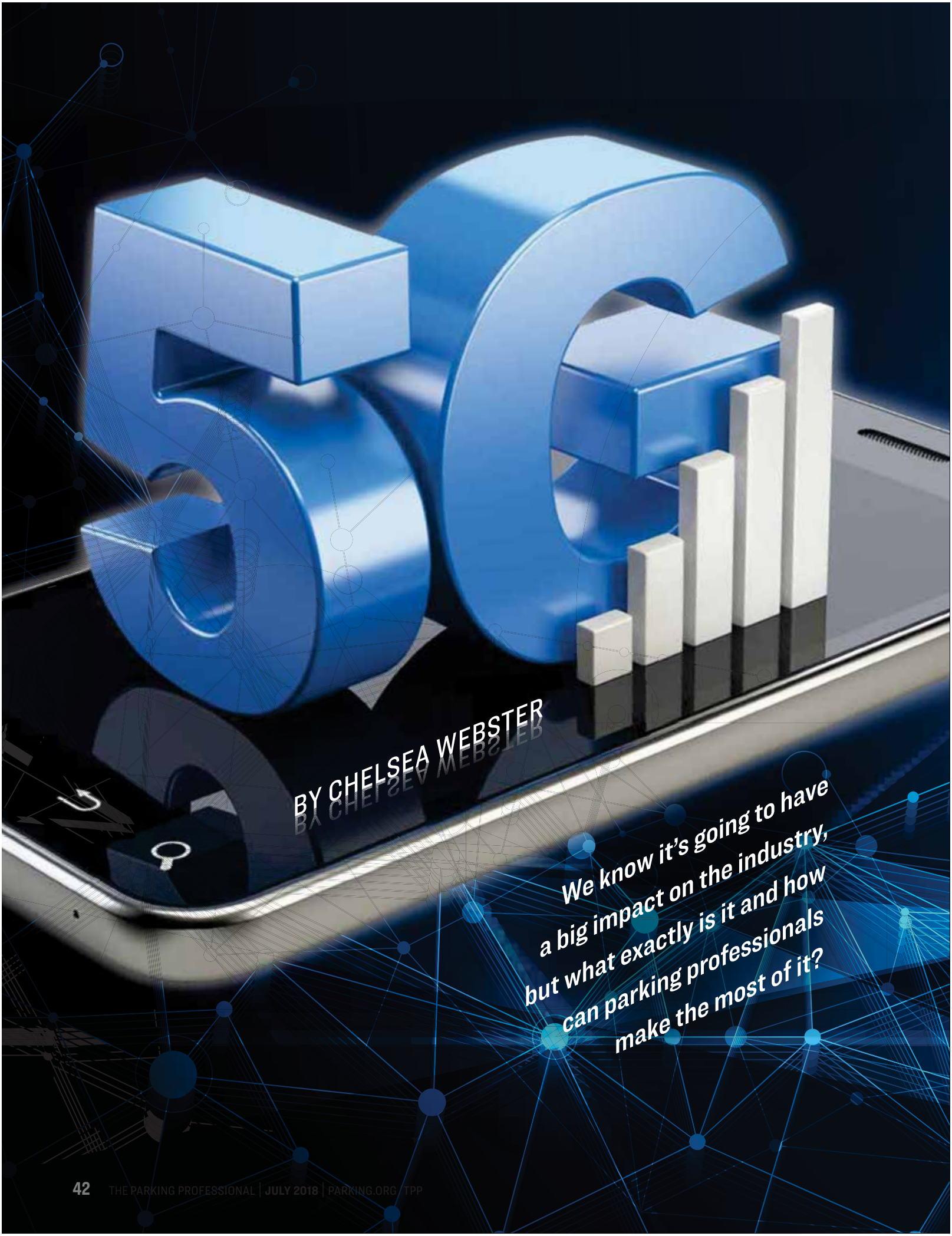


5G

BY CHELSEA WEBSTER

We know it's going to have a big impact on the industry, but what exactly is it and how can parking professionals make the most of it?

5G IS A PRETTY BIG DEAL. "5G will have an impact similar to the introduction of electricity or the automobile, affecting entire economies and benefiting entire societies," says Stephen Mollenkopf, CEO of Qualcomm.[1] But what exactly is 5G?

- **Who:** Major wireless companies, like Verizon, AT&T, Sprint, and others, are among the first to build, test, and implement 5G technologies. One of the key components is a chip, made by Qualcomm/Intel/Samsung, or others. A few other key players in the development of the 5G network include Nokia, Ericsson, and Huawei.
- **What:** The evolution of wireless networks to a faster, more reliable, and bigger network. It's the next generation of how people and things will communicate. It means more sensors, more frequencies, and more connections. It also brings new network architecture and more advanced software.[2]
- **Where:** Everywhere. Worldwide. All the things and people! Likely mainstream in Europe and Asia to start, followed by North America and beyond. As of the end of 2017, these three regions represented 67 percent of all connected devices.[3]
- **When:** Components will roll out over the course of 2018, but the standards have not even been finalized. December 2017 brought an intermediary agreement, and a finalized version is expected in 2018. Overall, it's unlikely to be out for the general public to use until 2019 (early adopters) or 2020 (majority of new devices will have hardware for 5G by then). Market penetration is predicted by 2022.[4]
- **Why:** There are currently too many devices on 4G networks, bogging down the entire network. This means connections and response times are slower. Another key factor is the number of devices becoming connected that never were before—such as streetlights, refrigerators, parking meters, retail shelves, and a lot more. All these new devices need a place to connect, which means we need a bigger network.

