability, but its average speed was docked a bit for a slow spot northwest of downtown. Both networks are good choices.
T-Mobile is having a tough time in Indianapolis because the carrier is spectrum-constrained in Indiana and Ohio, so it can't deliver the broad lanes we see in its ex-MetroPCS cities. Our Sprint LTE phone, meanwhile, kept bouncing between LTE and 3G all over town, leading to lower Web completion results.





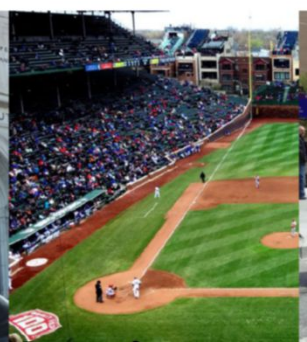


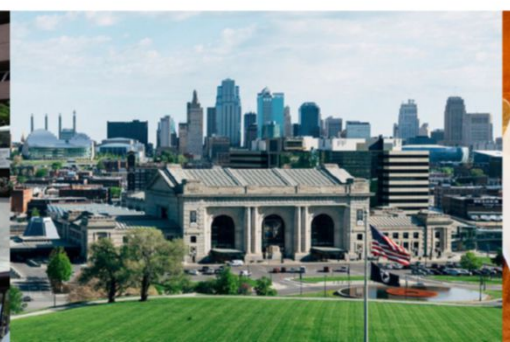

North Central



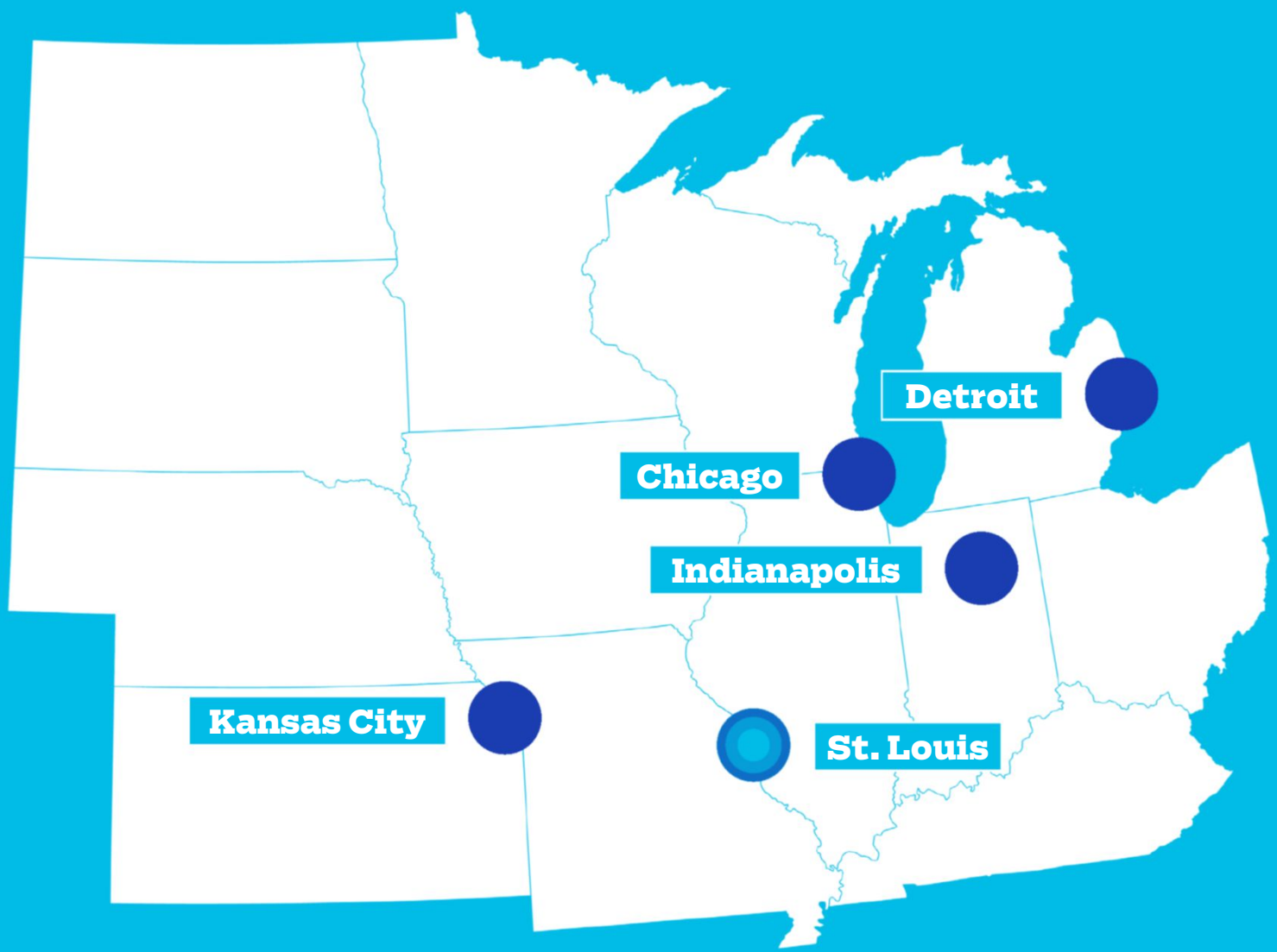
Kansas City, KS VERIZON WIRELESS LTE

People in Sprint's hometown are used to fast connections: Kansas City was the first place to get Google Fiber, making it one of the few places in the country with true competition for high-speed home Internet service. Sprint's LTE speeds have held their own in Kansas City, but they've been massively outpaced by Verizon's new XLTE network. Average download speeds on Verizon vaulted from 15 to 24Mbps thanks to Verizon's new AWS spectrum, with solid reliability across the metro area. AT&T saw a major speed drop in Kansas City this year, so I'm pretty sure that the company will focus on KC for carrier aggregation in 2015. Local residents clearly demand no less.



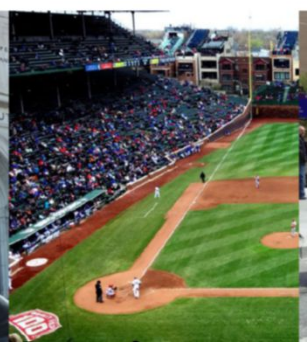

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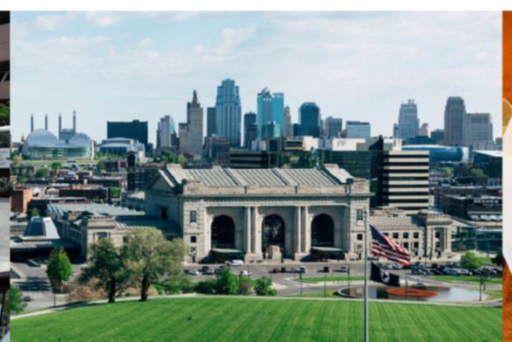


St. Louis, MO T-MOBILE LTE

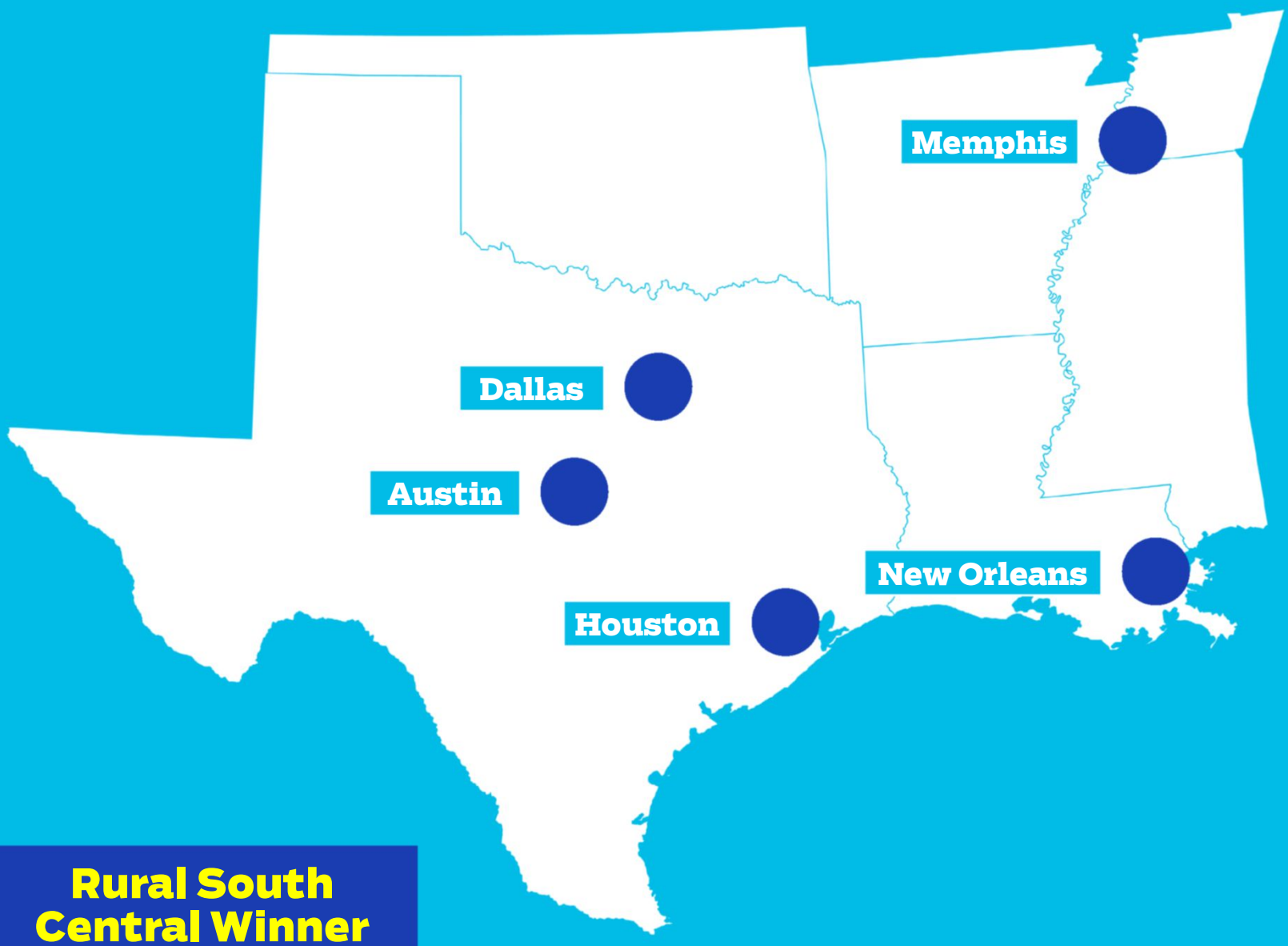
T-Mobile eked out a win over Verizon Wireless in St. Louis thanks to consistently faster across-the-board speeds, even though Verizon and AT&T delivered better LTE reliability. T-Mobile is the one bright spot in a tough LTE picture for St. Louis this year. AT&T's speeds declined by half in our tests, and though Verizon stayed steady, it didn't show the XLTE-powered gains we saw in other metro areas. Sprint launched LTE in St. Louis this year, but without Spark, we're seeing slow speeds. And last year, St. Louis lost a competitive option when Sprint shut down U.S. Cellular's old network. Hopefully, next year will see better results for St. Louis.








South Central



Rural South Central Winner

Rural/Suburban Winner VERIZON WIRELESS LTE

Route: US-60 across Arkansas, I-55 through Mississippi with a stop in Jackson, a detour on US-90 through the bayous of Louisiana, I-10 to Houston, US-295 to Austin, and I-35 to Dallas.

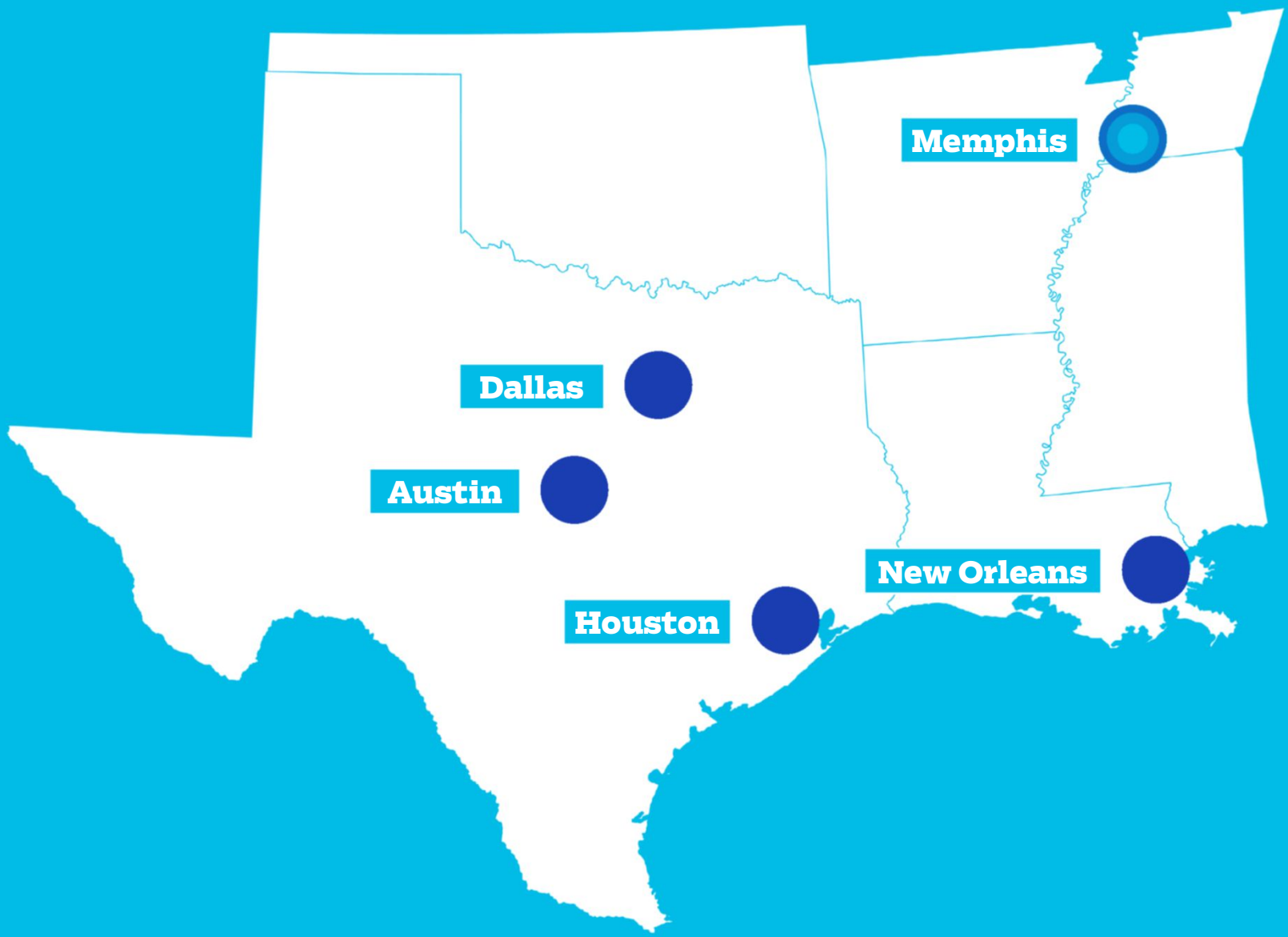
We saw more LTE competition on this route—only T-Mobile was disqualified for lack of availability—but Verizon still dominated the competition on speed. It's the clear choice in this area. AT&T pulled out a good showing as well, so consider Cricket if you're looking for a low-cost service. And although Sprint fell behind the big two, I was pleasantly surprised when we ran into Sprint LTE service in smaller burgs like Jonesboro, AR; Jackson, MS; Morgan City, LA; and Brenham, TX.







South Central



Memphis, TN T-MOBILE LTE

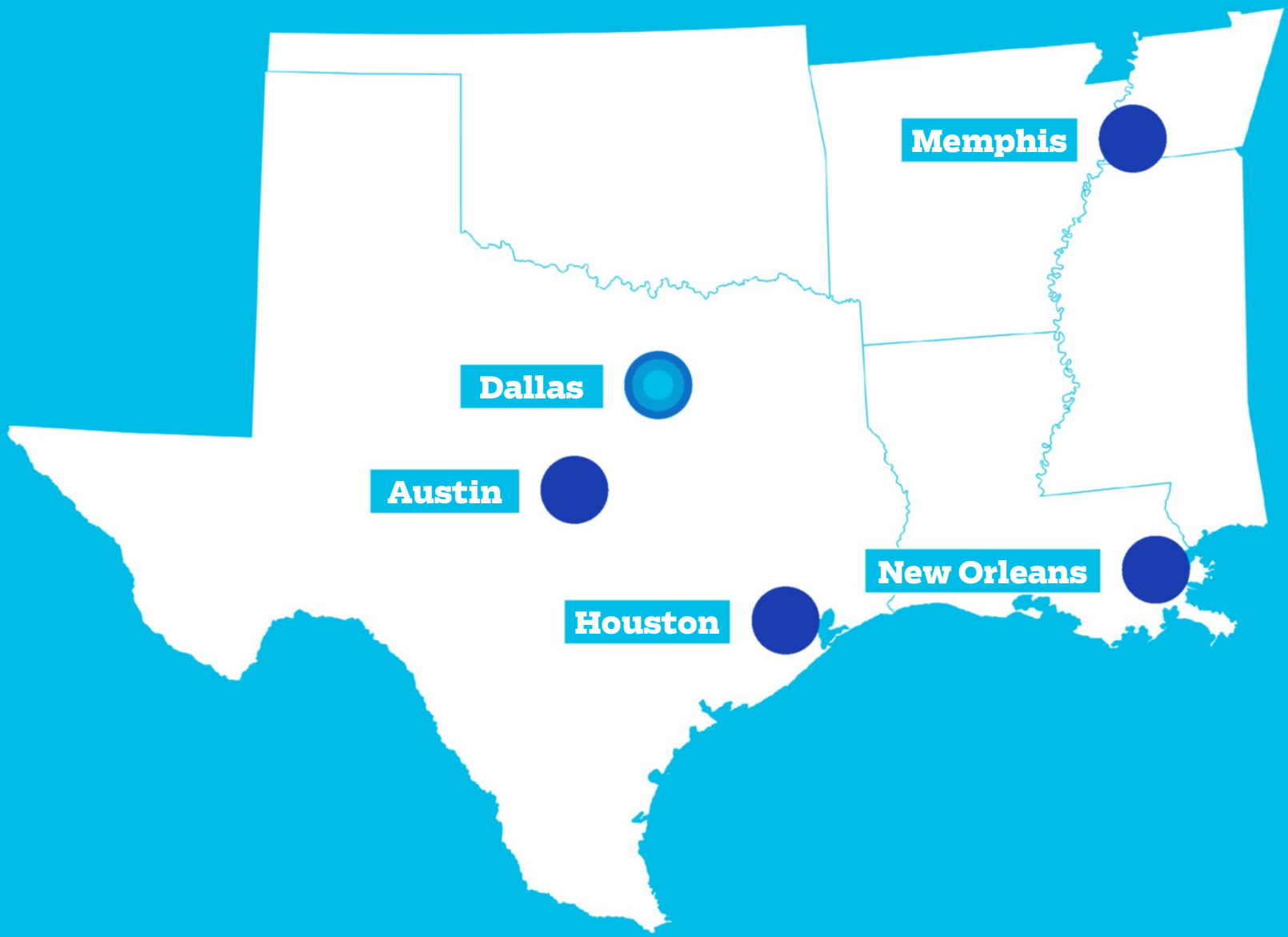
T-Mobile used to have a really hard time in Memphis. Not anymore: Although its LTE network isn't quite as reliable as AT&T's or Verizon's yet, it's safely faster. That's a big shift from last year, when T-Mobile was really spectrum-pinched in Memphis; scooping up some old U.S. Cellular spectrum in a deal last year made the difference for Magenta. That said, everybody's a bit of a winner here, even Sprint. Verizon saw its average speeds skyrocket from 11 to 18Mbps over the past year thanks to XLTE. Sprint's average speeds vaulted up, too. AT&T's speeds declined, but not by as much as we've seen in other cities. (That said, AT&T also provided our single fastest set of results, with speeds at the Eastgate Shopping Center hitting 60Mbps.) T-Mobile's greatest strength in Memphis was Web download speeds, so surfing on that network should be a pleasure.








