What is small cell technology?

Small cells are a critical piece of Verizon's network plan—both for our existing 4G LTE network today and our 5G network of tomorrow. In addition to helping us enhance our 4G LTE coverage and capacity in locations where usage demands are highest—such as downtown areas, shopping centers and college campuses—their deployment on our 5G network will help unleash innovation on a massive scale, delivering superior coverage and signal penetration in even the densest urban areas.

Verizon has been investing heavily in small cells over the last several years to stay ahead of growing demand on our 4G LTE network, but this technology is also integral to laying the groundwork for our upcoming 5G network.

With data transfer rates 30 to 50 times faster than 4G and sub-millisecond latencies, 5G is the key ingredient for kicking off a Fourth Industrial Revolution. But for the revolution to take hold, a network has to be built to support it. Small cell technology will be key to that effort in towns and cities, and for transmitting signals over millimeter wave spectrum—the spectrum we'll be using to send massive amounts of data at high speed.

The advantages of small cells don't stop there. Learn why this hardware can help tomorrow's bandwidth-hungry applications live up to their potential.

How important is small cell technology for 5G?

At their core, small cells are wireless transmitters and receivers designed to provide network coverage to smaller areas. So while tall, high-power "macro" towers keep the network signal strong across large distances, small cells suit more densely developed environments like cities.

The ultimate goal of small cell technology is to improve the cellular experience for end users. It strengthens coverage and data transfer speeds where devices might otherwise compete for bandwidth. And small cells have been shown to extend handset battery life by reducing power draw, so devices can go longer between charges.

Every network provider wants to deliver 5G as soon as possible, but only Verizon has had the market foresight to act clearly and decisively on it. "We believe we've got more small cells than anyone else in the U.S.," says Nicki Palmer, chief network engineering officer and head of wireless networks at Verizon, "and it's serving customers well."

How small is small?

Building a network capable of delivering 5G may be complex, but small cell technology is a straightforward idea. Whereas most of today's cellular data travels between towers and antennas that may rise hundreds of feet, small cells are about the size of a picnic cooler or mini-fridge.

"The best way to serve an almost insatiable demand from our customers is to not build 200-foot macro [cell towers]," says Palmer. "It's to go low and tight, serving the demand as close to where it originates as possible. And that's how we've been building these networks."

We've been at the small cell game for years now.

Nicki Palmer, chief network engineering officer and head of wireless networks at Verizon

Mounted on street lights, utility poles, buildings and other structures, this tech helps deliver the media and information that users need—whether it's an HD movie or a 3D-rendered blueprint, where and when they need it. Small cell hardware is discrete and energy efficient. In fact, the technology is already up and running in many communities—blending seamlessly with the environment and helping deliver robust 4G LTE connectivity to customers who rely on this tech every day, even if they may never see it.

"We've been at the small cell game for years now," says Palmer. "We have small cell networks in 97 of the top 100 markets. That doesn't happen overnight. Some other carriers, frankly, have not invested in that direction. We have a very good start."

All this work has made Verizon America's largest and most reliable 4G LTE network—and it underpins everything we're doing to build a 5G-powered tomorrow.

What's next for small cell technology?

Small cell tech isn't just emerging. It's here and delivering better digital experiences today. But at Verizon we're driving a digital transformation, and we're not relying on any single piece of technology to get us there. "The important thing is to build the network that performs the best," says Verizon CEO Hans Vestberg.

Innovation typically comes in fits and starts. Over Verizon's 5G network it will arrive in a rush. We're building a network to meet the demands of technology that's still in its infancy, and new demands that have yet to be imagined. Cars that communicate with road infrastructure; drones that troubleshoot repairs on heavy industrial equipment miles away; real-time workplace collaboration that happens with nobody in the same room—this is the future that 5G promises, and that small cells will make possible.

Why 5G is crucial for the smart city of tomorrow

Blazing network speeds and low latencies can help improve the functionality of entire cities.

5G is poised to have a massive impact on how we live, work, learn and play. But the potential of 5G doesn't stop at the front door of our homes, schools or workplaces.

The blazing speeds and low network latencies brought by 5G can enhance the functionality of entire cities. Whether it's helping fight traffic congestion, improving the ways cities monitor and manage vital services, or enabling autonomous mobility, 5G will become an ever more critical tool in cities' arsenals. Pairing Verizon's industry-leading network with ever-smarter data analytics tools and computing speed, communities will be empowered to drive efficiencies, spur economic growth and, most importantly, improve quality of life for their residents.

Why smart cities, and why now?

From population growth to resource management, communities face daunting challenges to their livability standards; resiliency in the face of rapid development and environmental calamities; and ecological sustainability. With an estimated three million people moving into U.S. cities every week, the strain on resources, infrastructure, energy and shared space is all too real.

Americans spend over eight billion hours a year stuck in traffic, and a car that idles an hour per day emits 10 pounds of carbon dioxide in a week. Verizon has already laid smart-city groundwork with our Intelligent Traffic Management solutions, which help move people and vehicles more safely and efficiently. Using in-ground sensors and micro-radar to reduce drivers' stops and alleviate gridlock, these solutions have become trusted, invaluable tools in cities across the U.S.

"The data helps city managers and planners better understand how to provide facilities for the citizens, which will then improve or reduce commute times and CO2 emissions," explains David Tucker, Verizon product director for traffic management/data services. "It's all about making it easier to commute within your cities. That's why we're in this—to help improve our citizens' lives."

The potential impact of 5G on cities

By 2025, the global market for smart-city services—from healthcare to transportation to energy security—is estimated to reach $2.57 trillion, and those investments will largely hinge on network providers' ability to relay massive amounts of data among connected devices and systems in near-real time.

"A lot of cities are really looking for that new innovation … [We] pull together the best of Verizon in a holistic fashion."

Lani Ingram, Vice President, Smart Communities at Verizon

A fully functional smart city requires gigabits-per-second throughputs and single-millisecond latencies. The pre-commercial 5G trials we conducted in 11 U.S. cities in 2017 demonstrated 5G's ability to deliver that level of performance.

"A lot of cities are really looking for that new innovation," says Lani Ingram, vice president of Smart Communities at Verizon. "I think what we offer from a core infrastructure really enables a lot of that. It pulls together the best of Verizon in a holistic fashion."

Envisioning the 5G-enabled smart city

Cities that tap into the power of 5G connectivity—like Sacramento, which will be one of the first 5G cities—are better equipped to drive improvements in public safety (smart street lights, remote security monitoring), transit (intelligent rail, smart parking), utilities (water treatment and management), public Wi-Fi access and emergency preparedness.

"Sacramento has positioned itself as a leader in technology and innovation investment," notes Ingram. Of our Sacramento partnership, she adds: "This proposal not only underscores the city's commitment to putting its citizens first, but to providing them with the tools, engagement opportunities and innovation to drive digital equality and quality-of-life improvements."

More communities are set to follow suit, and they'll find their own ways of preparing their communities and citizens for a future that rides on 5G. These cities will develop digital payment processes for public services such as tolls and parking, innovate around ambulance dispatch services, and attract investors and businesses that value the convenience and reliability of supportive, robust 5G infrastructure.

Ultimately, municipalities will become active agents in their own maintenance and upkeep, allowing them to become more efficient and more responsive to the needs of their citizens.

Bottom line: Better information leads to better resource allocation, which in turn leads to safer, more sustainable places. With Verizon's 5G network, the smart cities of tomorrow are already coming into view.