



How 5G Will Help Us Fight Future Pandemics

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Executive Summary

“How do you get this thing to stop beeping?” asked my then 65-year old father as he grappled with the small pager in his hand. He had been a small-town optometrist for over 35 years when he sold his practice to the Cleveland Clinic and for the first time in his life, was asked to embrace a “new” wireless technology letting him know to call the hospital operator for an urgent message.

Fast-forward 20 years and healthcare professionals and the facilities they work in have embraced to varying degrees, wireless technologies providing high-speed broadband for doctors, patients and guests through a combination of fiber, Wi-Fi and distributed antenna systems (DAS). Faced with the current COVID-19 pandemic, the need for 5G networks to support urgent hospital activities such as video-based telemedicine, file sharing and physician to physician consultations has never been more pronounced.

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The daily challenges of healthcare are magnified during a pandemic

Over 60 million people in the US live in rural areas and depend on small regional hospitals for their health care. According to a December 2019 article in *Becker's Hospital CFO Report*, 119 rural hospitals have closed since 2010, with 30 closures in Texas alone. The article goes on to say the trend is increasing with a record 18 rural hospital closings in 2019 and another 600 hospitals vulnerable to closure. As rural America struggles to provide adequate healthcare and pandemics like COVID-19 spread without regard to city limits, reliance on technologies like telemedicine for patients and virtual-reality training for hospital residents and doctors becomes essential.



COVID-19 has also shown the importance of the sharing of data between healthcare professionals, as well as between Federal, state and local public health agencies to curtail the spread of the virus. The ability to quickly, securely and remotely send and receive large amounts of data becomes vitally important, as is the ability to get accurate information to the masses.

With the potential for millions of Americans subject to self-quarantine, ensuring adequate network bandwidth on existing 3G and 4G networks presents a challenge for commercial carriers like Verizon, AT&T, T-Mobile and US Cellular. During normal circumstances, these networks can often struggle with network capacity challenges (see Network Capacity below) in urban and suburban areas.

What is 5G and how will it help?

5G is currently being deployed by commercial carriers across the country. It has the promise of providing increased speed, network capacity and improved security. During a recent on-site test, Waterford engineers witnessed a Samsung 5G mobile device register over 2 Gbps download speed. For reference, AT&T provided fiber to homes in Raleigh, NC with a top download speed of 1 Gbps. Current cable providers advertise a measly 150 Mbps (on a good day when your teen child isn't on-line gaming) or 13x slower than 5G.

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What is 5G and how will it help?...continued

In an April 2019 address from the White House, President Trump stated, “Secure 5G networks will absolutely be a vital link to America’s prosperity and national security in the 21st century. 5G will be as much as 100 times faster than the current 4G cellular networks. It will transform the way our citizens work, learn, communicate, and travel. It will make American farms more productive, American manufacturing more competitive, and **American healthcare better and more accessible**”.

Fast, Fast and Faster

The speed of 5G eliminates the latency (delay) in the transfer of data like patient files, MRIs and photos from one device to another. When you see the spinning, spiked wheel on an Apple device, you are experiencing latency. COVID-19 has likely opened most Americans to the idea of telemedicine, providing video conversations between medical professionals and patients. The promise of no latency furthers accelerates the promise of telemedicine, including near real-time patient monitoring (wearables) and reduces the spread of the virus by allowing patients to remain in their homes instead of going to a hospital.



Network Capacity: How many people fit under the umbrella?

5G improves network capacity so more people and devices can be served in a hospital location. Commercial carriers have to strike a balance between coverage and capacity when designing a network. Coverage is similar to the size of an umbrella; a golf umbrella provides more coverage from the rain than one that collapses and fits in your purse or backpack. Capacity is equivalent to how many people can get under the umbrella. 5G requires more antenna locations (smaller umbrellas) due to the higher frequencies and shorter wave lengths, creating increased network capacity vs. today’s 4G LTE networks (it magically fits lots of people under small umbrellas).

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Security

Doctors bringing their mobile devices to work, patients transmitting vital signs via wearable devices, video conferences between providers and patients and the transfer of patient files all require a secure network to protect vital information. Add in medical devices and hospital equipment connected to the “Internet of Things” or IoT, and the many access points have created a critical infrastructure for health care and a significant security challenge.

Verizon, deployed 5G in 31 markets in 2019 and addressed concerns by stating, *“We realize that we don’t always control the choice of the devices (like handsets or routers) that our customers may connect at the periphery of our network. So, we use network features like a new 5G security tool that isolates devices until they are fully authenticated, to defeat any malicious activity at the network edge. The evolution toward a fully-realized 5G environment will bring even stronger security—more encryption, more defense at the edge, and greater potential for creating secure enclaves or slices.”* Verizon has also taken steps to ensure their supply chain sources network components from trusted vendors and countries.



Conclusion

5G holds the promise of accelerating the future of healthcare, including the fight against pandemics like COVID-19. Some key benefits include:

- Addressing the knowledge and resource constraints facing rural hospitals
- Providing medical care to rural Americans with no convenient access to medical facilities
- Reducing the cost to upgrade existing wired hospital networks by deploying 5G wireless networks
- Expediting the adoption of telemedicine to reduce healthcare costs
- Improving the speed and security of data transfer between devices (patient files, MRIs, etc.)
- Opening the potential for virtual reality training for surgical procedures

My father never did wear or learn to use his numeric pager, but now at 86 years of age he has mastered surfing the internet and sends me numerous articles about how to wash my hands to avoid COVID-19.



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About Waterford

Waterford Consultants was founded in 2004 and is a professional services organization specializing in FCC and FAA regulatory compliance, engineering, site development, and a host of software and technology-related offerings that service the wireless industry.

Waterford specializes in a diverse collection of technical and consulting services that continue to expand with significant focus given to utilizing the most innovative and tech-savvy solutions.

Waterford's clientele consists of the industry's leading carriers, tower and structure owners, engineering and site acquisition firms, as well as most local, state and federal government organizations.

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