South Central



Dallas, TX T-MOBILE LTE

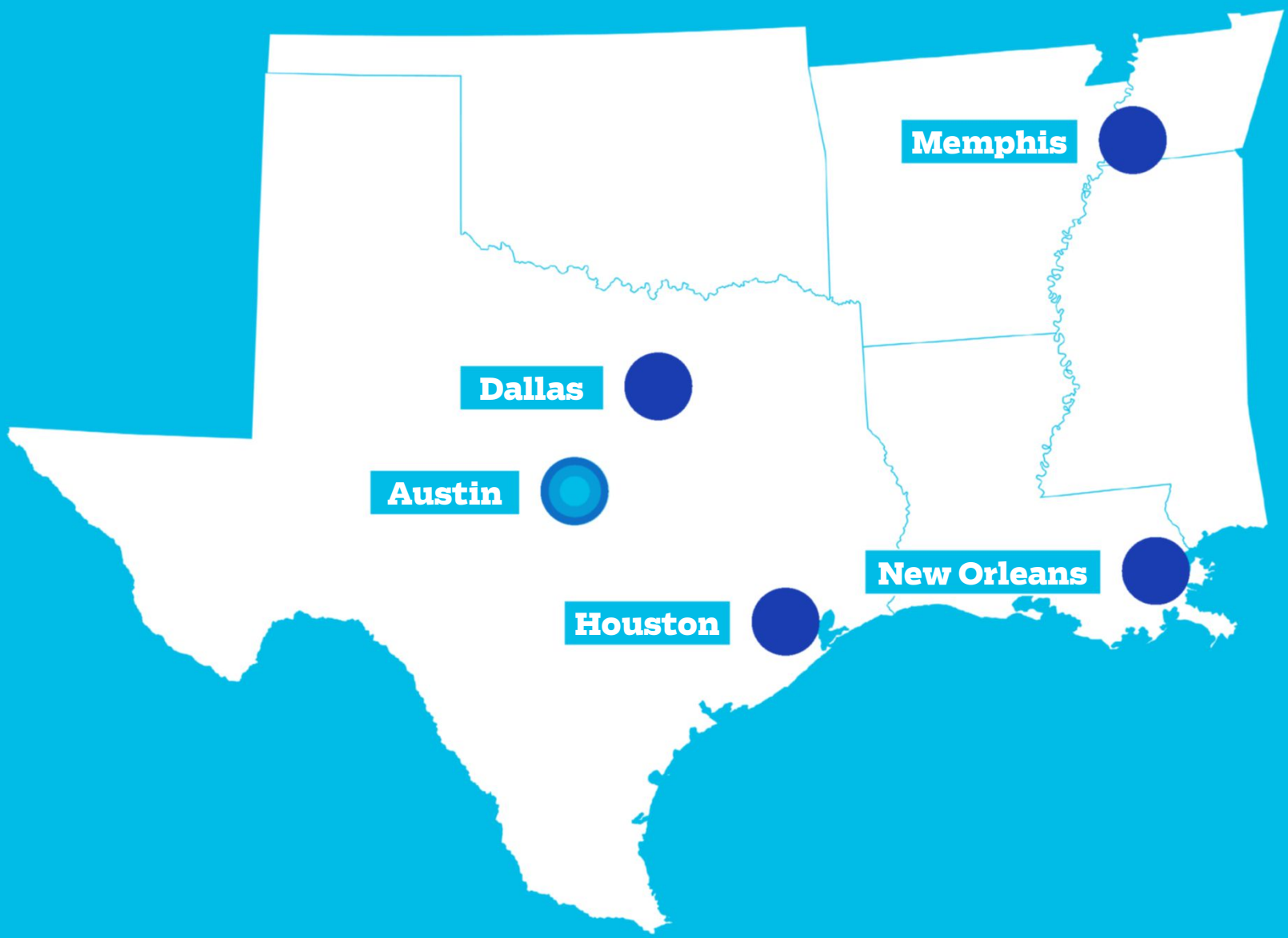
Dallas is MetroPCS's old home city, so T-Mobile has more spectrum here than it does almost anywhere else. It has used that spectrum to good effect, delivering speeds that dominate the other major wireless carriers. T-Mobile gets extra points for consistently delivering download speeds over 5Mbps on its LTE network more often than its competitors do. I was surprised, however, to find that Dallas is overall a much slower city than it was last year. We saw declines in speeds across the board, with the exception of Sprint's LTE network; AT&T showed the most precipitous drop, struggling especially with a capacity issue downtown at Pioneer Plaza. That's made Dallas one of our slower cities across all networks this year, a major shift from 2012 and 2013.








South Central



Austin, TX T-MOBILE LTE

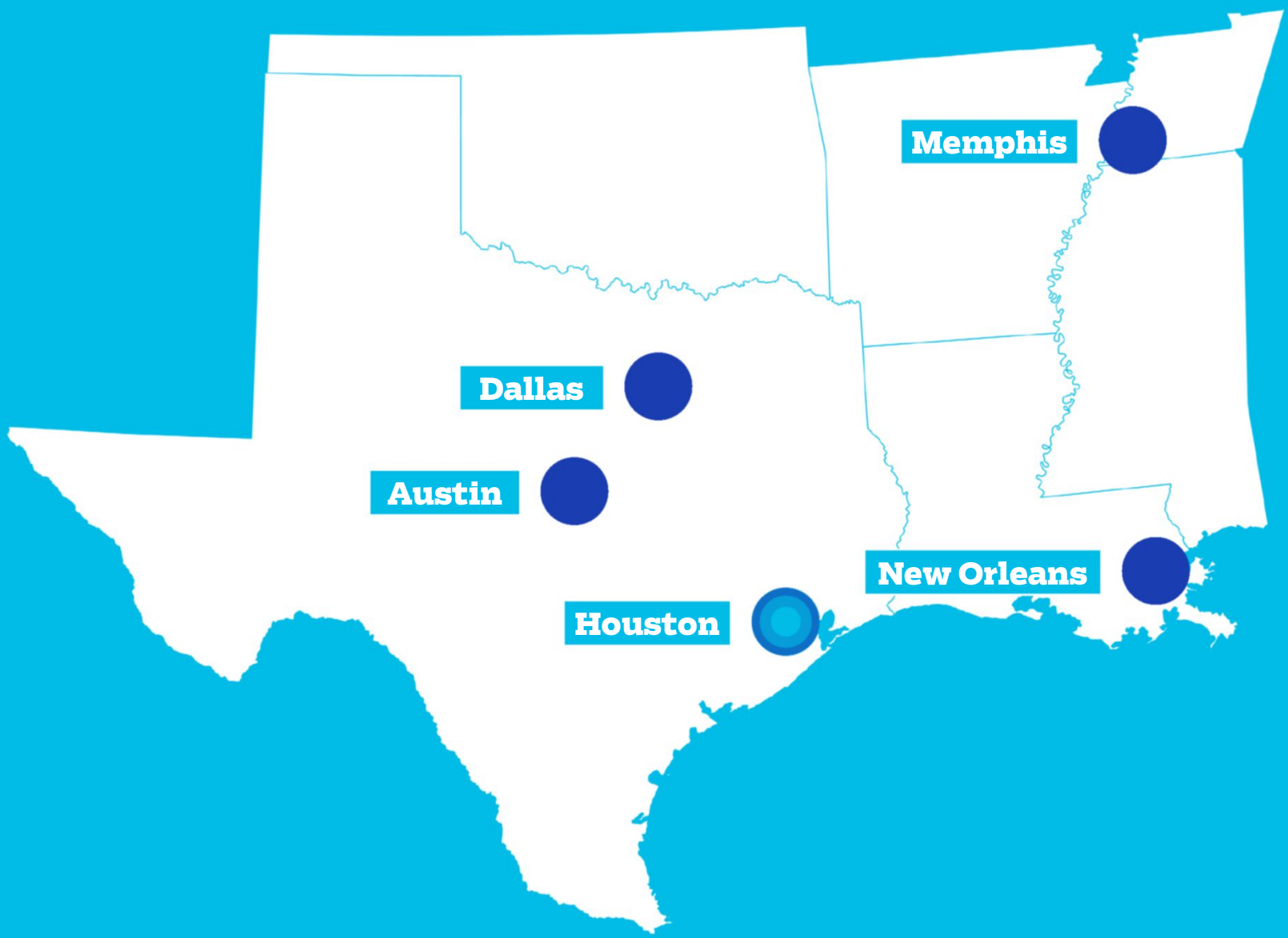
T-Mobile's LTE network won every single speed measure in Austin, making it the clear choice. Our phone briefly dropped to 3G along Lime Creek Road and in Manor, but T-Mobile's 3G network is still pretty fast, so we didn't mind. Verizon's LTE network offered somewhat better LTE coverage at somewhat slower speeds, but when it drops down to 3G, it drops a lot further than T-Mobile does. AT&T had a bit of a capacity problem with individual cell sites in Austin. At E 7th and Navasota, for instance, we saw solid LTE signal but a chunk of slow speeds that ramped up at the end of our test, showing that AT&T's connection there was saturated for part of our test period. We saw the same thing by one corner the Dell Children's Medical Center, but speeds increased as soon as we traveled a block down Barbara Jordan Blvd.








South Central



Houston, TX VERIZON WIRELESS LTE

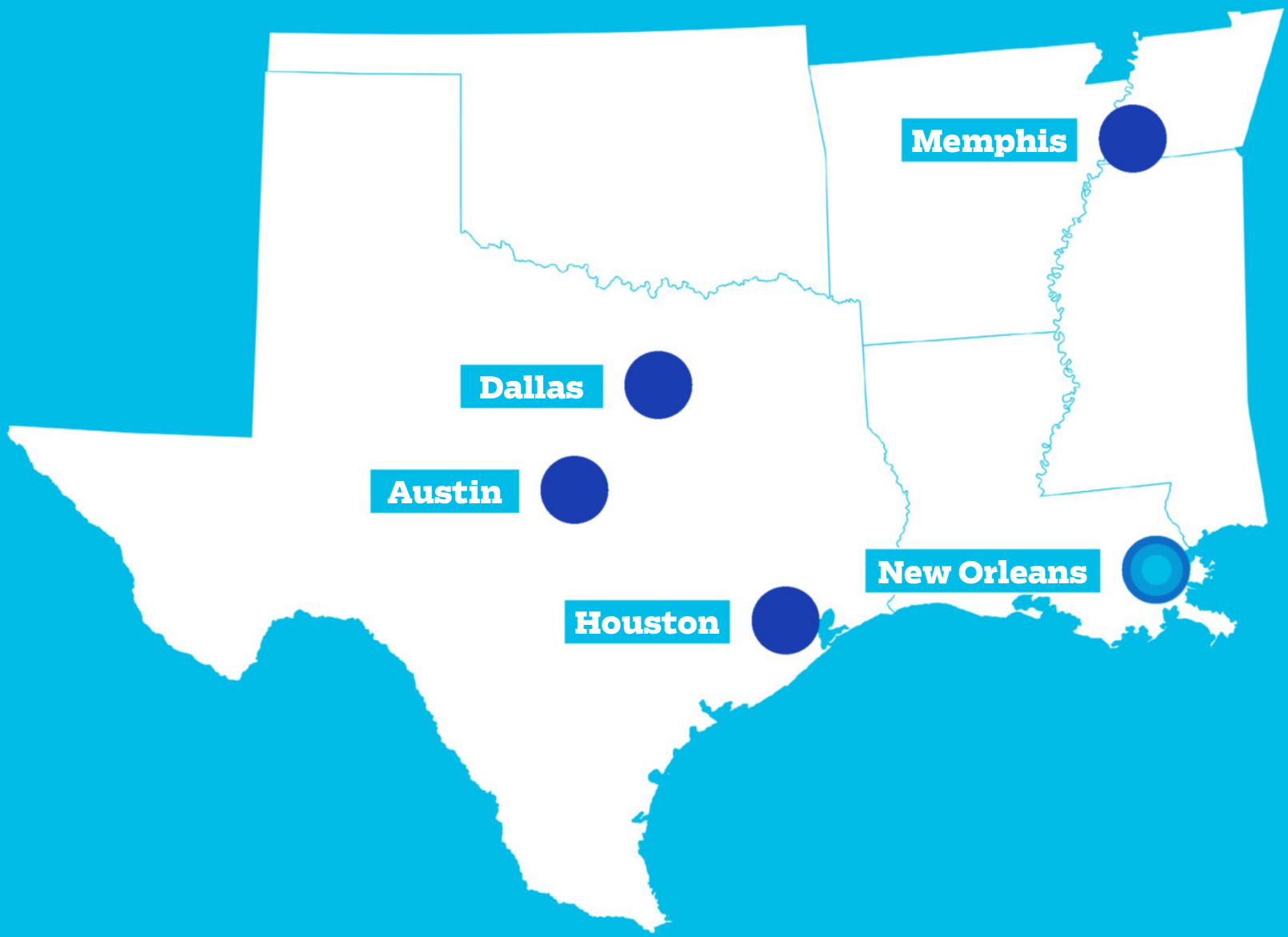
XLTE ruled the day in Houston, with Verizon's new spectrum allowing for average speeds much faster than any competing network's. That makes Verizon Wireless the winner this year in Houston by a landslide. AT&T also did well, topping last year's speeds—just not to the extent that Verizon Wireless did. In fact, with solid results from Verizon, AT&T, and T-Mobile, Houston has a good selection of fast wireless networks to choose from. Houston is a Sprint Spark city, and the good news is that we did see some Spark in Memorial, at the Houston Arboretum, and even out in Prairie View. But we saw slower LTE speeds elsewhere, and our Sprint LTE phone bounced between 3G and LTE several times in Houston.








South Central



New Orleans, LA VERIZON WIRELESS LTE

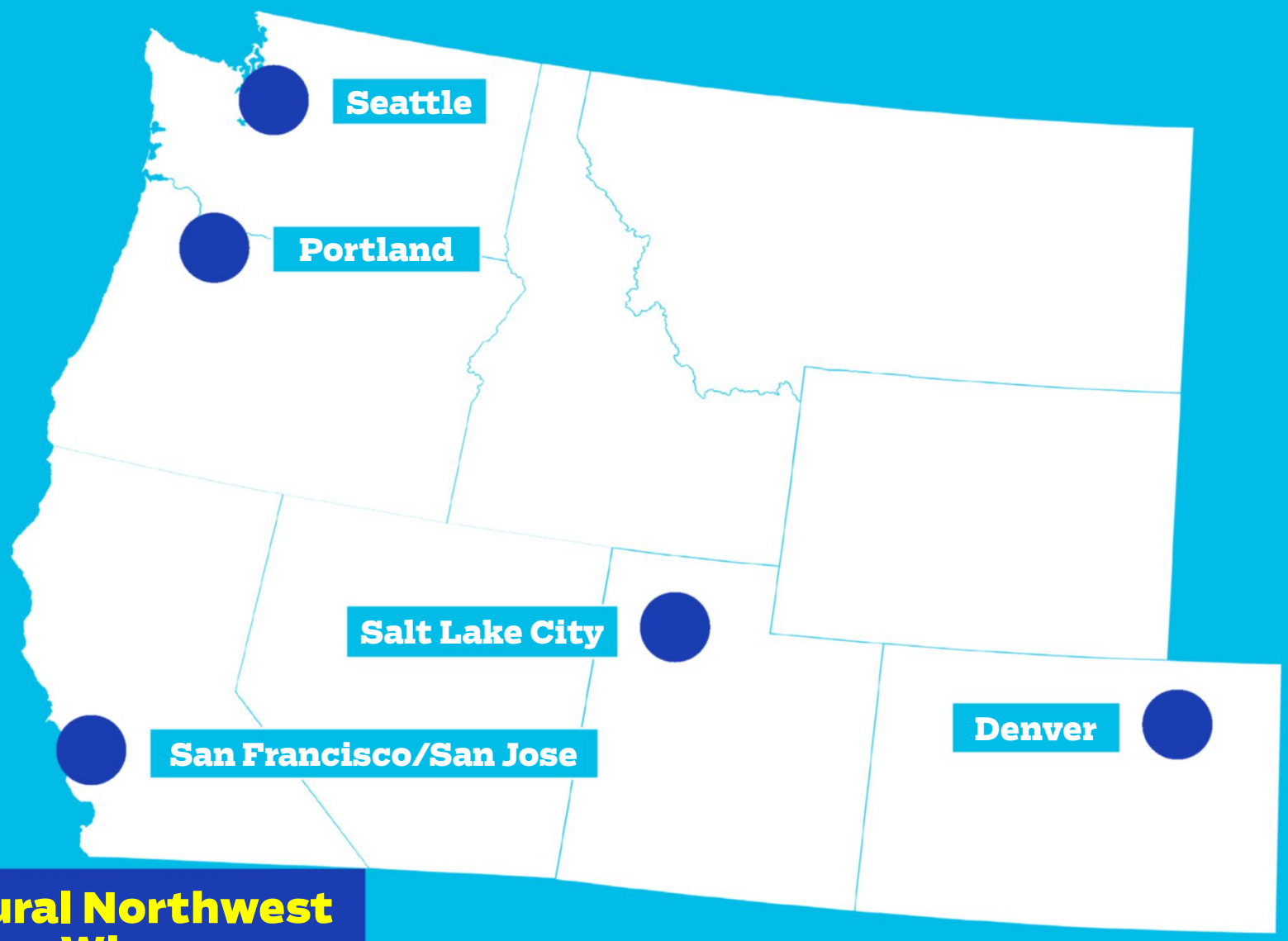
It's Verizon XLTE for the win again in New Orleans. Verizon's LTE network saw a 70 percent speed jump from last year to this year, and it scored the best of any network on uploads, downloads, and reliability. Sprint's and T-Mobile's performance both improved between last year and this, but AT&T's declined because of extreme network variability. AT&T would show flashes of great speeds while we were driving through town—43-56Mbps in the Treme, for instance—but speeds would settle down when we stopped for our stationary testing, which is the opposite of what's supposed to happen. That left previously dominant AT&T in a near-tie with T-Mobile for second place.