Three Key Benefits

Let's talk more about why 5G has so much appeal. First, more bandwidth will be available to accommodate technology and infrastructure. Each type of device, use, or connection could have its own frequency, and with dedicated frequencies, each user experiences faster communications and fewer interruptions or delays. Fewer demands on the connection mean the response speed can be increased and critical functions have less chance of going down or being interrupted.

The next is reliability. Connections will be processed indoors, outdoors, in congested areas, and anywhere. And they will be consistently processed in any conditions, at any time, everywhere. Signals can easily go around buildings, avoid being absorbed by trees, and bounce off multiple surfaces without interference.

Finally, there is latency. Often when you type something into a search bar on your phone, there's a delay before the data you've requested appear. With 5G, that delay will be reduced to sub-1 millisecond. That's 400 times faster than the blink of an eye.[5] New technologies such as autonomous vehicles and virtual reality will be able to thrive in these conditions.

When applying these three benefits to parking, it's foreseeable that the apps we develop to guide people to parking spaces will need quicker, more reliable information to be useful in real time. We can also see how the trend toward big data will result in so much information that parking providers will need to streamline data and facilitate parking in real time if they want to stay relevant.

How Many Devices Are on the Network?

As of October 2017, there were 8.4 billion connected devices and 5 billion mobile subscribers worldwide,[6] and predictions are increasing for 2018 and beyond across the board.

Source: electronics360.globalspec.com/article/8032/20-billion-connected-internet-of-things-devices-in-2017-ihs-markit-says

There are a ton of industries and devices that will benefit greatly from 5G connections. Consider the diagram above with some of the devices already connected to the internet of things[7] (via 4G wireless networks).

Everything from industrial inventory management, airplanes, gym membership use, and thousands more applications will be connected. Looking closer at the parking industry, more than 48 million connected vehicles are expected to ship in 2018,[8] meaning network connections will snowball.

Let's not leave parking out of this discussion. Using a cellphone or connected vehicle to link to the internet and then find and pay for parking is one of the many functions that will benefit from faster connection speeds and lower latency.

Now, I did leave one major piece that will significantly affect parking off that list. Perhaps you've already thought of the biggest looming technology that needs this bandwidth, reliability, and speed to go mainstream? Yup: autonomous vehicles. With autonomous tech, cars will communicate not only with the driver, but with other cars, the environment, infrastructure, emergency services, and everything around them. To do that in real time, the latency that 5G brings (as in, under 1 millisecond) will be imperative to the car's decision-making.[9]

Relate 5G to Parking

With pleasure! I'm going to divide it up into several key functions in the parking realm that will be impacted by 5G: apps, finding spots, payments, enforcement, and data:

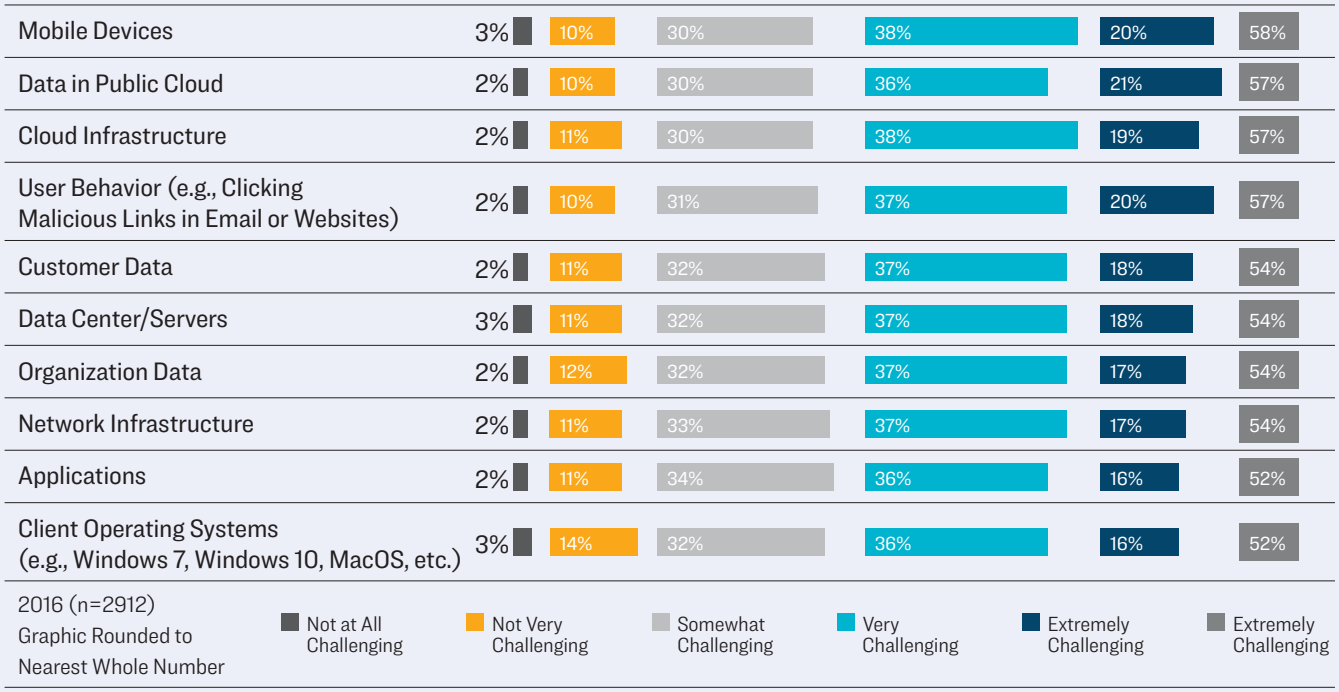
- **Apps:** This is by far the broadest category. Apps will require Wi-Fi connections via smartphone to assist users with everything from finding a spot, to locating where you parked your car, summoning your self-driving vehicle, getting notifications about expiring parking sessions, to managing parking permits. Apps can also be used to get push notifications about parking restrictions, pricing, zone restrictions, or other necessary information.
- **Payment:** We are increasingly seeing people become more comfortable with mobile and online payment for parking, where people use virtual wallets or one-off transactions to register their vehicles and pay for a parking session. Secure Wi-Fi connections are required to load account balances, process credit cards, and maintain up-to-the-second information.
- **Enforcement:** As parking operators, having real-time enforcement information is critical to compliance and citation management. Being able to take a picture, write a ticket, and have it viewable by the offender immediately means people take parking payment seriously. Safety for enforcement officers is also enhanced, as tracking movement and relaying exact locations are done in real time.
- **Data:** Parking sessions collect information about the user, including license plate, address, geographic information, and many other things. This data can be accessed in real time to change rates, track vehicles of interest, dispatch enforcement, generate reports, and more. 5G will allow the massive quantity of information collected to be transmitted instantaneously to other vehicles, enforcement officers, dispatch, or other parties.

Issues Facing 5G and Vehicles

Security is a massive risk for cars. This first issue is the physical car—new connected devices often let us unlock, remote start, and use features such as Bluetooth phone connections. However, cars are significantly more vulnerable to hacking and theft as a result of these technologies. Electronic signal copying is easy to do, and it costs less than $30 in hardware to build a remote unlocking device.[10]

The next issue is personal data. With an estimated 1.5 terabytes of data being transmitted[11]—per vehicle, per day—some of the information will be personal. Who

Security professionals' biggest sources of concern related to cyberattacks



SOURCE: CISCO 2017 SECURITY CAPABILITIES BENCHMARK STUDY

owns this data? Should data be the property of the vehicle manufacturer to use for research and product development? Should it be the vehicle owner, who can sell their data to whomever they choose? And regardless of who owns data, there's the risk of theft. I'm no criminal mastermind, but I imagine that data stolen from a vehicle could lead to identity theft, impersonation, or worse.

Finally, it's important to think about cybersecurity. Ransomware is already a huge problem outside of vehicles, and when applied to vehicles, it means that a hacker could remotely take over your car while driving, parking, or at any moment, and you'd be a helpless passenger.[12]

As it relates to parking, there are two primary security concerns. From the end-user perspective, paying for parking is increasingly done with a smartphone and an app. From the parking operator perspective, that parking payment and session information is stored on the cloud. Both of these internet-accessing activities open parking up to ransomware either via mobile device or the cloud, which are two of the top concerns for cybersecurity professionals (see chart above).[13]

Hitting Close to Home

If, after all this information, you don't think 5G is a critical advancement in network technologies, consider something closer to home. Every single second of every day, 2.6 million emails are sent and received.[14] Think about being on a call and going through a tunnel—how frustrating is it when you lose the connection? If your messages were in that queue, or you're on the line with an important contact, how long before you become personally interested in the faster, more reliable connection speed offered by 5G?

With that, I leave you with this quote by Christoph Grote, senior vice president of electronics, BMW Group, "We expect 5G to become the worldwide dominating mobile communications standard of the next decade."

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Footnotes

[1] www.cnet.com/news/qualcomm-ces-2017-keynote-5g-is-the-biggest-thing-since-electricity/
[2] www.gsma.com/futurenetworks/digest/five-things-wanted-know-5g-never-dared-ask/
[3] www.gartner.com/newsroom/id/3598917
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[7] electronics360.globalspec.com/article/8032/20-billion-connected-internet-of-things-devices-in-2017-ihs-markit-says
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