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Grayway



5G and the Future: What's Next?

Data Centers Prepare for the Technology of Tomorrow

A JOURNAL FOR BUSINESS AND INDUSTRY



Welcome.

We have all been waiting for 5G—its high speeds and low latencies promise to revolutionize communications, automation, transportation, the metaverse, and basically anything connected to the Internet.

However, 5G has been slow in coming to much of the world, with no real sense of urgency. Although this is disappointing, the extra time does give data centers more time to prepare for the huge amounts of information that will be coming through 5G networks when they are more fully deployed.

But it doesn't stop with 5G—R&D teams are already looking ahead at 6G and 7G technologies that could overrun 5G due to faster speeds, with latencies measured in microseconds. These futuristic networks will enable incredibly realistic virtual environments and create what some are calling an "Internet of Everything."

Could 8G come along that renders 6G or 7G obsolete? Hard to say, but as technologies converge, and automation AI comes into play, data centers will need to continually innovate to keep pace with advances we have not even thought of yet.

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Even as 5G deployment continues, researchers are already developing much faster 6G and 7G technologies, with latencies measured in microseconds.



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Building a More Secure Future for Data

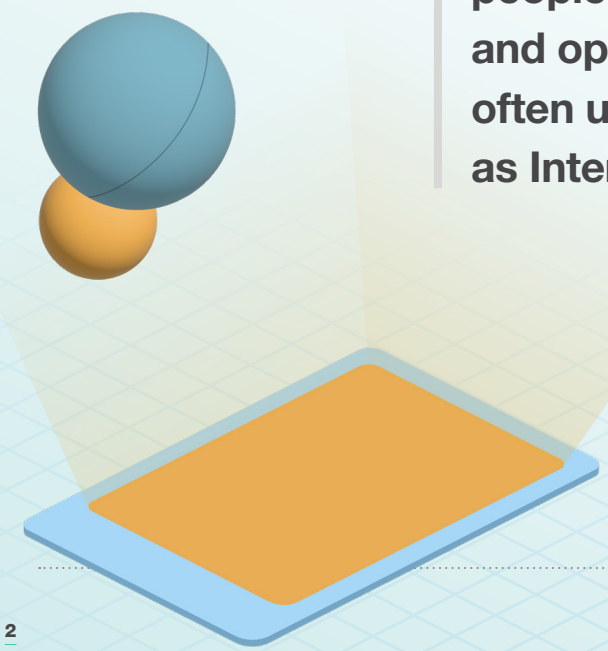
Gray continues to establish itself as a premier partner for the Mission Critical sector, building more than 400 MW of capacity for customers each year.

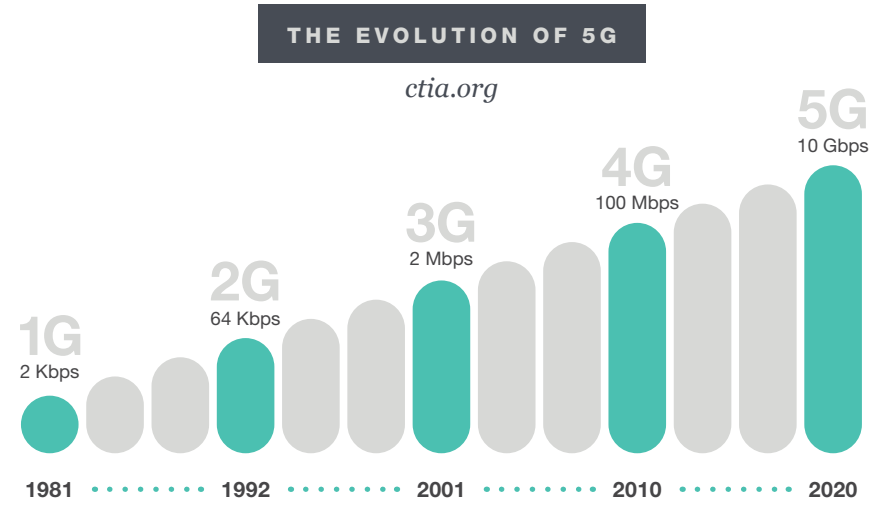


5 Keys to Push 5G *Forward*



More functional than 4G, 5G – the next generation for mobile communication networks – has the capacity and speed to connect more people, devices, machines, and operational systems, often utilizing platforms such as Internet of Things (IoT).





5G combines low latency with greater availability, higher volume, and speeds up to 100 times faster than 4G. These added benefits enable more devices to connect to the Internet, all without slowing down communications and response time. This level of speed is a must for highly technical, complex products such as autonomous vehicles, virtual reality systems, and large-scale IoT deployments.

In China, South Korea, and the U.S., mobile operators began 5G deployment in 2019. Despite being a leading market, the U.S. ranks 15th because its 5G speeds are still slow. The average 5G speed in the U.S. is only twice as fast as 4G and speeds are nowhere near the potential speeds that have been claimed for 5G. Further, indicators show that, until there is more demand for 5G, wireless providers are wary about spending billions of dollars to upgrade their infrastructure.