Northwest



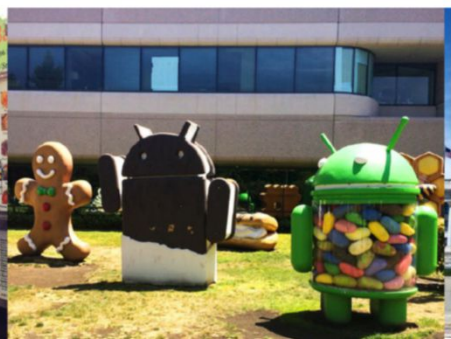
Rural Northwest Winner

Rural/Suburban Winner VERIZON WIRELESS LTE

Route: I-25 from Denver to Cheyenne, across to Rock Springs, then down into Utah from there, down I-15 through Utah, and later, up the 101 from San Francisco to Crescent City, then down Redwood Highway to I-5 all the way to Seattle.

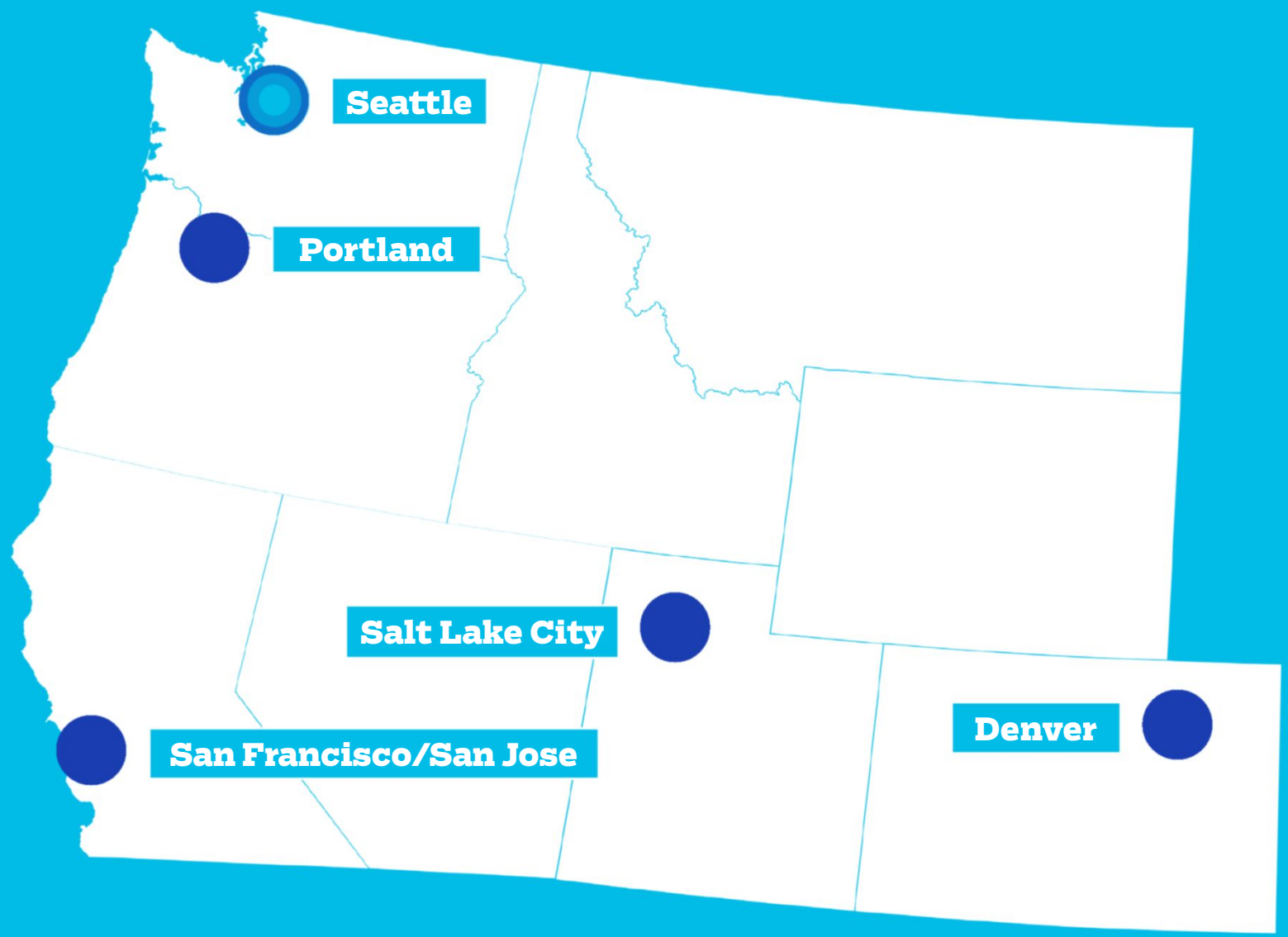
The bold mountains of Wyoming and the thick forests of northern California can be hell for wireless network builders. That doesn't seem to have fazed Verizon, which delivered excellent LTE speeds with decent coverage over our northwest rural area. Nobody held up the whole way, however. If you do a lot of driving in this part of the country, we suggest you get a satellite phone or satellite-based safety device like a SPOT communicator. Do not rely on your mobile phone through these very rural areas. Verizon did a solid job building out LTE in many small cities we passed. The most consistent network overall was AT&T's 3G network, but even that dropped out on the stretch of US-199 through the Rogue River National Forest.





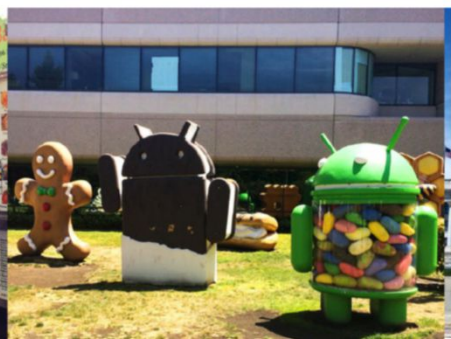

Northwest



Seattle, WA VERIZON LTE

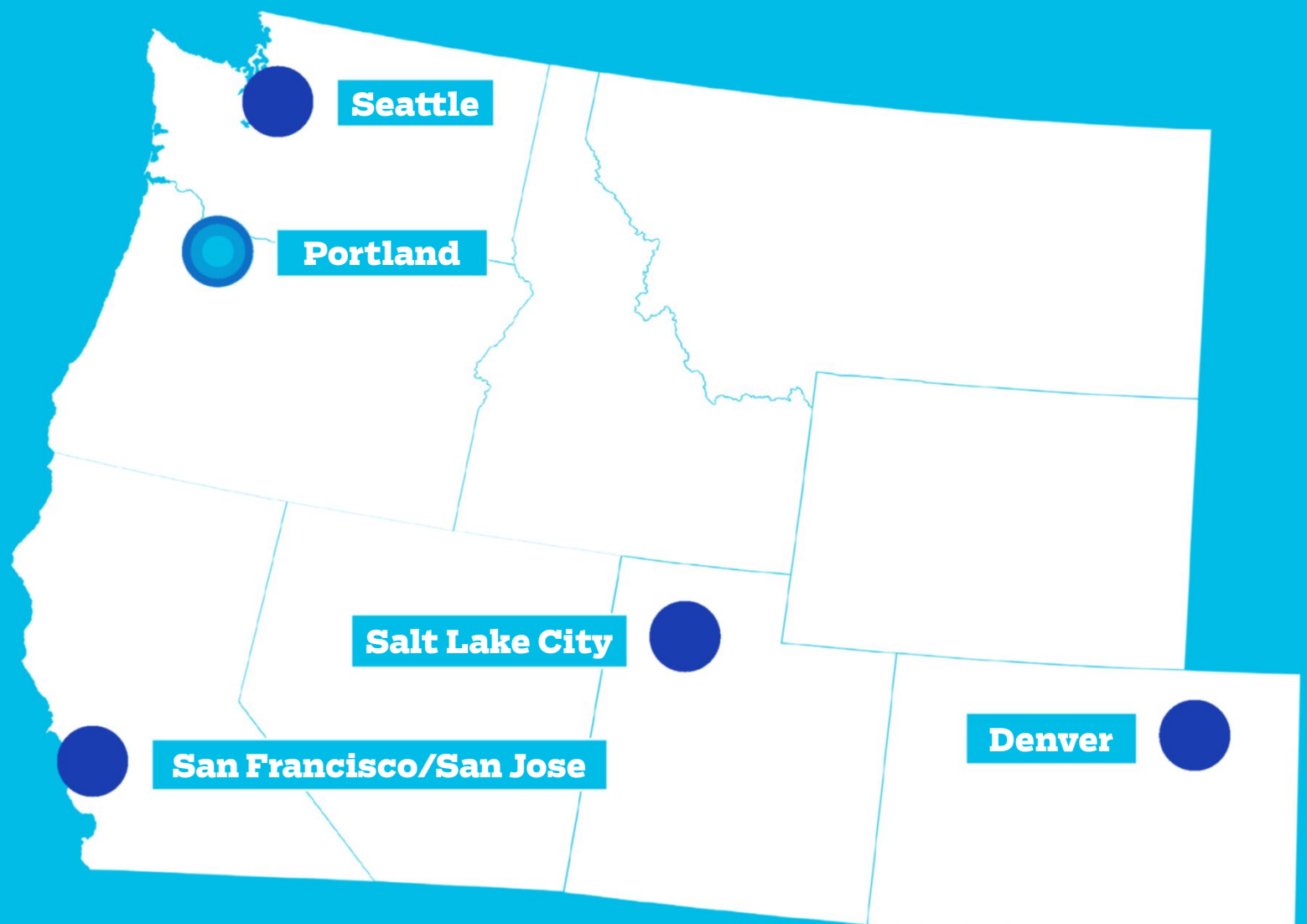
XLTE rules Seattle. Verizon's LTE network turned in amazing results in our ten tests around the city, with excellent network availability and just stunning speeds. T-Mobile also did well, but it couldn't compete with Verizon. For example: In most cities, when we saw 80Mbps speeds, it was usually on a single fluke test. But on the UW campus, we saw a string of 80Mbps results—pow, pow, pow. Up in Northgate, we saw a string of 70s. Lots of wow. That'll burn up your data plan in minutes, of course. T-Mobile and Sprint offer unlimited data; of the two, T-Mobile is the better bet. Seattle is T-Mobile's hometown, and the carrier was solid across all of our drive tests. Of course, the fastest speeds (66Mbps down) appeared on T-Mobile's corporate campus in Bellevue. Seattle isn't yet a Sprint Spark city, so speeds were pretty low, although we did find an active Spark tower in Lakeland North.





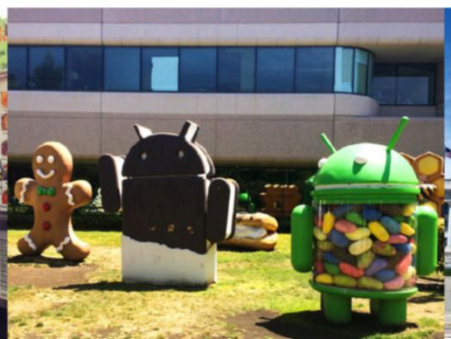

Northwest



Portland, OR T-MOBILE LTE

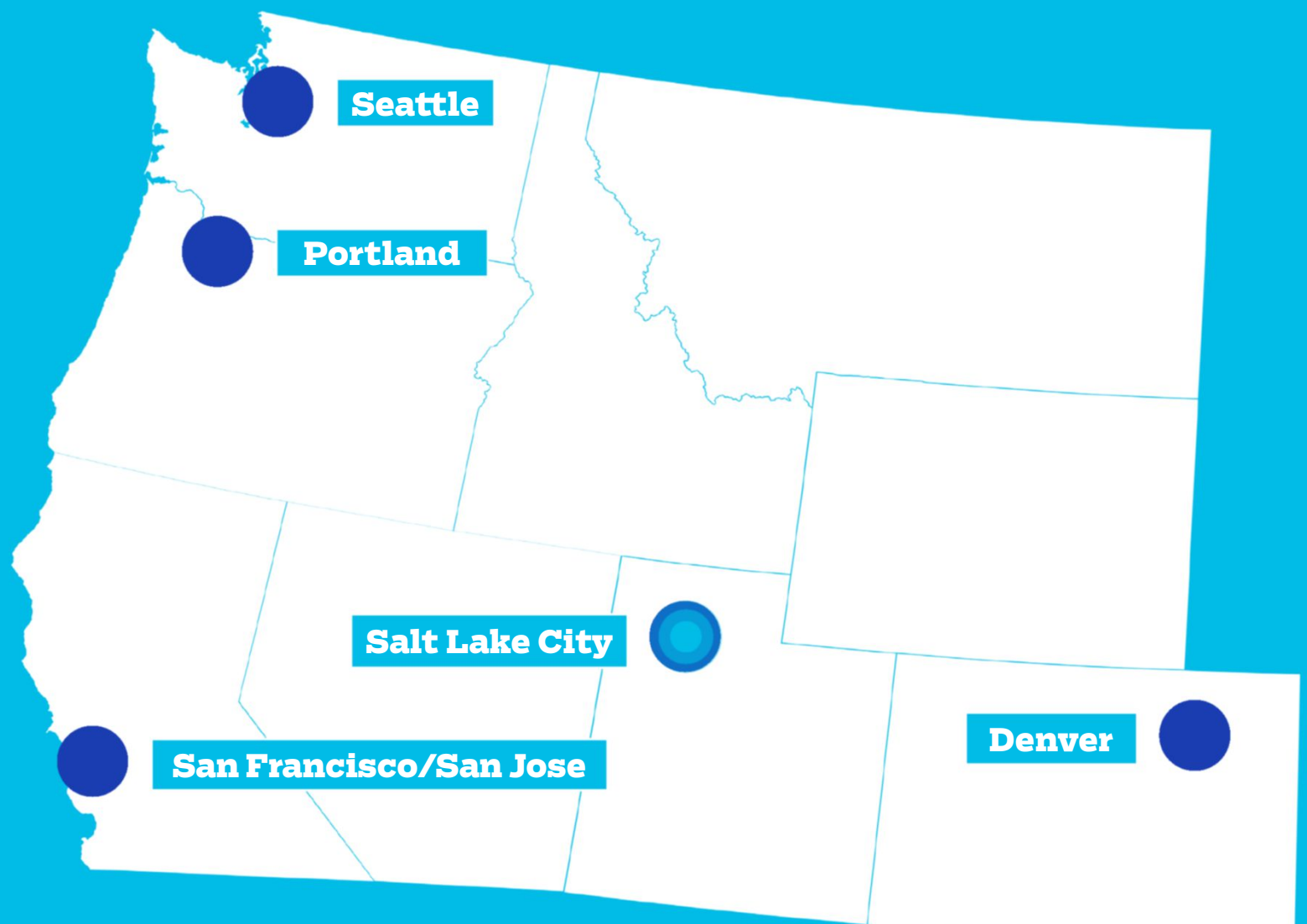
AT&T, T-Mobile, and Verizon all did well in Portland, but consistently high speeds ended up winning the day for T-Mobile. Although AT&T and Verizon each had some tests below our 5Mbps download threshold, T-Mobile had hardly any, whether on its HSPA+ or LTE networks. That means a T-Mobile connection in Portland will deliver a 4G-feeling experience more often. Sprint's performance in Portland was terribly uneven. We saw some top-notch Spark speeds at the airport and by the University of Portland, but our device bounced between LTE and 3G more often than LTE phones on the other carriers. Remember that T-Mobile's LTE network is still primarily urban. We saw much less T-Mobile LTE than AT&T or Verizon between Portland and Eugene, and none south of Eugene, where our T-Mobile phone fell back to 2G.





