

# THE FIFTH GENERATION: *Connecting Us All*

5G WILL EMPOWER MORE THAN JUST FASTER INTERNET SERVICE — IT HAS NEW GROUND RULES THAT OFFER THE PROMISE OF TOTAL CONNECTIVITY.

Just as quickly as internet users embraced wireless for laptops in place of Ethernet cables, 5G offers the ability to ditch the wireless router and connect devices to the internet directly.

Soon, one cellular data plan will support many “internet of things” devices. When the afternoon sun beams into the living room, the thermostat will tell a device to pull down the shades to maintain a comfortable temperature. Or, if a tractor-trailer limits visibility on the highway, the truck’s forward-facing camera will send video to the screens of surrounding vehicles to help drivers see what lies ahead.

Municipalities will use ubiquitous wireless to access aggregated multidimensional data from connected water quality sensors to support preventive and proactive water management. And, at all times, power utilities will mitigate fire outbreaks with immediate notifications of real-time data when any lines arc or break.

This is only a glimpse of what life with 5G could look like. More significant than its increased speed, 5G provides new radio technologies for low-cost, long-life battery-powered sensors. These sensors will massively increase the number of devices that could simultaneously connect to the network and provide extremely low latency, resulting in hardly any delay for users.

“Because of cost or availability of service, many people in dense urban and rural areas only access the internet via their mobile device,” says Matt Olson, projects director in the Networks, Integration & Automation

department at Burns & McDonnell. “The deployment of 5G will provide all users with connections as fast as wired, and in more places than we could take the wired network, at the same cost of their mobile service today.”

## Going the Distance

Significant planning is underway to develop the 5G infrastructure and hardware needed to unlock more mobile bandwidth and push data facilities to take on higher volumes of data.

5G will be the first mobile network to tap into the millimeter wave (mmWave) spectrum providing high-precision and low latency. It will be game-changing for both those using the data and those providing it. Because these high frequencies require a pure line of sight between the antenna and the device to be effective, antennas need to be strategically placed, such as high on utility poles.

“We’re still going to have a need for massive data centers that aren’t so time-sensitive, but we’re also going to see new types of data centers that are much closer to the user through edge computing,” says Robert Bonar, a regional practice manager at Burns & McDonnell who specializes in managing data center design and construction.

Today, networks are supported by large hyperscale data centers with thousands of server racks. Moving forward, a data hub the size of a backpack could cache Netflix shows, and a shipping

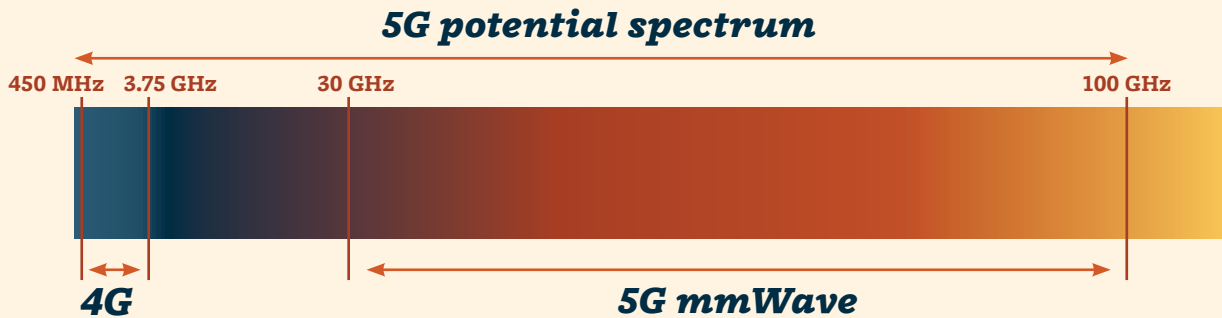
*Imagine the Possibilities*

**5G** can connect up to **50+** devices per home



# Coming Soon:

## INCREASED CONNECTION SPEEDS AND BANDWIDTH



Sources: Forbes (McGregor), TIRIAS research

container-sized facility hosting 15 server racks might provide signals to trash receptacle sensors to inform a city's waste collection plan.

Where the infrastructure to support mmWave is not feasible because of obstructions like trees or buildings, 5G will rely on both low- and mid-band spectrum. Low-band spectrum allows signals to travel farther without line-of-sight issues and enables the use of sensor devices. With the right infrastructure in place, 5G networks will understand the type of data being requested and will switch to different modes to support devices.

### Leveraging Benefits

As major communications carriers and utilities begin to deploy 5G, the key to maintenance and sustainability will be to remain adaptable and responsive as users discover how 5G can improve their lives. Collaboration is required among the

major players for 5G deployment. As utilities work to strengthen their resilience against outages — through an investment in batteries, for example — utilities and communication companies could consider options to place batteries at cell towers to benefit both the power and communications networks.

5G is about meeting the demands of users, wherever they are and with quality data that suits their needs.

"It's usually a missing link — like 5G, in this case — that enables people to do things they never could have dreamed of doing before," Bonar says.



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