To accommodate the changes, data centers must upgrade their existing infrastructure and network servers. However, these and other key elements for digital upgrades (for example, virtual radio access networks) have been slow in coming—in part because most countries and telecom companies are implementing 5G gradually.

Proceed with Caution

Despite slow rollouts of the new technology, data centers must make changes now to keep up with new 5G developments and make the necessary capital investments to handle 5G efficiently and seamlessly, or risk becoming obsolete as a provider. The enormous amount of data that 5G is expected to generate could overwhelm operators that have not upgraded their computing capacity and the associated infrastructure, such as storage, connectivity, and edge computing support. And, as they become more comfortable with 5G, consumers will demand even faster services and support for their mobile devices. Data centers need both short-term and long-term strategies in place for capacity, capabilities, and growth to support this and other new technologies. Some areas to address include:

1. ***Upgrading existing infrastructure.*** New technologies/architectures are needed that incorporate automation to facilitate fast and seamless 5G integration and management.



The first step for many providers is transferring edge computing networks, containers, and virtual servers to the cloud. According to TechTarget, "Data centers can increase their lifecycle upgrade processes by replacing simpler networking hardware—such as switches and routers—with 5G-capable ones." "Some networking hardware and software have already been upgraded to be faster and more efficient, with containerization leading the way."

2. ***Edge computing.***
   As the primary source of latency (delay) is distance, a good portion of 5G data will have to be processed closer to where it is generated, thus keeping latency low. These local and regional data centers are collectively called "edge computing" because they are close to the communities they serve. To meet future 5G demands, data operators are building new "edge" data centers with smaller footprints. "Edge facilities allow information to be processed in closer proximity to the source and where the workload is being utilized," says Ben Burgett, business unit leader for mission critical at Gray.

3. ***Containerization.***
   Traditional data centers will be less able to handle 5G traffic smoothly, especially as more large-scale deployments occur. Rather than build new, large, and costly data centers, a growing trend is toward prefabricated, complete containerized data centers to meet current market demand. Such "containers" are fully functional data centers that include networking equipment, servers, cooling systems, UPS, storage devices, and other essential components. Containerized data centers are designed for energy efficiency, rapid deployment, and scalability—because they are modular, they can be used to increase (or decrease) capacity as needed.

4. ***Hybrid multi-cloud.***
   The hybrid multi-cloud is like a virtual supply chain—it utilizes multiple public cloud services, typically from a variety of different cloud providers, to support 5G. For example, an organization might host its web front-end application on AWS and host its Exchange servers on Microsoft Azure. By adopting a multi-cloud approach, businesses can select IT services from various providers for the best deal and not get locked into a single cloud provider.

5. ***Metaverse.***
   The metaverse (currently being developed) will be a dazzling interactive platform where users immerse themselves in complex virtual environments. To achieve this, 5G technology is expected to provide seamless, fully integrated interactions between participants and virtual environments. Latency must be minimized to ensure that all graphical elements react immediately to ensure smooth, real-time responses. This is where edge data centers become especially important (short distances, low latency). As the metaverse expands, so will demands for fast, powerful, reliable, and cutting-edge data centers.

Moving Forward

5G is changing how we interact with everyday life. And once 5G is fully realized, it will change the way we engage with and utilize data. Data centers must be able to deliver the scale of deployment that is needed to efficiently move massive amounts of data, especially from data-intensive virtual and augmented reality, self-driving cars, and IoT in manufacturing and logistics. These and other applications will require the support of advanced and specialized infrastructure, including hybrid cloud, automation, and increased cybersecurity. Co-location and convergence of 5G architecture and supporting technologies (at edge data centers) will likely be the ongoing goal to ensure smooth transfer of data with the lowest possible latency.

Learn more about the adoption and adaptation of 5G. →



Beyond 5G: New Technologies on the Horizon

As 5G becomes more widely accepted and adopted, new advanced communications technologies are already in development. Some of those technologies, believe it or not, could actually overtake 5G before it reaches its full potential.

This raises the question: As corporations prepare to invest billions of dollars to upgrade networks for 5G, how soon will more upgrades be needed to accommodate the even newer technology?

6G by 2030.

The next wireless network technology on the horizon is named—not surprisingly—6G

Although 6G doesn't exist yet, it will, and again not surprisingly, be a more powerful form of 5G that will still make use of concepts such as edge computing, containerization, and artificial intelligence (AI) to create a much faster Internet. This will be enabled through the use of terahertz waves—sub-millimeter-sized radio waves that sit on the border between microwaves and infrared radiation The result? Increased speeds and latency measured in microseconds.

"Our world is rapidly approaching the wireless environment, with a great need for uninterrupted information access anytime and wherever it is required."