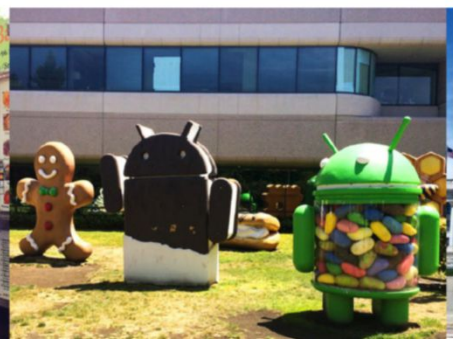

Northwest



Salt Lake City, UT T-MOBILE LTE

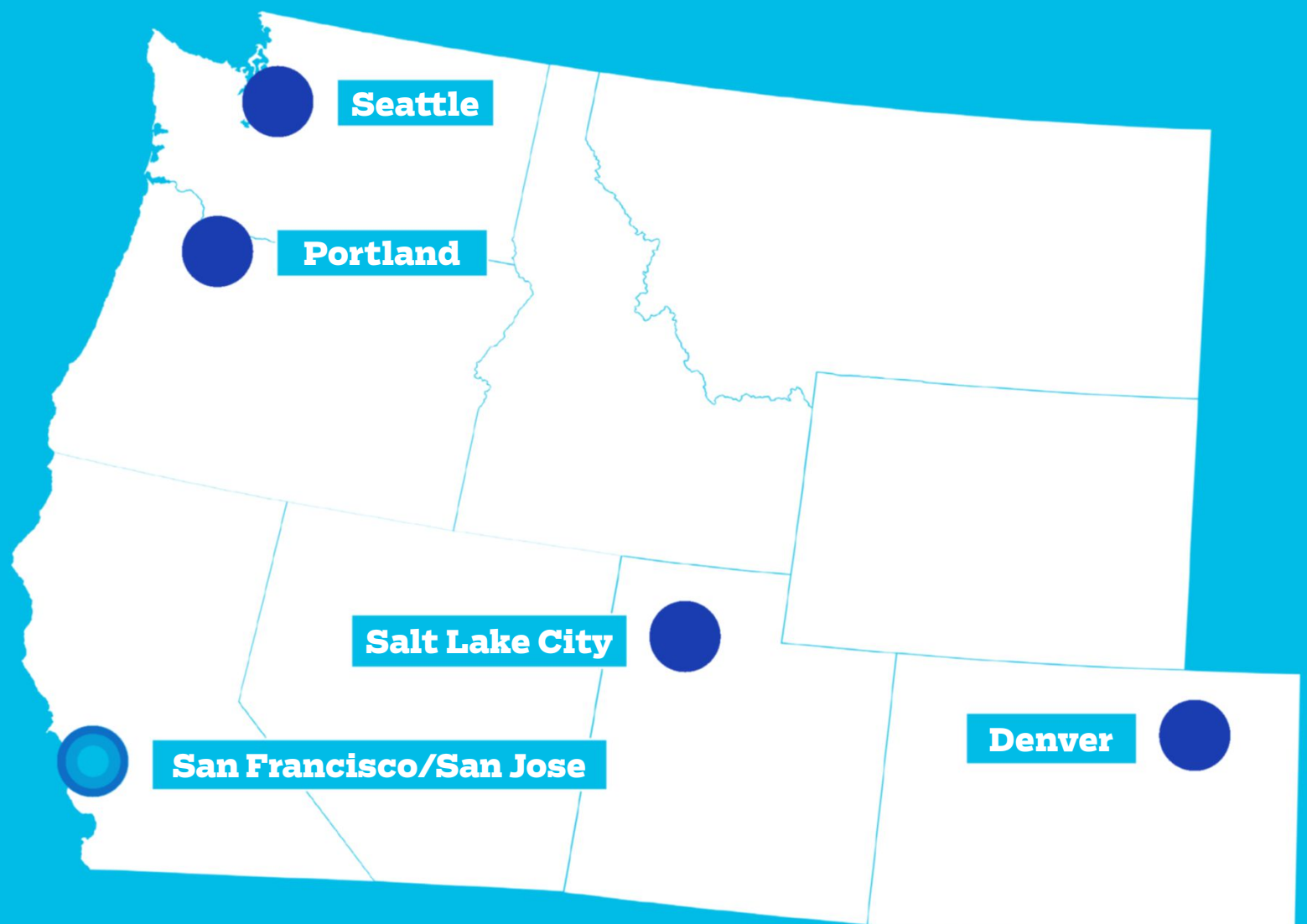
T-Mobile's performance in Salt Lake City shows why it's important to look at speed distribution across a large number of tests. AT&T and Verizon had better peak download speeds, and Sprint matched T-Mobile's download peak. Almost half of AT&T's LTE download results were below the 5Mbps threshold we established for a good LTE experience. With T-Mobile, 97 percent of its tests were over 5Mbps. As usual, Verizon also did well here. Sprint offers Spark service in Salt Lake City and Provo. We saw it at the airport and Brickyard Plaza, but not elsewhere; our crowd-sourced testers also showed similarly poor results finding Spark, although it showed up pretty reliably downtown on one tester's LG G2 phone.





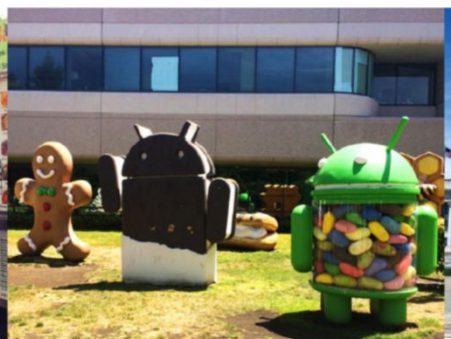

Northwest



San Francisco/San Jose, CA T-MOBILE LTE

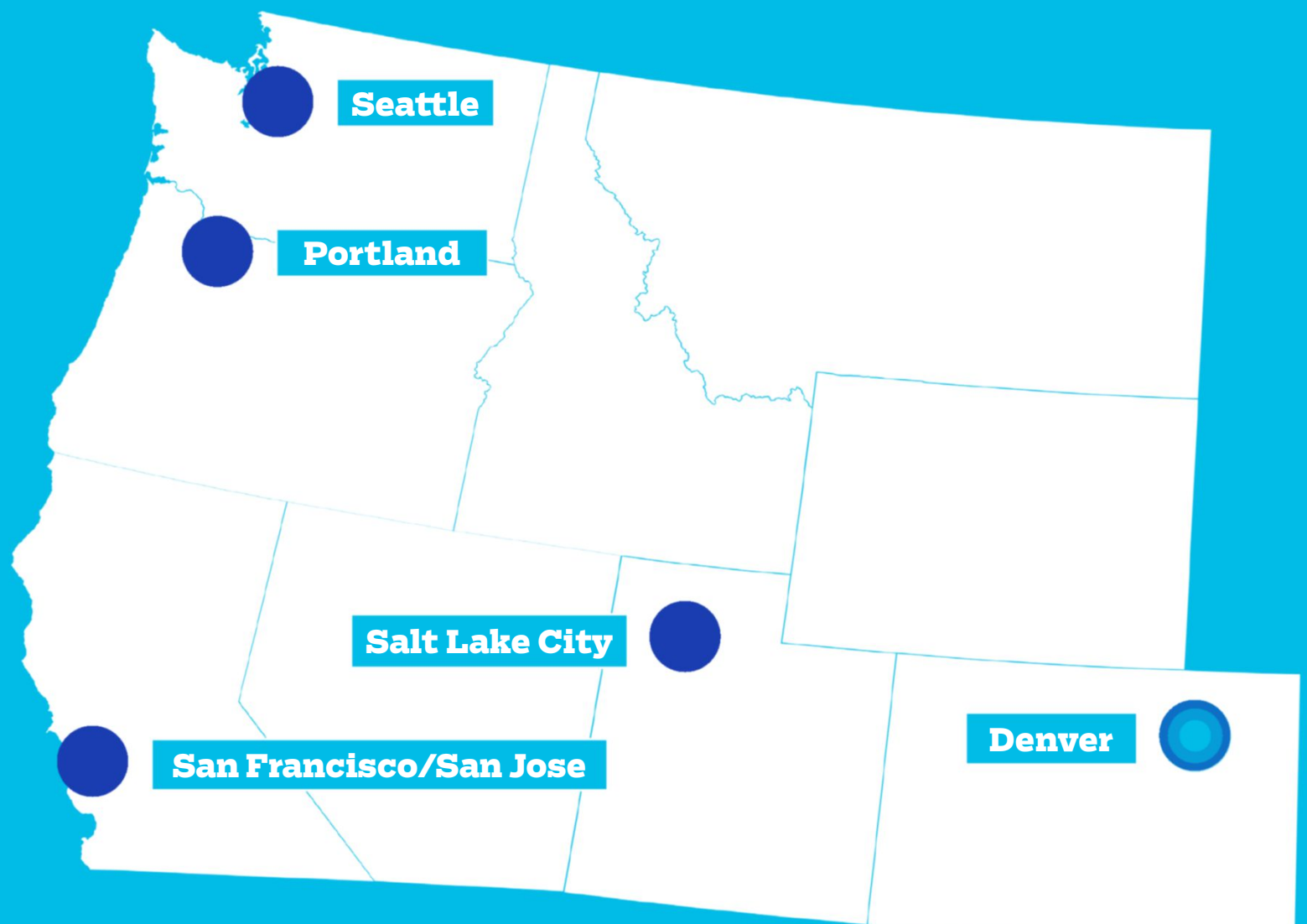
T-Mobile's speed killed the competition in the Bay Area. We did five tests in San Francisco and then drove down the peninsula to San Jose, doing three tests in Silicon Valley and three in San Jose. As we've seen elsewhere, AT&T and Verizon showed higher peak speeds than T-Mobile, but T-Mobile consistently delivered download speeds over 5Mbps and upload speeds over 2Mbps more often than the competition, making it a more reliably LTE-class experience. You'd think T-Mobile coverage would vary across the metro area, but we found surprisingly consistent high speeds all the way down the peninsula. We did see some brief drops to 3G at Stanford and on the 280, but T-Mobile's HSPA+ network is also really fast—in fact, those speeds tended to blend right into the LTE picture.





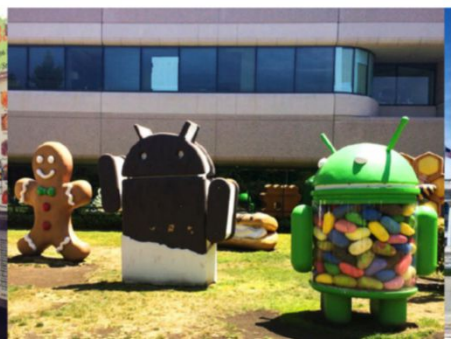

Northwest



Denver, CO T-MOBILE LTE

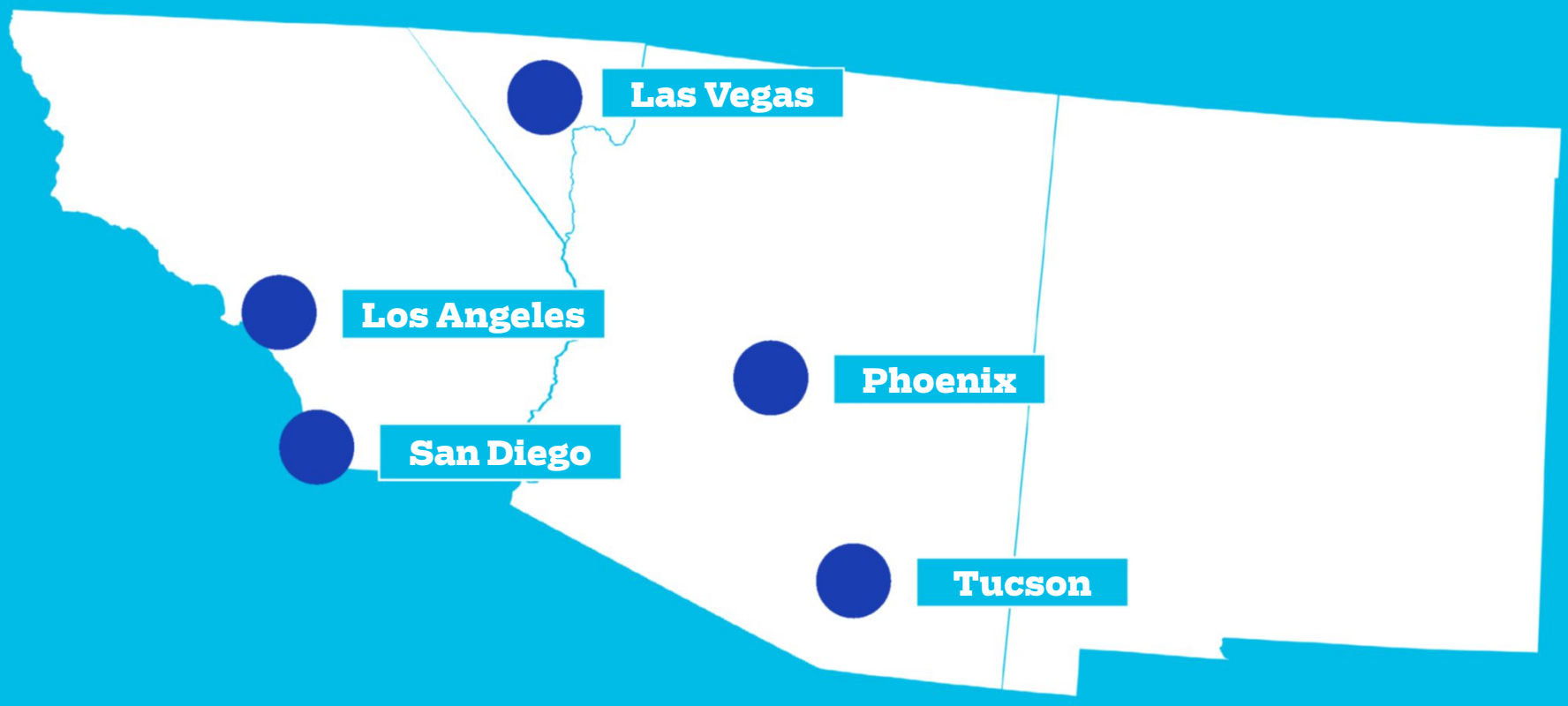
Denver is the only city we tested this year without four official LTE networks. Sprint hasn't launched LTE in Denver yet, although we saw a few towers turned on as we drove around town. AT&T and Verizon weren't noticeably slower this year than they were last year. The big news is T-Mobile's new LTE network, which launched last July and has just been going gangbusters all around the Denver metro area. It's really fast—as long as you don't travel farther out than Longmont or Boulder. This year, we drove up I-25, through Fort Collins, and then into Wyoming on our way to Salt Lake City. T-Mobile coverage in Denver was excellent, but it was much poorer in the more rural areas. If you tend to drive farther afield, take a closer look at Verizon Wireless.






Southwest



Rural Southwest Winner

Rural/Suburban Winner VERIZON WIRELESS LTE

Route: US-93 from Las Vegas down to Phoenix, I-10 from Phoenix to Tucson, I-8 to San Diego, and I-5 to Los Angeles and Bakersfield.

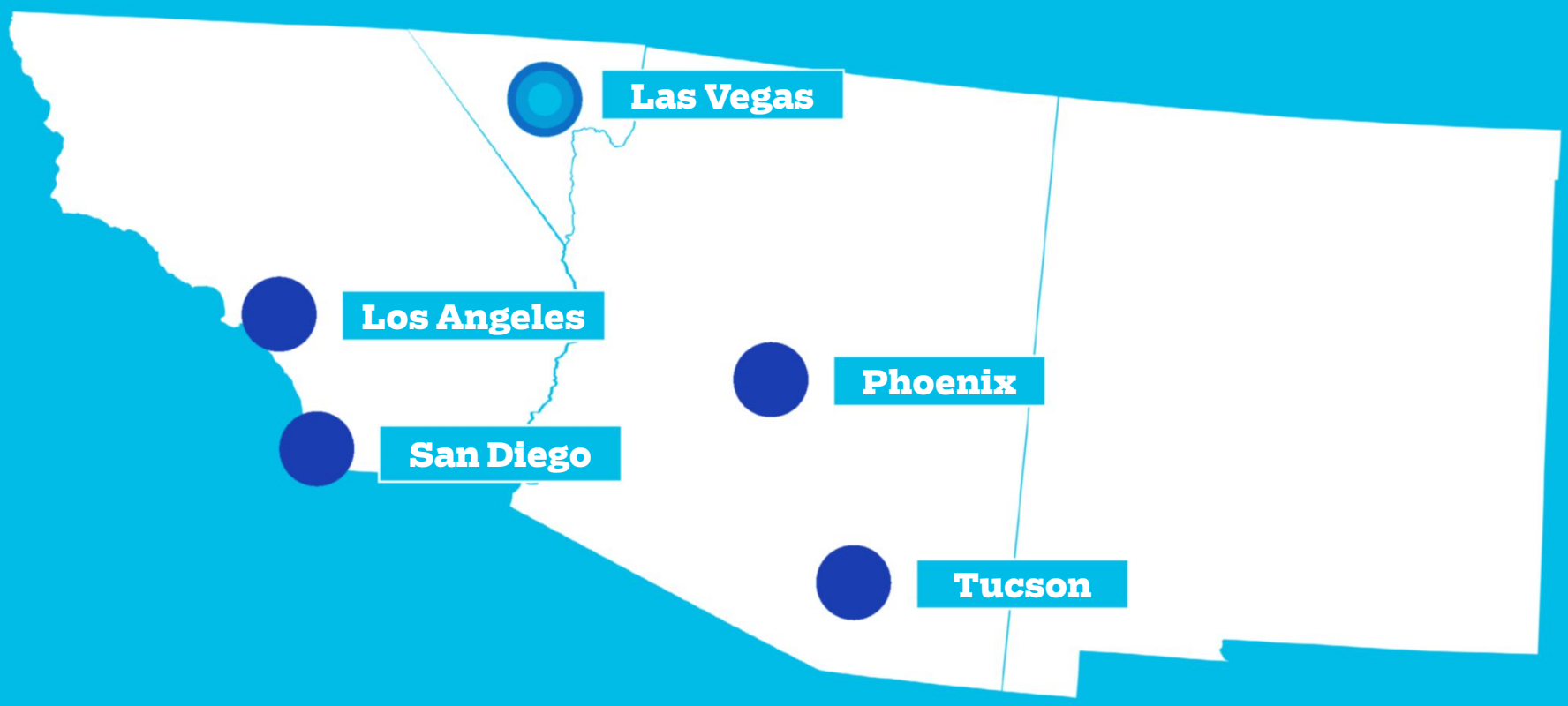
As we saw elsewhere, Verizon's LTE network and AT&T's 3G network were the two most reliable networks on this drive by far, and Verizon's LTE network beats AT&T HSPA for speed hands down. Our fastest results came in Bakersfield, which is, of course, a significant-sized city. In this area, Sprint and T-Mobile LTE were both disqualified for being available less than 30 percent of the time.








Southwest



Las Vegas, NV T-MOBILE LTE

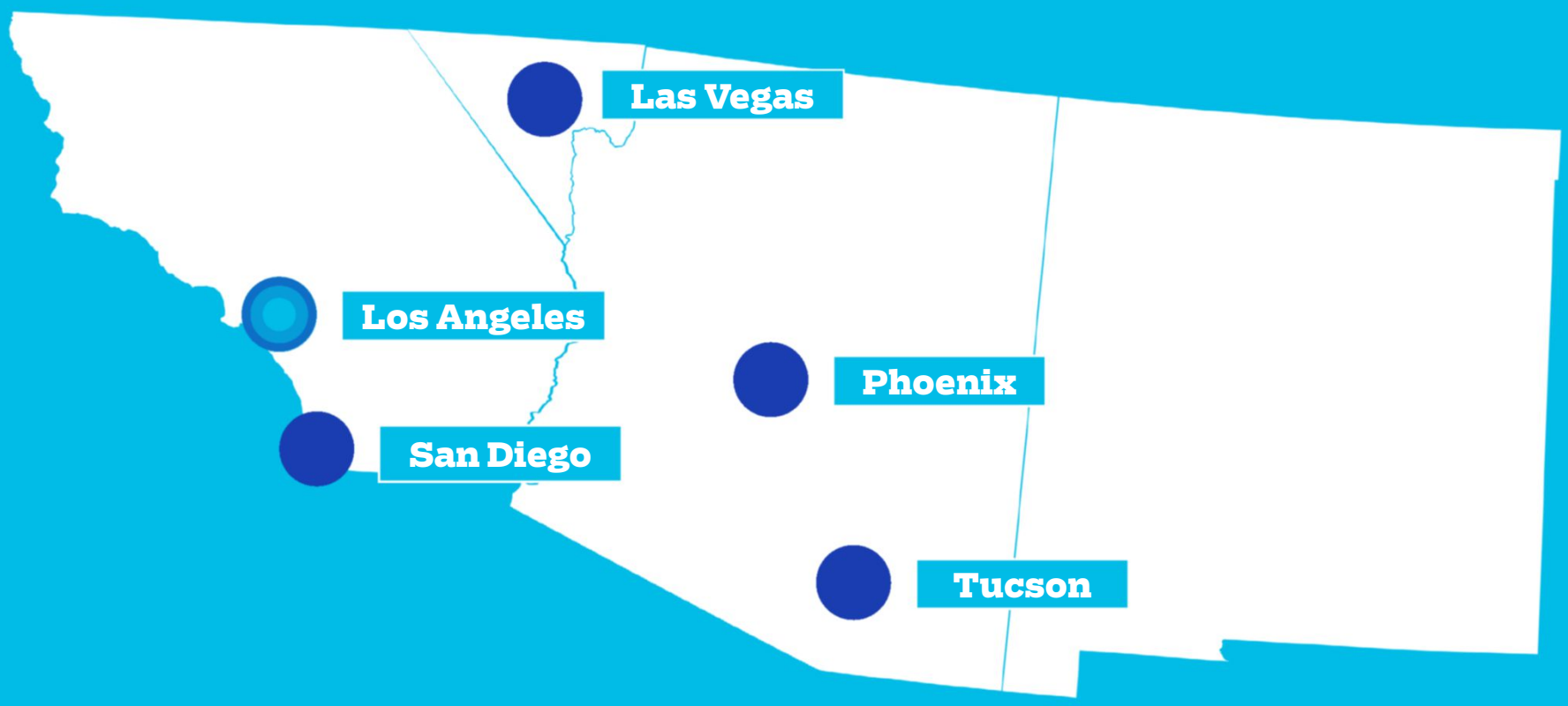
Think of T-Mobile as the Selfie Network. T-Mobile and Verizon both have a lot of spectrum in Las Vegas, and they've both been upgrading to broad 20MHz channels. T-Mobile won in large part because of much faster upload speeds—that's the time it takes for your high-res selfie to make it to Instagram. Download-wise, T-Mobile's speed advantage came and went across our ten test sites. T-Mobile did better along the Strip, Verizon showed better performance in neighborhoods west of I-15. Within big hotel-casinos, of course, anything goes: Reception there is entirely dependent on whether that casino has made a deal with your carrier of choice for an in-building coverage system. I've seen mixed results in dozens of trips to Las Vegas over the past ten years.








Southwest



Los Angeles, CA TIE (T-MOBILE LTE AND VERIZON LTE)

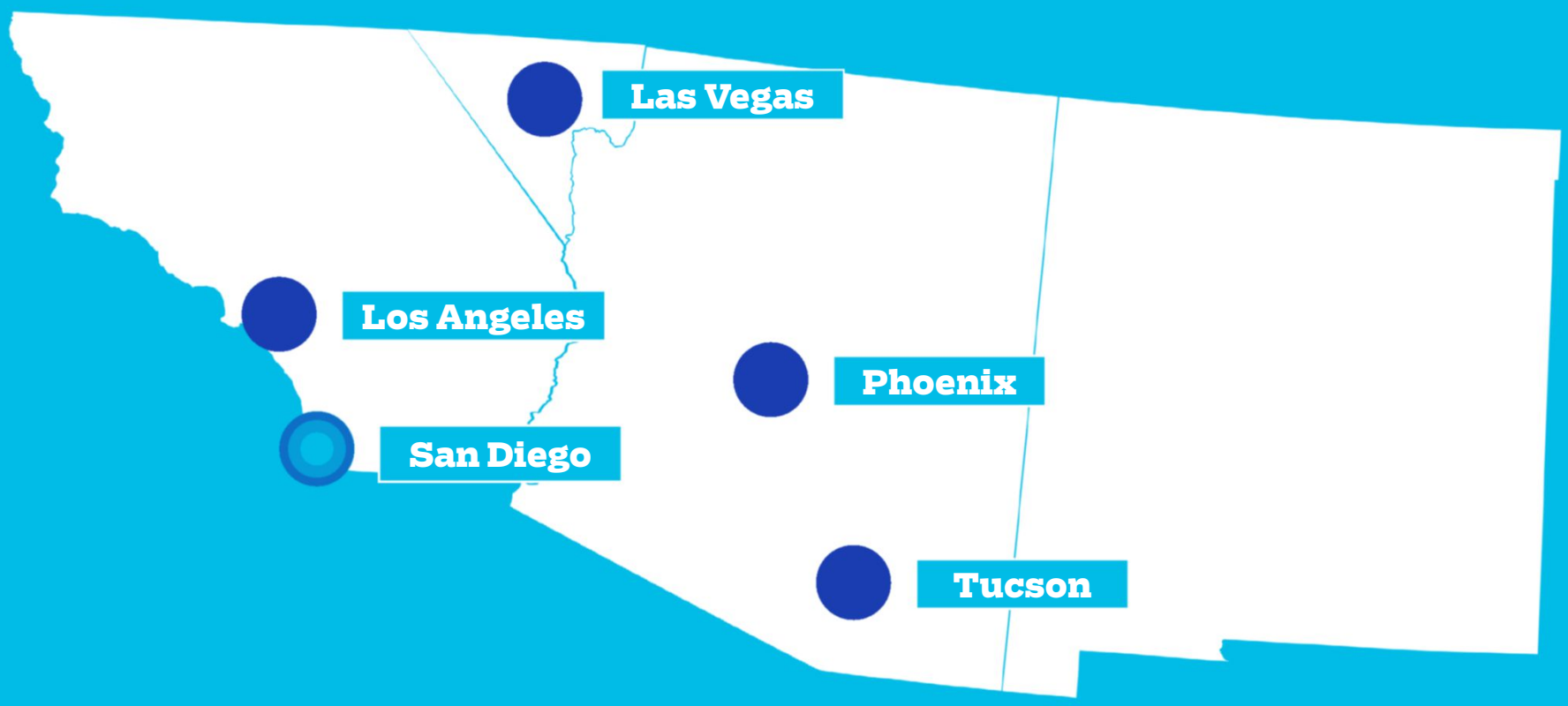
Are you into uploads or downloads? T-Mobile and Verizon tied on our weighted score in Los Angeles, but you still have to decide. Verizon delivered faster peak and average download speeds; T-Mobile LTE had somewhat faster uploads. The networks broke dramatically differently across neighborhoods. We saw stronger T-Mobile and AT&T results than Verizon downtown. Just a few miles away, Verizon dominated around USC, and T-Mobile performed very well in Westwood and Santa Monica. T-Mobile delivered admirable speeds up in Pasadena and Pomona, and Verizon had better LTE reliability in parts of Orange County. Nobody had perfect network reliability in Los Angeles—in most other cities, at least one network had a Web completion score above 90 percent. With such imperfect networks, it's important to try out new phones during their return period before you commit to a carrier choice.








Southwest



San Diego, CA VERIZON WIRELESS LTE

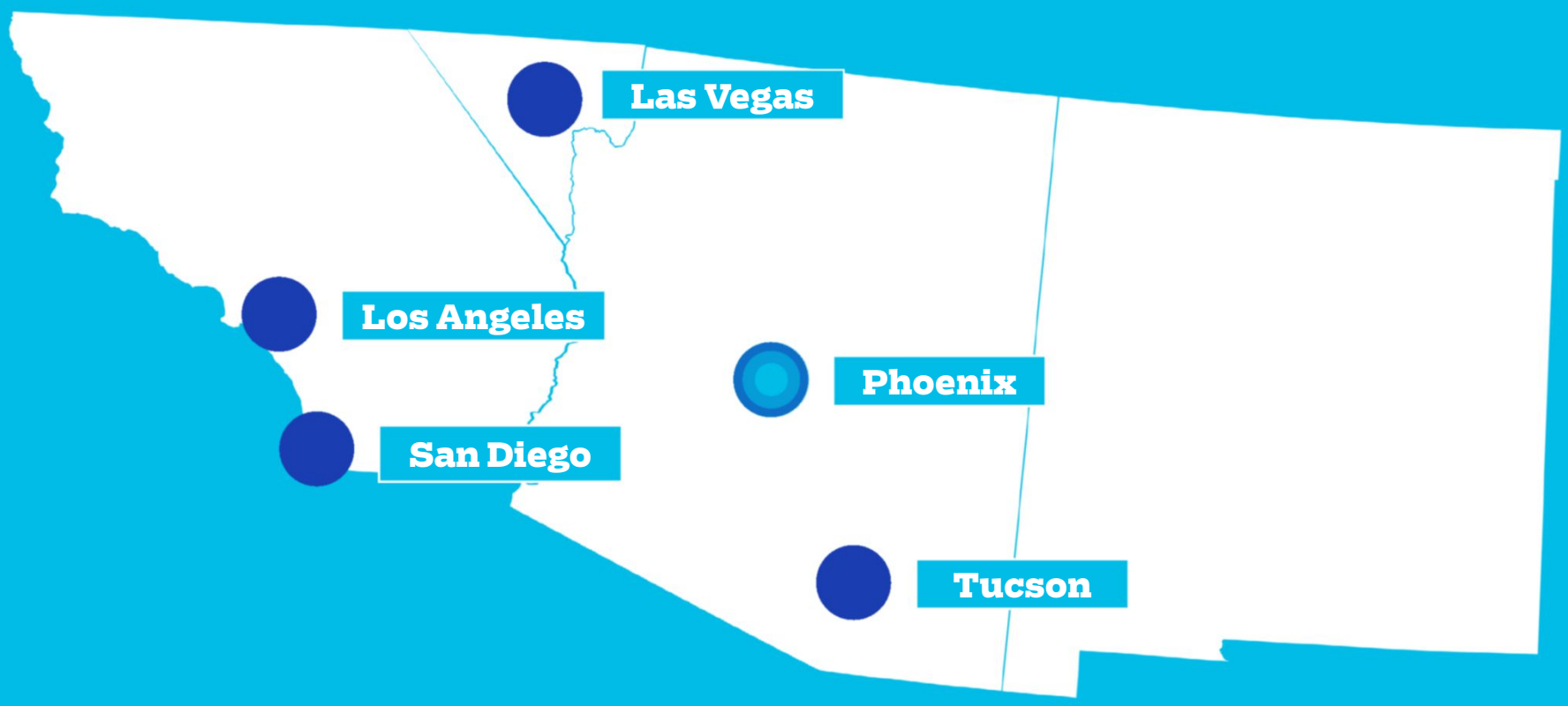
Superior reliability gave Verizon Wireless the crown in San Diego; all three of the other LTE networks dropped to 3G at some point during our roaming around San Diego County, but Verizon never did. Combine that with dramatically higher speeds this year compared with last year, and we found our winner. Across southern California, Verizon looks like the Cadillac choice right now and T-Mobile the affordable alternative. AT&T needs to step up reliability here, as the network had some wobbles in Point Loma and La Jolla at locations that proved no problem for Verizon's LTE network.








Southwest



Phoenix, AZ T-MOBILE LTE

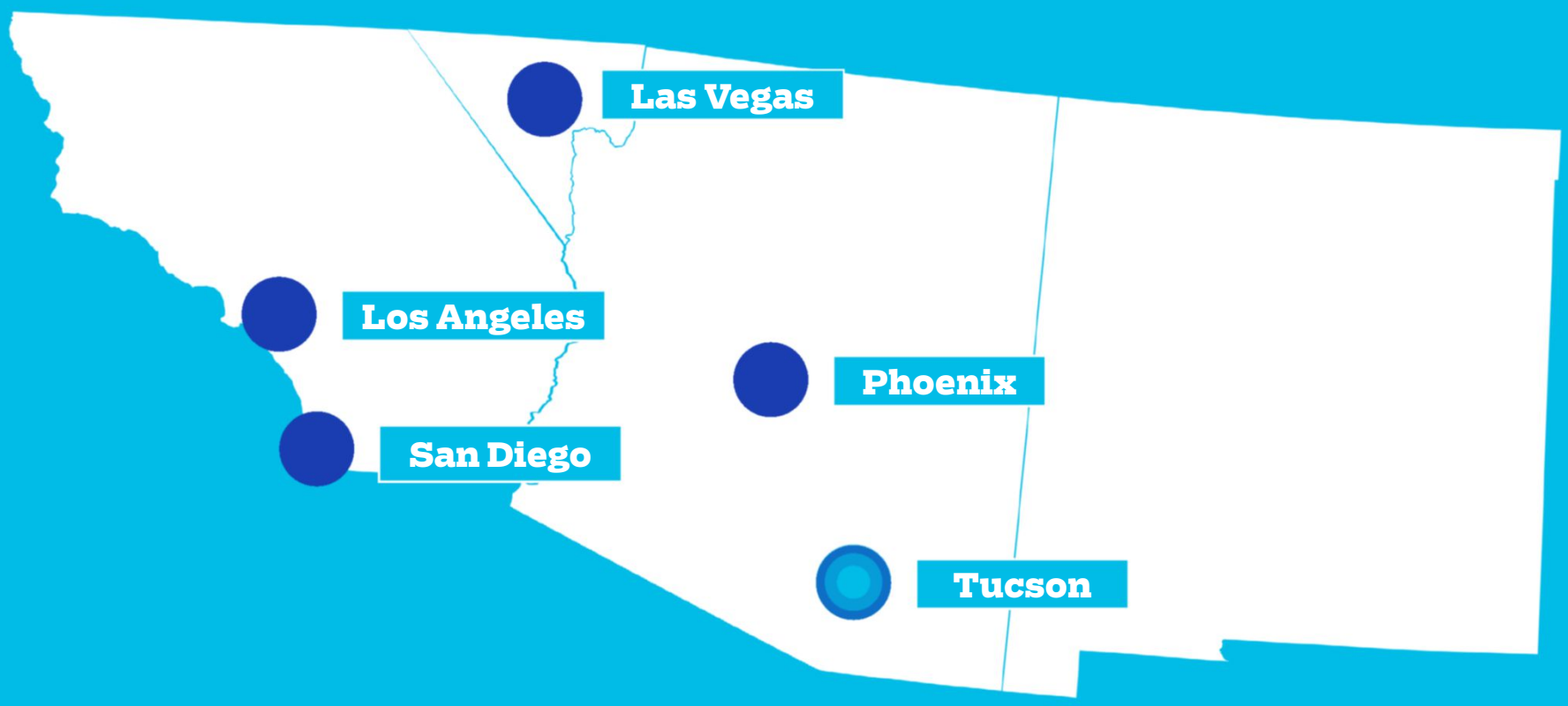
I remember when we drove past a lone T-Mobile LTE tower in Phoenix last year and I said, “This thing looks fast.” Well, T-Mobile put up the rest of the towers, and they are indeed fast. T-Mobile won Phoenix over Verizon by providing more consistently speedy downloads and considerably faster uploads; the carrier’s 4G network is also paired with a 3G network that’s better at picking up the slack than Verizon’s 3G system. AT&T delivered fast speeds, but hit a couple of saturated choke points in town. If you regularly drive between Phoenix and Tucson, meanwhile, look more closely at Verizon; it did the best job maintaining consistent LTE coverage down to Casa Grande and beyond.








Southwest



Tucson, AZ T-MOBILE LTE

Tucson was a surprisingly slow city all around, with lower average and peak speeds than we saw in much of the rest of the country this year. T-Mobile's LTE network turned in the best performance of a bunch of so-so results, but let's note that T-Mobile's winning score here would have been a loser as close by as Phoenix. That said, we like T-Mobile all around in Tucson because not only did it deliver the highest speeds, it did so with the least coverage drops. T-Mobile has the fastest 3G backup network of the four national carriers, as well, so even when you fall down to 3G, it doesn't hurt you too badly. That said, if you regularly drive between Phoenix and Tucson, look more closely at Verizon; it did the best job maintaining consistent LTE coverage up to Casa Grande and beyond.










Different Carriers, Different Strengths

AT&T is in an off year. It has a generally solid network, but we saw congestion pull down speeds from last year's award-winning heights. Its speeds declined by half in cities like Boston, St. Louis, and Kansas City, even as it got faster in Charlotte, Houston, and Phoenix, and showed admirable LTE coverage across smaller cities in the Northeast. AT&T is preparing several moves to speed up things next year, using carrier aggregation to bring together scattered chunks of spectrum and turning on some new 2.3GHz airwaves.

Sprint is still hauling itself out of a deep hole. Last year, it covered 24 of our 30 test cities with LTE; this year, it has 29. Its Spark project more than doubled LTE speeds in Miami, Philadelphia, and Houston, but we didn't see a similar improvement in Baltimore, Chicago, or New York. More important, Spark just isn't measuring up to its 50-60Mbps promises. Out of more than 29,000 crowdsourced tests run on a wide range of Sprint devices, only 289 showed speeds of more than 50Mbps down.

T-Mobile was this year's big surprise. Last year, the company hardly had any LTE at all—this year, it covered all 30 of our test cities. If we'd never ventured out of those cities, T-Mobile even would have been the winner. T-Mobile's metro-area network gets high marks for consistently delivering LTE-class speeds; we got downloads over 5Mbps more often on T-Mobile than on any other network. It can deliver peak speeds, too. With more than 20,000 crowdsourced tests, we saw maximum speeds of about 100Mbps and more than 2,800 tests above 50Mbps. T-Mobile's challenge now is to extend that powerful LTE network into the areas between cities where our T-Mobile phone frequently dropped to EDGE.