TT Consultants
TECHNOLOGY CONSULTING FIRM

Faster speeds and lower latency will enable instantaneous communication in phones, computers, wearable devices, robotics, and more. Terahertz waves, combined with edge computing, will allow for widespread implementation of wearable smart devices, metaverse tools, automated infrastructure, and other devices that have yet to be designed. Other advantages of 6G, noted Gerry Christensen, CEO of Mind Commerce, an information and communications technology analyst firm, include:

- Technology convergence—6G will integrate previously disparate technologies, such as deep learning and big-data analytics
- Edge computing—Greater deployment and increased capacity of edge computing to ensure fast, ultra-reliable, low-latency communications solutions
- Internet of Things (IoT)—6G will increase the global capacity for incredibly fast and efficient IoT applications, including automation, robotics, and machine-to-machine learning
- High-performance computing (HPC)—Combined, 6G and edge computing resources will drive the increased speed and capabilities of high-performance computing, which are critical for mission-critical and mobile technology applications

The 6G technology market should also enable advances in the fields of sensing and imaging, presence technology, and location awareness.

6G is expected to be available around 2030.

7G by 2033.

Even though 6G is still on the drawing board, other wireless companies have already started to look beyond 6G to 7G—for the very same reasons that 6G is being considered over 5G. Why settle for a conceptual 6G when a conceptual 7G could be so much better?

Although large-scale 6G networks do not yet exist, some research groups have already started exploring seventh-generation (7G) wireless technologies. Edge and core computing 7G should be capable of delivering data at speeds as high as 11 Gbps, or about 100 times faster than most Wi-Fi available today.

According to TT Consultants, a technology consulting firm, other potential advantages of 7G are:

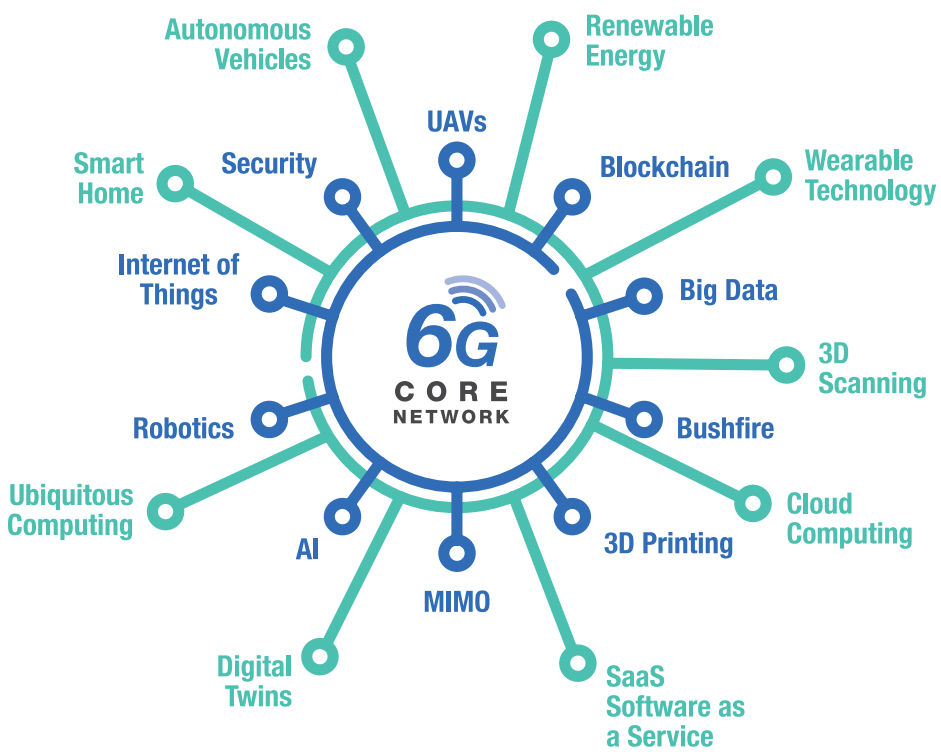
- Virtually no latency in communication
- Super-high-speed connectivity
- AI-based core networking solutions
- Incredibly realistic virtual environments (metaverse)
- Internet cognition
- Satellite networks for better global coverage
- Internet of Everything

"We are moving towards a wireless world with endless benefits, where everybody wants high-speed internet and a delay-free calling facility," said TT Consultants. "Our world is rapidly approaching the wireless environment, with a great need for uninterrupted information access anytime and wherever it is required. As with growing wireless technology, we will see increased bandwidth at a lower cost and with higher quality."

Take a deeper dive into new tech on the horizon here.

ENVISIONED 6G BASED APPLICATIONS

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PROJECT SPOTLIGHT



Building a More Secure Future for Data

Gray continues to establish itself as a premier provider for the Mission Critical sector, offering scalable, end-to-end solutions that our customers need to do business in a competitive market.

With design, construction, and equipment services at our core and a nationwide network of experienced trade partners, Gray delivers secure data centers enabling on-demand cloud computing platforms to individuals, companies, and governments. Our data center projects total more than 400 megawatts of load capacity each year, backed by redundant power and cooling systems installed by our MEP experts. Whether edge, co-location, or hyperscale, Gray offers the tools and support to ensure our cloud computing customers can operate securely and with confidence.

Check out our Mission Critical Case Studies.



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