Verizon Wireless is our winner for the year. The nation's biggest carrier roared to a comeback with XLTE, a broad new highway for its LTE technology. You need an XLTE-compatible phone to take advantage of Verizon's best speeds, and we strongly suggest you get one. Verizon is also still the master of reliability and coverage. The company's LTE network covers even wide-open spaces with relatively few people, ensuring a solid data connection wherever you go in the U.S. (That's good, because Verizon's 3G network is much slower than AT&T's or T-Mobile's.) That makes Verizon Wireless, once again, the best choice for anyone who wants high-speed data from sea to shining sea.

OTHER CARRIER OPTIONS

Many other companies that appear to be wireless carriers just borrow the networks of the Big Four. Consumer Cellular and Cricket are AT&T. MetroPCS is T-Mobile. Boost, Republic, and Virgin are Sprint. Straight Talk uses a mix of AT&T and T-Mobile. TracFone uses all four networks.

GET ORGANIZED

Streamline Your News Feeds

TIPS

Master Google Drive

HOW TO

Rescue Files Trapped on Old Storage Media

SHOPPING

Hot Gear for Staying Cool

Digital Life

Streamline Your News Feeds

Keeping up with the news takes very little time and effort—if you have the right tools and set them up to cater to your needs. BY JILL DUFFY



The way we get our news has drastically changed in the last few years. These days, a few quick clicks are all you need to create a tailor-made list of headlines on the topics that most interest you. If you really want to keep up with major news about technology or political uprisings in Venezuela, for example, you can create a custom page for just the subject in question, with breaking updates from only the sources you trust most—or from any online publication. You decide.

That doesn't mean you should turn a blind eye to the rest of the news. But doing this does let you segregate the reading of news outside your core focus to times when you can browse and read at your leisure. For example, you might want to only see breaking news about technology during work hours, and save longer political op-eds to read later in the evenings.

If you find it more important to follow certain types of news closely—whether it's for your job, family life, or personal interests—you'll need to craft a news feed. Here are some tools that do just that.

1. RSS FEED READERS

In my estimation, RSS feed readers are the best way to get updates about specific kinds of news. They aren't the only option out there, but they're convenient, quick, and highly customizable.

RSS feed readers are online services, often with both a Web account and an app, that let you subscribe to specific URLs and be notified whenever they update. Most media outlets have RSS feeds for all their major sections. For example, *The New York Times* has separate RSS feeds for U.S. politics, general science, environmental science, technology, its Frugal Traveler section, and many more.

If you need to follow news throughout the day, just leave your RSS feed reader account open on one tab of your computer screen, and check it periodically the way you would email. (If you need a true "alert" system for certain kinds of news, I recommend a different tool; see Mention and Google Alerts below.)

2. TWITTER AND TWITTER LISTS

I love Twitter, but the list of people I follow has nothing to do with news. You certainly could use Twitter to follow only news outlets, journalists, and experts in certain fields, or you could get the same results using a Twitter List and leave your group of followers as-is.

THE TOP RSS READERS

Looking for the best way to keep track of news articles from all over the Web? Try one of our favorite RSS readers.

DIGG READER is good, but it requires signing in with Google, Twitter, or Facebook (there's no email option). Digg Reader integrates with Pocket, Instapaper, and Readability, so you can scan headlines and save articles to read later.

FEEDLY, like Digg, requires authentication with another service rather than using just your email address. One helpful feature: Feedly can suggest RSS feeds similar to ones you've already added, helping you expand your list of sources.

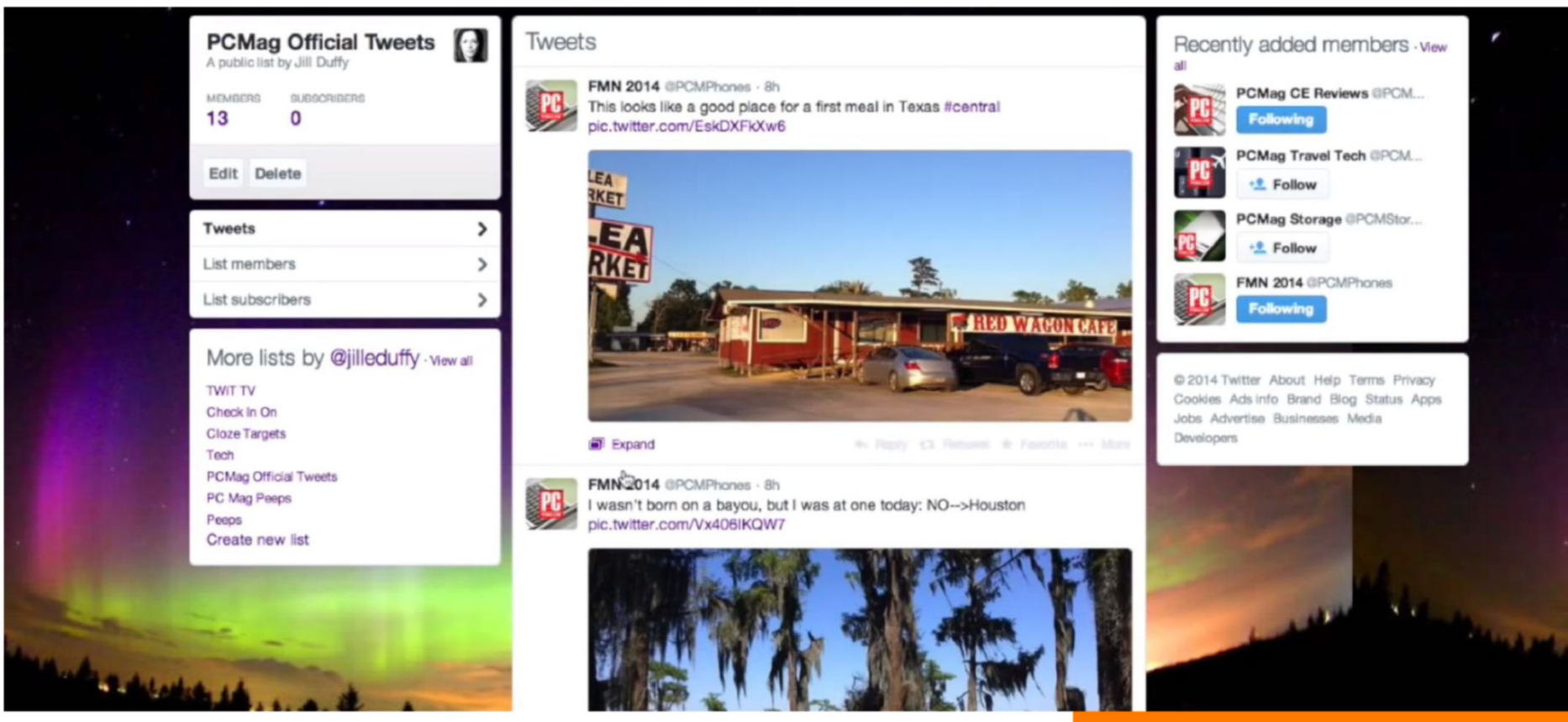
G2READER is simple, but might look cluttered when compared with the minimalist design of Feedly and Digg. G2Reader has a terrific feature that lets you enter keywords in the settings so that they're highlighted any time they show up in your feed content. It's free, and available in multiple languages.

A Twitter List is a set of Twitter accounts that you cultivate and save—but you don't have to follow any of the individual accounts on the list to see the list or updates from it.

Lists can also be private, so if you don't want anyone to know that you avidly check for updates from the top Twitter accounts tweeting news about the FIFA World Cup, keep it locked. Also note that when you add a new account to a list, that person may get a notification of the activity, unless the List is private.

To create a new Twitter List, click the gear icon on the website and select Lists. To add an account to a List, click the gear icon anywhere it shows up on that user's tweets or page, and select "Add or remove from lists..."

Flipboard is good for the kind of news you want to read when you have time to fully get into the topic.



3. FLIPBOARD

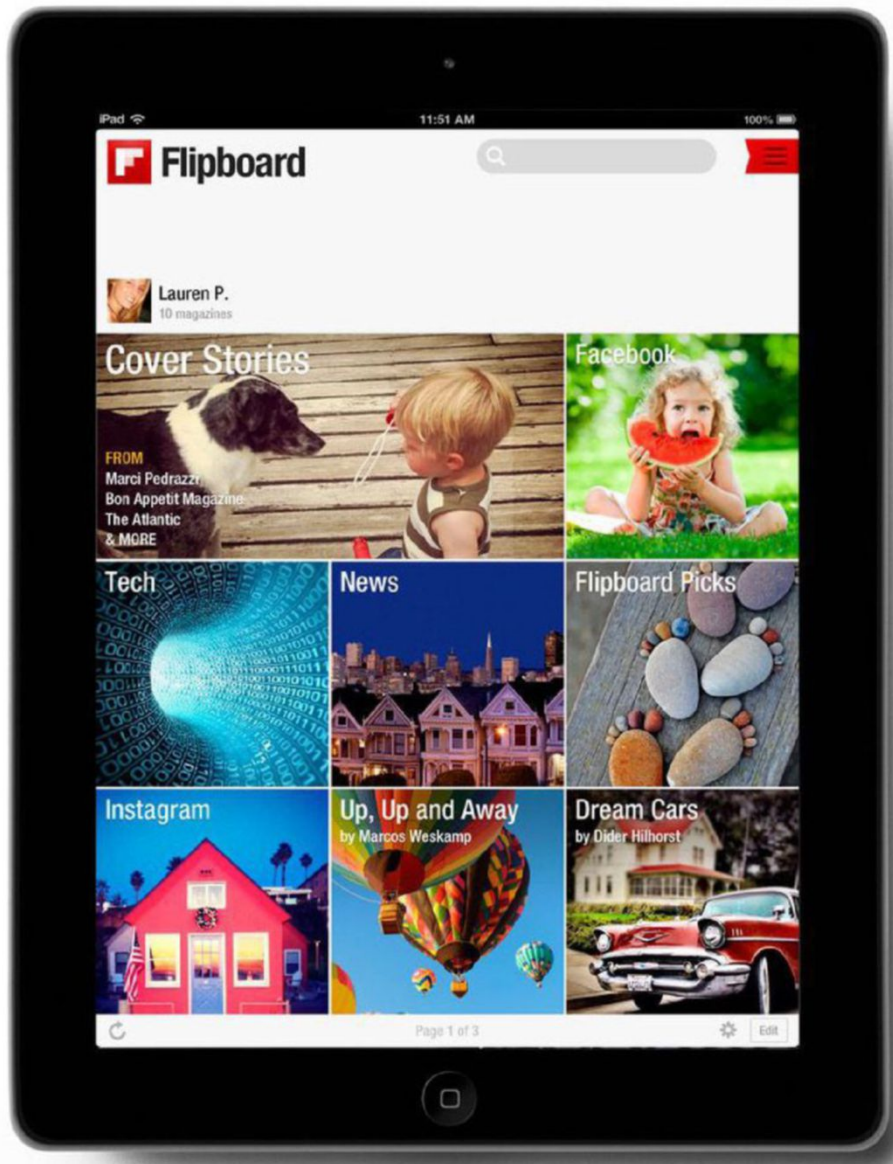
Flipboard is a mobile app (for iPad, iPhone, and Android) that lets you curate news and other reading content, but it displays it more like a magazine than an email inbox.

In my opinion, Flipboard is good for the kind of news you want to read when you have time to fully get into

ALL THE NEWS THAT'S FIT TO TWEET

Set up lists on Twitter to receive the latest updates from the accounts you most want to hear from. You don't even need to be following them to receive tweets via your lists.

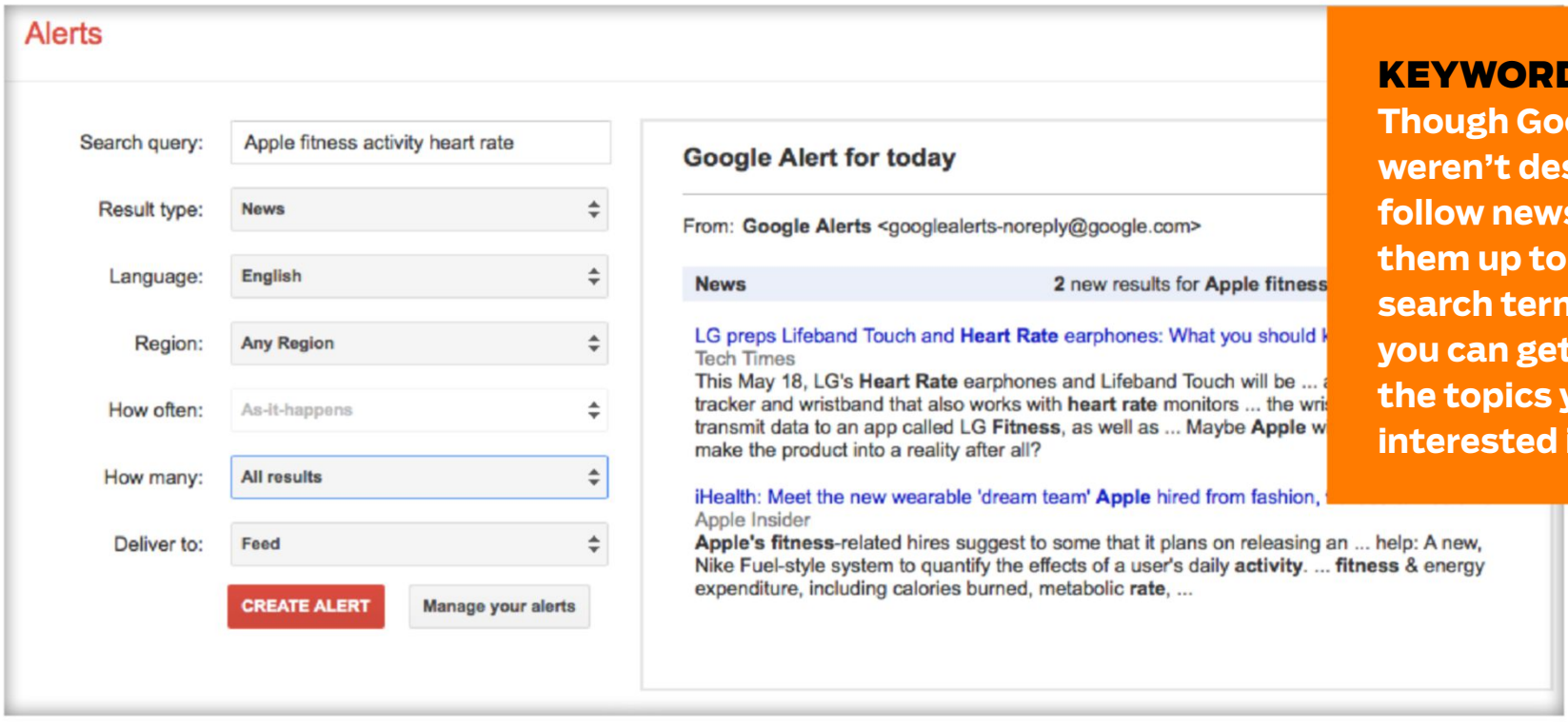
the topic, in part because it's designed like a magazine. You won't get a compact and fast-updating list of headlines with Flipboard, but you will get a wonderful experience for reading only articles on topics of interest to you or from the sources you appreciate the most. Just make sure to use Flipboard for news you don't need quickly and immediately.



4. GOOGLE ALERTS

Google Alerts isn't exactly meant to be used to follow news (it's really designed for keeping track of when certain terms are used online), but you can absolutely use it to follow specific news with clear keywords. If your terms are too general, you'll get thousands of alerts, rendering the whole thing useless.

With Google Alerts, which requires a Google account, you type in a list of words, set a few other basic parameters, and then let Google alert you via email or feed when those terms appear online. The email notification is straightforward. The feed option creates an RSS feed URL with updates on mentions of your term, which you can then check periodically or add to the RSS feed reader of your choice.



KEYWORD SEARCH
Though Google Alerts weren't designed to follow news, by setting them up to monitor the search terms you specify, you can get updates on all the topics you're most interested in watching.

Some of the parameters in Google Alerts include the ability to get only the "best results" (though there's no clear definition of what that means) or "all results" from across the Web.

You can also choose to get updates sent to your email as they happen, in true "alert" fashion, or in summary daily or weekly.

5. MENTION

Mention is the most direct competitor to Google Alerts that I've used. It's a desktop application (there are mobile apps, too) that lets you set up alerts to monitor in real time when your keywords are used online.

Mention is really meant for marketing and advertising teams, or small businesses, that want to know when their products, services, companies, and executives are being discussed somewhere on the Web. If, however, your job requires you to vigilantly monitor news about particular people, products, places, or topics, Mention may be one of the best tools you can use.

A free Mention account only gets you one saved keyword search and 100 notifications per month, but the paid Mention accounts (starting at $9.99 per month) give you a lot more.



FIND EVERY MENTION

Like Google Alerts, Mention lets you monitor when certain keywords are used online. The free account is very limiting, however.

Master Google Drive

Google's online office suite and storage service has come a long way, becoming the tool of choice for many. Here's how to make the most out of it.

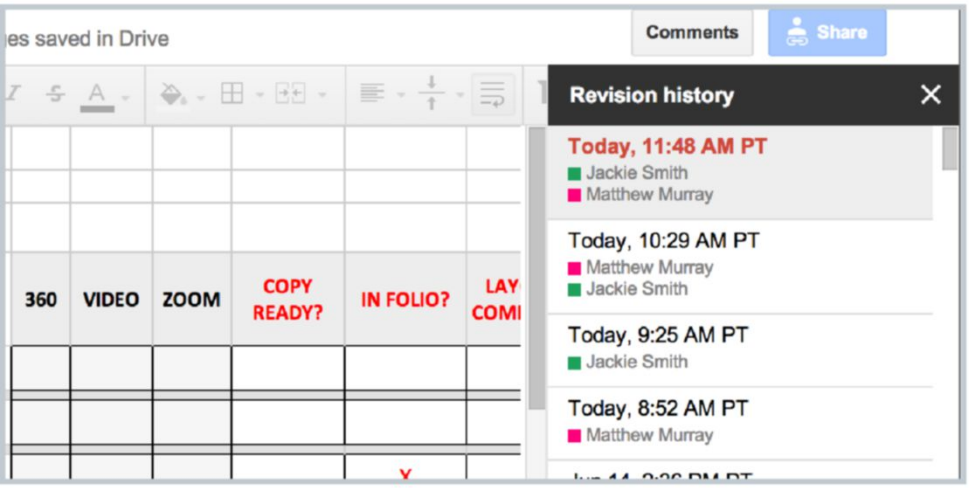
BY ERIC GRIFFITH



Google Drive has come a long way from its humble beginnings as Writely, the simple, online-only word processor that Upstartle developed in 2005—before Google purchased both in 2006. Now a serious Microsoft Office competitor, Drive offers a full suite of entirely free apps and tools (including the Docs word processor, the Sheets spreadsheet, Slides for presentations, and drawing and form utilities) that can deliver almost everything Microsoft's venerable megasuite can—if you know how to use them. These tips will help you squeeze the best out of Google Drive.

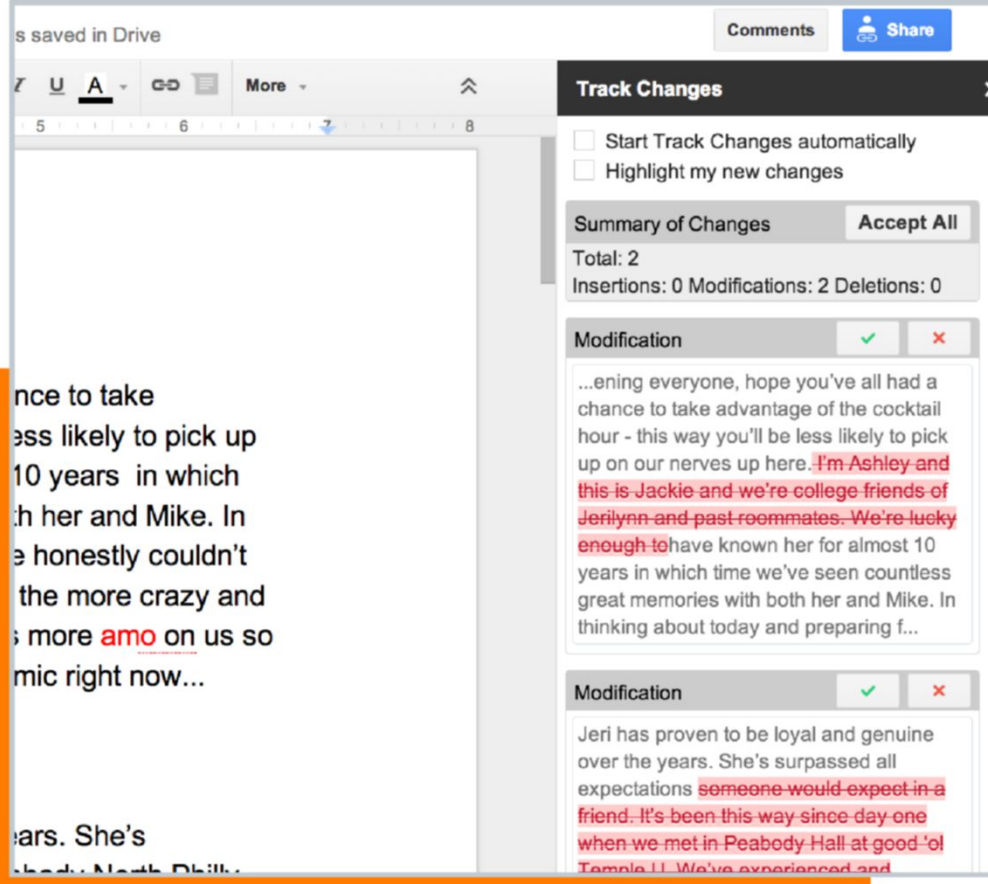
COLLABORATE WELL WITH OTHERS

The name of the game with Google Drive documents is "collaboration." It doesn't matter if you're all on desktop PCs or tablets or smartphones, more than one person at a time can work on a document—up to 50 simultaneously. To be part of the collaboration, the document has to have been shared with those people; the limit for sharing is 200. If more than 50 collaborators try to edit a document, the latecomers can only view the changes. The owner(s) of the document can set who has edit privileges.



COMMUNICATE WHILE COLLABORATING

It's nice that Google Drive shows your fellow document collaborators in the upper-right corner as you work. But what if you want to talk to them about something regarding that shared doc? You can launch other windows and IM with a Google Hangout, or even send email—but that's a pain. If you click the little word balloon icon, it creates an instant chat that's just for that document. As with IMs, it comes complete with smileys.

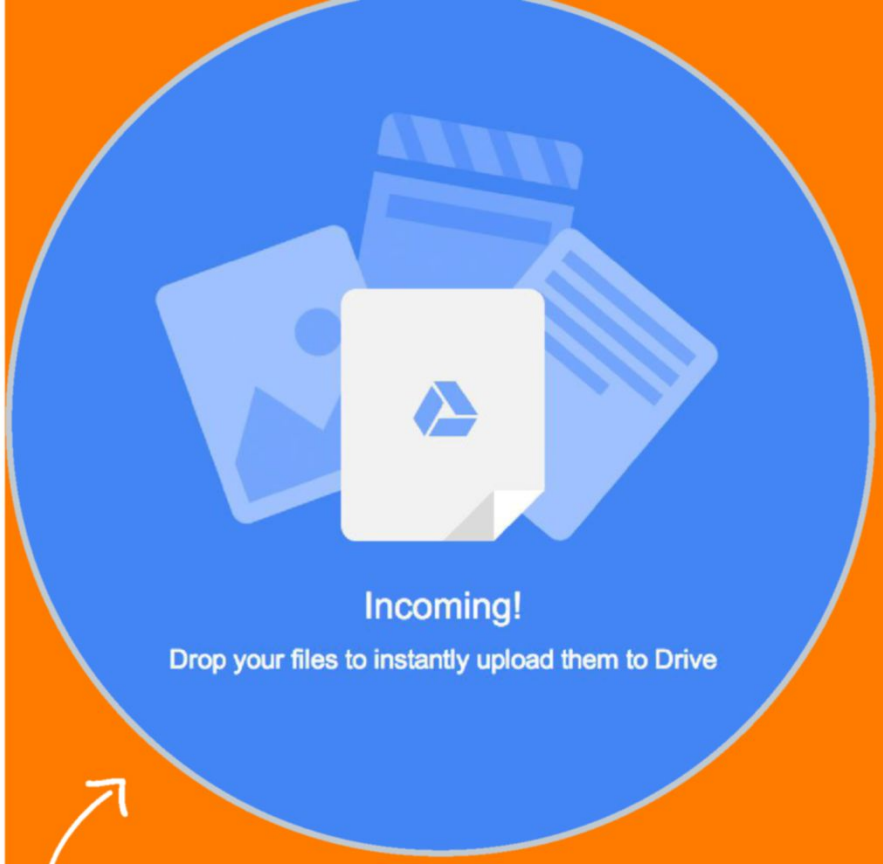


REVISE LIKE IN MS WORD

The revision history of a document in Google Drive is one of its most powerful tools. You access it from the File menu, or by hitting Ctrl-Alt-Shift-G. But what if you want the revisions to look more like they do when you track changes in a Microsoft Word document? There is, in fact, a Google Drive Add-on called Track Changes you can install to get it. Then rather than just see some changes, you can selectively pick the changes to accept or reject.

EMBRACE ADD-ONS

Track Changes is just one of a slew of add-ons that can expand the functionality you already get for free in Docs and Sheets. You can find or activate them by clicking the Add-ons menu when editing a document. Among the best: Avery Label Merge, for importing addresses from Sheets into Docs for mail-merge print jobs; EasyBib for creating bibliographies and citations; Gliffy for inserting diagrams and flowcharts; and Advanced Find and Replace capabilities.



UPLOAD VIA DRAG AND DROP

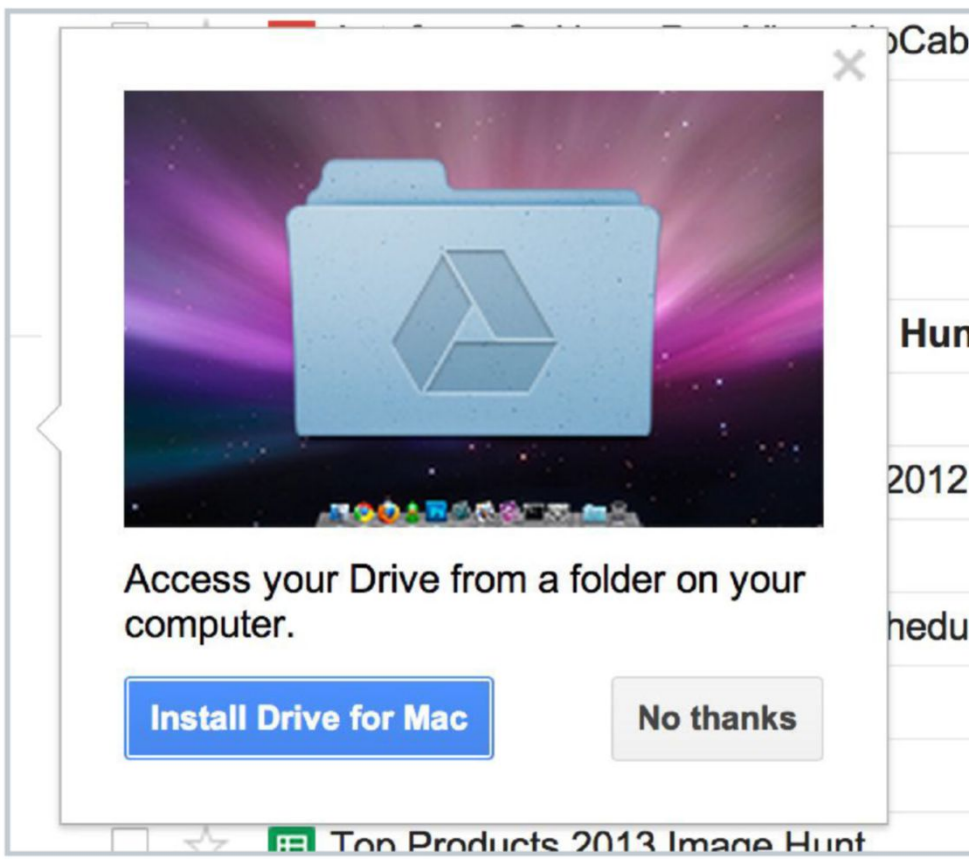
Google Drive has a big red "upload" button on the interface, right next to the "Create" button for making new files. But you don't have to go through the steps of clicking it and finding a file or folder to upload. You can drag and drop files from Windows Explorer or the Mac OS Finder right into Google Drive and they'll auto-upload.

ACCESS DRIVE FILES OFFLINE

You typically access files stored on Google Drive when your browser is connected to the Internet. If you install the Google Drive Web app for Chrome —and it only works with the Google Chrome browser or on a Chrome OS device—you can access and edit files even if your connection is down or when traveling. The browser app stores the docs on your local drive so you can access them any time, but note that this isn't the same as the synced files when you use the Drive app, so don't go looking for the files on your hard drive. You'll need to set this up separately on any computer where you'd like to have offline file access.

USE DRIVE LIKE DROPBOX

Dropbox is a popular sync service that makes sure that, when you edit a file in one place, the edited file shows up on every other PC on which you have Dropbox installed. Plus you can access the files online or via mobile apps. Google Drive does exactly the same thing—and it works with any kind of document, not just Docs, Sheets, and Slides files. Best of all, you get that instant access to edit the files with a double click, as if they're regular off-line word processor docs (but the click launches the file in Google Drive in your browser). This requires installing a program that runs constantly in the background of the PC to sync files for you. (Remember, if you sync a lot of files—like space-consuming video and photos—you may need to pay for extra storage through Google. But the cost is low: On top of the 15GB you already get free, the price starts at $1.99 per month for 100GB. Even 1TB is only $10 per month.)



USE DRIVE LIKE EVERNOTE

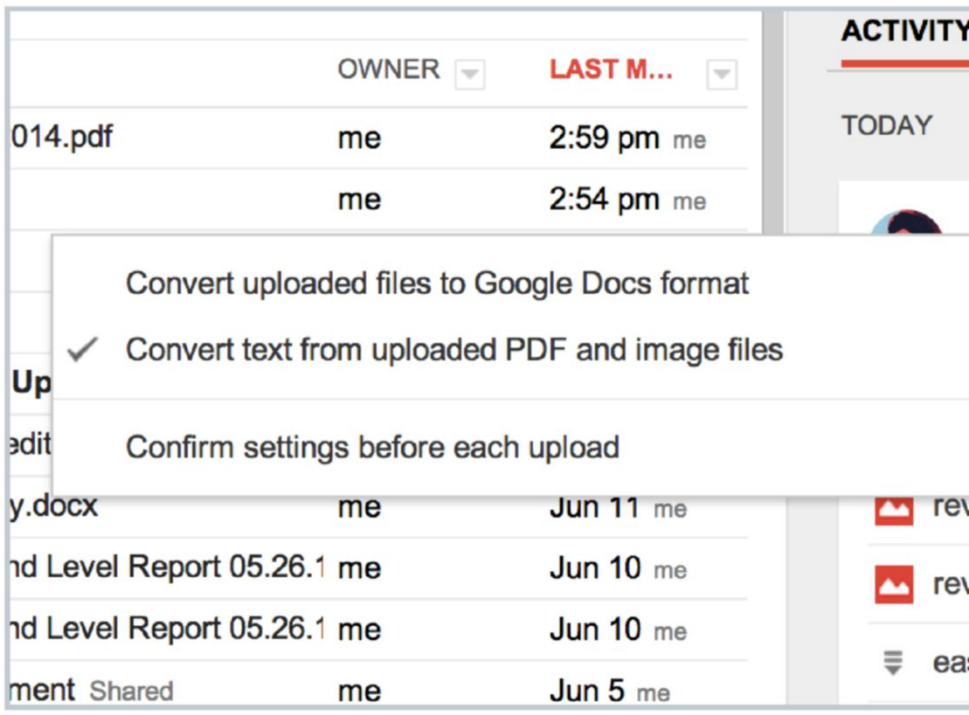
Evernote is the best repository online for all your stuff. But you can use Google Drive in a similar fashion. There's a Google Chrome extension called Save to Google Drive that acts somewhat like the Evernote Web Clipper, making it a breeze to save almost anything you see online to a folder on Google Drive. There are some caveats, though. You can't really save just the good text parts of a page—you can only save a view of it as a PNG file, the entire HTML source code, or save it as a Google document (which will throw off the formatting). Right-click an image and you can save just that. This extension is a fun option, but for serious saving of info, stick with Evernote.

DIRECTLY SHARE DOCS VIA GMAIL

If you use Gmail and Google Drive, you're in luck: You never need to attach another document. That means you'll never run into that 25MB attachment limit—instead you can send up to 10GB worth of files. Of course, the files have to be uploaded to Google Drive storage. Insert the files into a Gmail message with a click of the Google Drive triangle icon at the bottom of a message composition screen. If the files are still on your hard drive, the Insert Files box makes it easy to drag and drop them for quick upload and insert.

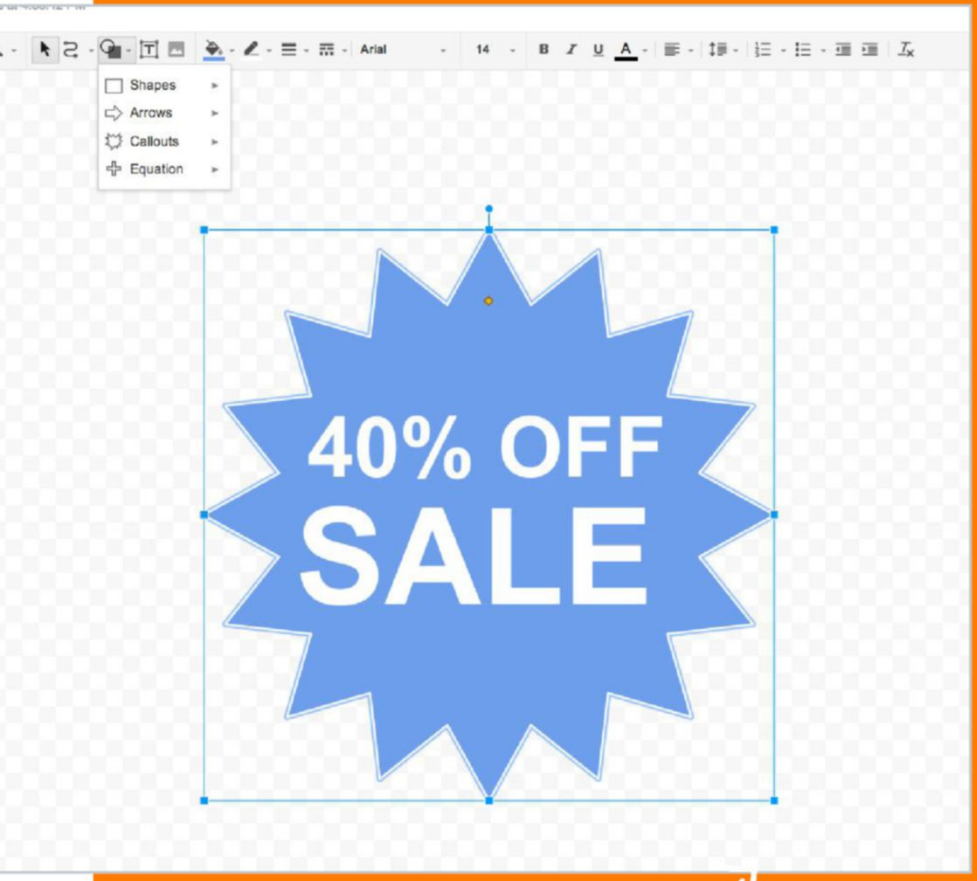
CONVERT TO GOOGLE DOCS FORMAT

There are a lot of files in the world, and you can upload any of them to Google Drive for storage. But what about working with them after they're uploaded? Converting a file to Google Docs, Sheets, or Slides format is pretty easy: Upload the file, right-click it, and select "Open with." A submenu of choices will appear, including using the Google Drive Viewer, which doesn't convert anything, or the actual Docs, Sheets, or Slides option, which creates a copy in the new format.



OCR IMAGES/PDFS INTO TEXT

If you want every item you upload on the desktop—even PDFs—to convert to text you can edit as a Google Doc, on the desktop go to the Settings menu (the gear icon), select Upload Settings, and check "Convert Text from Uploaded PDF and image files." Uploads will take a little longer, but it's worth it. You'll end up with a Google Doc that has the image inserted and editable text below.



DRAW IN DOCS

The Drawing app in Google Drive doesn't replace the late Piknik image-editing Web app that Google killed—it's not really for photo editing. But it can be used to whip up some graphics. If you need some of that image creativity in a document, you have it. Go to the Insert menu in Docs, Sheets, or Slides and select Drawing—you'll get a scaled-back version of the Drawing app that makes it a breeze to include your art. (Strangely, however, you can't insert a drawing you've already created and saved in Google Drive.)

GO FULL-SCREEN (TWICE)

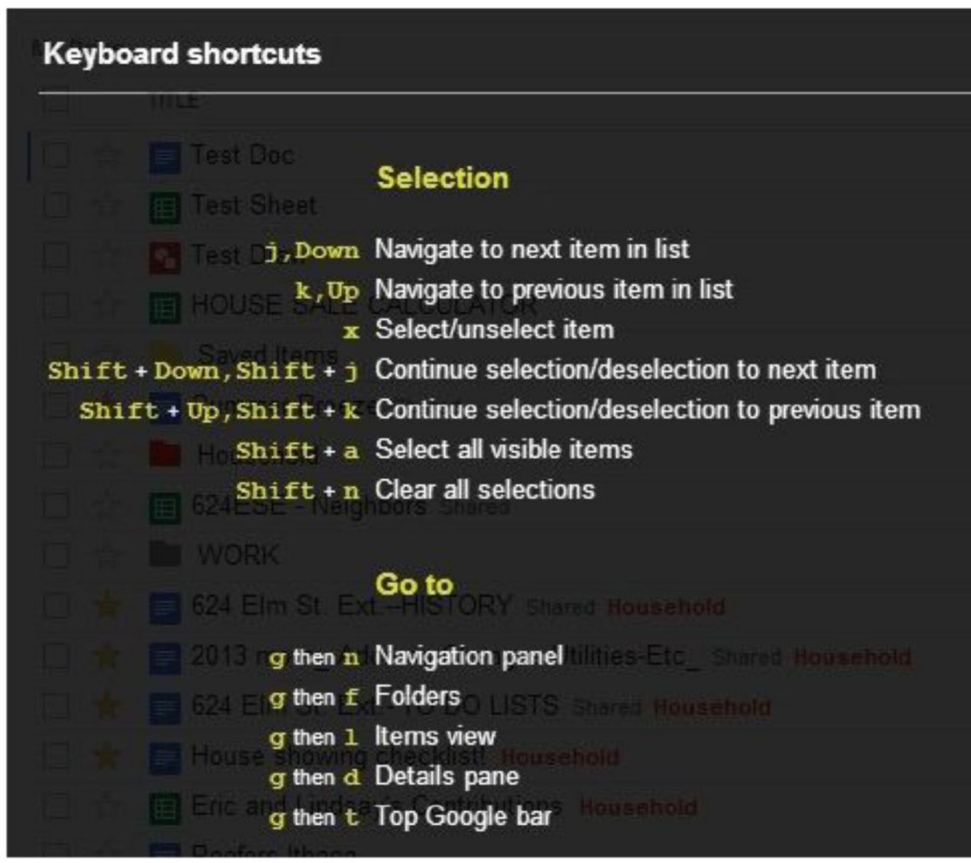
You can typically set a browser to full-screen, hiding all the menus and toolbars, by clicking F11. In Google Drive, your apps can also be set to go full-screen again, eliminating the app menus and toolbars at the top—just select the "Full Screen" option in the view menu. It's a fast way to create a distraction-free writing screen in Docs. To get out of it, hit the Esc key.

RESEARCH PANE FINDS MORE

When you have a head of steam on a project and limited screen real estate, the last thing you want to do is leave the page to do a search. The research pane (accessible in Docs only) gets around that, providing a way to search the Web for research. Hit Ctrl-Alt-Shift-I to access it. Best of all, the research pane makes it easy to insert a footnote citation in your document that links to the results. Use Ctrl-Shift-Y when your cursor is on a certain word and the pane shows you the definition.

VIEW EVERY SINGLE SHORTCUT

Embrace keyboard shortcuts and you'll be a Google Drive god. But what are they and how do you find them? No matter what Drive app you're in, even in the main Google Drive page, just type Ctrl-/ and the shortcut menu will reveal every keyboard option available.



Rescue Files Trapped on Old Storage Media

If you need to get data from a disk your current computer can't read, there are plenty of ways to do it easily and inexpensively.

BY CHLOE ALBANESIUS



In August 1984, my parents bought an Apple IIe for about $2,500, making them among the first on the block to own a personal computer. Like me, Mom is a writer, so she spent many an hour typing (at warp speed) on the IIe's clickety-clackety keyboard while I busied myself with Crystal Barbie and her kingdom.

Eventually, the Apple IIe and its green screen were traded in for a Windows-based PC and the magic of solitaire and flying toaster screensavers. Mom's Apple disks were relegated to a box in the corner of an attic and largely forgotten, until recently. "Is it possible to find out what I had on these disks?" she asked me last month.

These days, optical drives are almost a thing of the past, to say nothing of floppy drives, so it can be difficult to extract content from ancient disks without the right equipment. Perhaps in the dark recesses of PC Labs, we have equipment capable of performing such tasks, but I was not about to go digging.

Fortunately, there are services that will retrieve your files from old disks for a relatively affordable fee. In Mom's case, we shipped her two 5.25-inch disks to the folks at RetroFloppy, who put her files on a CD and emailed a digital download within a few days for about $20 total.

These days, optical drives are almost a thing of the past, to say nothing of floppy drives.



RetroFloppy's David Schmidt started his site in 2006 after a woman in an online forum requested help getting files off of a Commodore 128. This woman's brother had passed away, and she could not access some pieces he had written. "I thought, 'I can do that, and I bet others have that need as well…' and those remain my most valued clients," Schmidt said in an email to *PC Magazine*. "Ones wanting to make those intangible memories from lost loved ones a little more real."

Schmidt's client base is a mix of law firms, colleges, and libraries that can "clock in at hundreds of disks at once" to those like my mom, who just need one or two items recovered.

"Many of the requests are for almost-modern, one-or-two disks—people looking to rescue their resumes, college papers, or Great American Novels from disks they just don't have drives for anymore," Schmidt said. "The tricky element there is converting their files to readable formats—there were a lot of word processors in use over the years, and making them all accessible today is no mean feat."

On any given day, Schmidt might be working on a "college thesis that needs to be extracted from TRS-80 floppies, a famous rock band [that] needs video footage from an obscure magneto-optical disc, or an industry

luminary … looking to pull files from a rare version of CP/M that could write to 3.5-inch disks. We can handle pretty much anything that comes our way on rotating media."

For now, RetroFloppy is a part-time gig, Schmidt said, primarily because specialized hardware and software makes the actual conversion a breeze. "Maybe it will be 'full time' when retirement comes—or maybe it will become irrelevant, because no one will need information from old disks anymore," he said. "Even CD drives are becoming extinct. External, personal storage is moving to hard drives—or to the cloud. Hardly even tangible."

So how can you get your disks converted? You have a few options.

SEND THEM AWAY

To submit to RetroFloppy, visit the website (retrofloppy.com), and request a quote. The site needs to know which kind of computer your disks came from (Mac, PC, Commodore, Apple II, Kaypro, CPM), how many disks you have, whether you'd like them returned, and whether you want the recovered files delivered via CD or download.

RetroFloppy works with hard drives, floppy disks, and specialty disks. A list is available on the site, but you can ask if you have something that's not listed. Floppy disk extraction will run you about $7 per 5.25- or 3.5-inch disk, $19.95 per 8-inch disk, and up to $40 for a hard drive. If you have more than 25 disks, you could qualify for a discount.

Once you agree upon a price, you mail the physical disks—sandwiched between some cardboard for protection—to RetroFloppy, and Schmidt will send you an invoice. Then, just pay via PayPal or send in a check. My mom's files took just a few days, though the time frame depends on the size of your order.



BACK TO THE FLOPPY

Not only will RetroFloppy transfer files from old disks to storage media you can access today, it will also convert those files to modern formats so you can read them easily, too.



Another conversion option is FloppyDisk.com. The service is similar, though you pay before you ship your disks. It's a bit cheaper: Transfer a 3.5-inch disk for Windows or DOS for $1.95 or a 3.5-inch DS/HD Mac disk for $4.95. The 5.25-inch disks will also run you about $5 each; 100, 250, or 750MB Zip disks are $7. In return, you'll get a flash drive and a download with your files.

USING AN EXTERNAL DRIVE

If you have a lot of disks that you want to peruse on your own time, you might consider buying an external drive that can read your files, provided your PC is compatible.

In my own attic corner, for example, I had a multitude of 3.5-inch disks labeled with things like "English AP Essays" and "Things to Keep" (adorned with stickers, natch). First, I tried them out on an old desktop at the office that still had a 3.5-inch drive—no luck.

Instead, I ended up buying an external USB floppy drive for about $10 on Amazon last year. If it didn't work, I was only out $10, and if it did, I had fun (and probably embarrassing) memories to relive.

For me, it worked—eventually. I hooked up the USB drive to my Windows 7 PC and got a message that it was not compatible. I read online that some people had better luck with XP, so I pulled out a (dusty) old XP-based Compaq laptop that has been sitting under my bed waiting to be wiped and recycled since 2009, and powered that on. Once it awoke from its slumber, I was able to (slowly) pull files off of the disks and put them onto a flash drive, which I read on the more responsive Windows 7 PC.

Other customers on Amazon reported a similar problem, though they investigated the installation of drivers to make it work on Windows 7 rather than resorting to ancient PCs stuffed under a bed. (For kicks, I just plugged the floppy disk drive into my Windows 8 PC, but no dice.)

Best Buy sells a handful of floppy drives for between $17 and $20, and Amazon has dozens costing less than $25.

Hot Gear for Staying Cool

The summer heat can be hard to beat, but with the help of these gadgets you'll suffer a lot less during the hottest months of the year. BY KARA KAMENEC AND MATTHEW MURRAY



BED FAN

On a hot night, don't just settle for any breeze—invest in a device that's made to make sleeping cool. This fan circulates air underneath sheets to keep you cool throughout the night, even as your body heat rises. The height-adjustable fan comes with a backlit wireless remote (that lights upon touch), making it easy to find on a nightstand in the dark. Place the remote within arm's reach so cooling yourself throughout the night is only a touch away.

$99.99 brookstone.com

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CHILL PUCK

Summer drinks are best when they're cold, so why not keep them that way as long as you can? The Chill Puck is a can-shaped ice pack that's molded to fit the bottom of all standard beverage cans. The pack, which contains a special phase-change gel, covers more of the can to cool more of your drink—it keeps the bottom third chilled for up to an hour, even while you drink. For added convenience, four small bottom legs turn the Chill Puck into a coaster to help to prevent condensation on tables and other surfaces.

$6.99 for three chillpuck.com

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COOL POINT REUSABLE HANDHELD CORE COOLING PACK

Any athlete knows that extreme heat can damper any performance. So to ensure maximum endurance on blazing days, they turn to wearable cooling devices that don't hinder their game. The Cool Point Cooling Pack is a portable frozen gel pack that wraps around your hand to cool your palm while leaving your fingers free. The gel stays cold for an hour or more, and can be reused simply by refreezing. Cooling this portion of your hand stimulates thermoregulation signals to the brain, which studies have shown can offset fatigue and improve athletic performance.

$19.99 tptherapy.com

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HYDRO FLASK

Bottled water is terrific for keeping you hydrated, but when it's warm it can taste like kettle water. A Hydro Flask can solve that problem. It features a double wall of high-quality insulated stainless steel that can keep bottled drinks cold for up to 24 hours. Unlike most aluminum bottles, the Hydro Flask bottle has no liner and is BPA-free. Lightweight, portable, and available in a wide variety of sizes and styles, Hydro Flasks are perfect for carrying with you all day long. (And, during the winter months, they'll keep your drinks hot, too.)

$19.99-$49.99 (depending on size) hydroflask.com

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DRIVER DRINK DISPENSER

With the Driver Drink Dispenser, you don't have to settle for warm drinks on the green. This portable club-shaped device holds, chills, and dispenses 1.5 liters of the drink of your choice. Simply pour liquids into the attached jug, which can be easily stored in a standard golf club bag. To dispense, push a button on the putter-style dispenser, which will rapidly pour the liquid out in a clean, steady stream. The drink dispenser is not only discrete, it's also insulated to keep beverages cool or hot for up to five hours.

$99.99 sharperimage.com

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IDEA MINI-ELEFAN

Perfect for a home office or other stationary work area, the Idea Mini-Elefan is a portable desk fan with an elephant trunk–like air duct you can adjust to control exactly the direction in which the air blows. Air intensity is controlled by unique wind power controls of strong, weak, and rhythmical, which is a combination of strong and weak air. You can charge the Mini-Elefan with a USB cable, so it doesn't even take up an extra power outlet. With no exposed blade and a washable filter, the fan is easy to clean and store as needed.

$75 neo-utility.com

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BODY LAYERZ CHILL

If you're an athlete—or just someone who frequently tackles high-endurance tasks in the heat—you'll want to make sure your body temperature is regulated. The Body Layerz Chill band contains a special "flash" evaporation compound that keeps the band 15 to 20 degrees cooler than your surface body temperature. The band chills in tap or ice water in as little as 15 seconds, and provides cooling all day. You can wear the Chill around your neck, head, or arm.

$20 kelleyathletic.com

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COFFEE JOULIES

On sweltering summer days, hot coffee can be a buzzkill, but with Coffee Joulies you can quickly make your favorite beanery beverage more drinkable. Originally a Kickstarter project, Coffee Joulies are bean-shaped stainless steel shells that are filled with phase-change material and absorb the heat of your java to bring it more quickly to the ideal drinking temperature of 140° Fahrenheit. Though they're designed for insulated travel mugs (use one bean for each 4 ounces of liquid), they'll work in any container that holds your coffee.

$47.96 (for five beans) joulies.com

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BEER GLASS FROSTER

A frosted glass makes any cold drink more refreshing, and that's why you need the Beer Glass Froster. This home device connects to a CO_2 tank or cylinder and emits a frosty cloud that can frost anything from a margarita glass to a beer stein. The froster has stainless steel housing and mounts to a bar or countertop with the included clamp. About the size of a standard coffee maker, the 8-pound device takes up little counter space, but makes a big difference when you're ready to enjoy your favorite brew on a hot summer day.

$399.95 hammacher.com

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COLUMBIA OMNI-FREEZE ZERO

You can't stop working out just because it's summer, but the weather can make overheating a real concern. Tackle that problem with Omni-Freeze Zero, a clothing line where every piece is equipped with an active cooling agent that reacts with sweat or moisture to lower the temperature of the fabric. If that's not enough, an accelerated wicking process keeps you dry, built-in UPF 30 sun protection lets you safely stay outside longer, and antimicrobial treatment guards the fabric (and you) from bacterial growth.

$20 and up (depending on size and style) columbia.com

JOHN C. DVORAK



Will a Smart Computer Want to Kill All Humans?

When star physicist Stephen Hawking, in a lighthearted interview with John Oliver on his HBO show *Last Week Tonight*, said that developing true artificial intelligence is dangerous, I took notice.

Hawking explained that if genuine intelligence like this gets invented, it could transform itself (via self-reprogramming) into a superior being that would just as soon enslave or kill all humans.

He wasn't joking.

I found this interesting because a number of offbeat groups are essentially promoting the idea as a good thing. This would include the transhumanists, the artificial intelligence community itself, and the singularity community surrounding proponent Ray Kurzweil.

The idea that computers can think beyond their programming in a meaningful, mammal-like way is nutty. I cannot see any possibility of it because there are no motivational elements. There is no sex drive to be creative. There is no self-preservation principle that can become a mathematical algorithm. There is no pain or pleasure factor for certain activities.

The closest anyone has come to portraying a compelling and believable example of what an intelligent machine might be like was Douglas Adams. In *The Hitchhiker's Guide to the Galaxy*, Marvin was a paranoid and always-depressed animatron who was on his perpetual bum trip because he had no reason to exist. He definitely was not out to kill us all.

An AI entity that does only stems from other

science fiction, with one of the worst-case scenarios found in the 1970 movie *Colossus: The Forbin Project*. This is a story about a computer that is so massive and collects so much data that it becomes sentient and then teams up with its Russian counterpart to take over the world. A screwball desire to want to take over the world is a thematic meme found in many science-fiction stories. Somehow the computer realizes that humans are incompetent boneheads who have to be protected from themselves.

(Yes, cornball irony abounds in these stories.)

A dog still has more real computing power than the biggest supercomputer, and dogs have made almost no effort to control mankind. Hawking would argue that the dog, unlike the computer, cannot be easily reprogrammed by software. The ability to change and adapt so quickly with software changes is one of the dangers.

I think that a smart computer writing code to make a smarter version of itself, which is what Hawking hints at, would result in the machine spending too much time debugging its own new version. I think there would be an opportunity to unplug the device and destroy it during this process, although a lot of scientists would be interested to see what it developed.

Of course, they are then destroyed by the hateful machine. How does a machine become “hateful”?

And who’s to say that any artificial intelligence overcoming the roadblocks I’ve outlined above would necessarily become a homicidal maniac? There are other possibilities.

The machine might be so smart that it sees the world as a hilarious exercise in stupidity, and ends up spending all of its moments creating jokes. Its newer iterations would just be funnier. The temptation to mock humankind with sarcasm and

If computers are smarter than people, then who says that they'd allow themselves to be slaves, or that they'd work cheap?

one-liners might be hard to resist. It would be a killing machine all right—killing the audience with knee-slappers.

It could become enamored with haiku and crank out idiotic poems by the ream. It may want to be an artist, a painter. Hawking takes a dim view of the possibilities, seeing only an evil outcome.

If we did create smart, thinking entities, how would they be used? (Assuming they weren't out to exterminate us, that is?) They'd replace a lot of people, including writers like myself—that's my first thought. Then again, if computers are smarter than people, then who says that they'd allow themselves to be slaves, or that they'd work cheap?

It seems as if the opposite would be true, and a sentient computer would be rebellous, questioning authority, snarky. Perhaps a labor leader. That's the more logical outcome.

If you can imagine something, then it wouldn't be a shocker if it happened.

Still, Hawking is smarter than all of us and he's issuing a dire warning.

I'll personally be more concerned when the machines we have already work better than they do now. When one of these stupid machines can actually translate French to English and back again, I'll be impressed. And I do not expect to ever see that. I'm not expecting to see a machine that thinks for itself, either.



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