An ADTRAN White Paper

From Broadband to Better Health Care

Building the 21st Century Network

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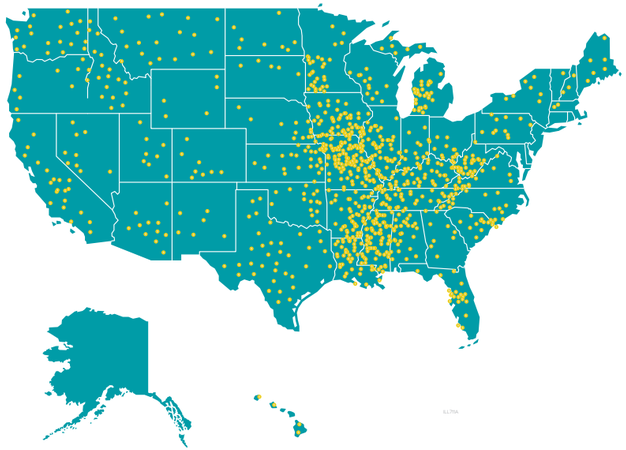

Across the United States, 90,000 non-profit and rural health care sites will spend an average of $42,000/year for upgraded broadband services.
Source: Schools Health & Libraries Broadband Coalition (SHLB)

Introduction

Telemedicine usage and telehealth initiatives are growing year over year, with the most recent surge in usage driven by the 2020 COVID-19 pandemic. Stay-at-home orders and social distancing compelled doctors and therapists to embrace telemedicine virtual visits for the safety of both patients and physicians. There has been steady growth in healthcare systems using broadband networks to quickly and more efficiently deliver access to electronic health records and hasten the assessment of imaging tests. Delivering the best medical care requires a 21st century network capable of delivering gigabit-class symmetrical speeds to hospitals, doctors' offices, and individual households.

However, today's telemedicine surge is only the tip of the digital health care iceberg. Telehealth and computational medicine initiatives that combine cloud applications, artificial intelligence, Big Data, the Internet of Things (IoT), and off-the-shelf consumer electronics offer the promise of improving individual health care, preventive medicine, and treatment of existing conditions. Data validation and integration from home devices such as blood pressure cuffs, activity trackers, or Apple Watches are now in the early stages of adoption. One can soon envision these enhancing patient care and improving outcomes by potentially providing early warning signs of everything from cardiac issues to virus infection.

Poor broadband, poor health?

At the same time, public agencies are increasingly concerned that the lack of broadband is detrimental to healthcare. In some cases, it may literally kill people. The Federal Communications Commission-National Cancer Institute (FCC-NCI) Broadband Center Collaboration webpage cites Centers for Disease Control and Prevention data showing that while communities nationwide have experienced a 20 percent decrease in cancer mortality over the past 20 years, Americans living in rural areas are more likely to die of cancer than their counterparts in urban settings. Analysis of the intersection between broadband data and cancer data shows rural "cancer hotspots" face major gaps in broadband access, leaving connected care solutions out of reach.

With over 20 million Americans lacking access to high-speed broadband, according to the FCC's 2019 Broadband Report, the need for faster connectivity is urgently needed by both individuals and communities. The Schools, Health & Libraries Broadband (SHLB) Coalition estimates that of the approximately 90,000 non-profit urban and rural health care sites in the U.S., at least 70 percent (63,000) are expected to seek FCC funding in 2020 to upgrade broadband and telecommunications services, spending an average of over $42,000 per year for these upgrades.

Defining telehealth, telemedicine and the future of both

Telehealth refers broadly to the use of technology and services to provide health care and services at a distance, while telemedicine is the formal practice of medicine with a physician directly involved using technology to deliver care at a distance. There is also telepsychology, where therapists work with patients directly but still remotely through a video session. All of these practices require high-capacity broadband to be effectively used by doctors and patients, with symmetrical services necessary for telemedicine and telepsychology sessions.

Most are familiar with telemedicine, where a doctor and a patient have a discussion via a video link. The term is also applicable in the context of doctors and specialists reviewing imaging scans of patients remotely. Gigabit broadband enables physicians to evaluate a patient's condition from anywhere–regardless of distance.

While society at large has received a crash course in telemedicine due to social distancing edicts, the practice has been in use for years in rural areas. Satellite Med, based in Cookeville, Tennessee, first opened its physical and virtual doors in April 2006, and has conducted over one-half million visits with an efficacy rating of 98.4 percent, meaning that nearly all patients treated in the Satellite Med telemedicine system improve and do not return to the clinic with the same illness within two weeks.

The telemedicine practice has a distributed network of clinics in the area with locations at local schools, several businesses, and a more traditional walk-in clinic setting. An on-site nurse conducts preliminary patient screenings by gathering data via a questionnaire and by taking vital signs. This enables the remote doctor to quickly review the information along with his or her existing medical records while talking to the patient via videoconference.

Telemedicine practice at Satellite Med in Cookeville, TN. A typical doctor-patient exchange, begins with an onsite nurse taking patient vitals, followed by videoconferencing with the physician

Photo courtesy of Satellite Med and Intellectual Care, LLC

Gigabit provides a real shot in the arm

What's the secret to Satellite Med's success? Gigabit broadband and maintaining continuity of care between doctors and patients, according to founder Dr. James Cates, M.D.

"We tried telemedicine with minimal broadband – 6 Megabits per second – and had a lot of difficulty sending x-rays and simultaneously conducting sessions between doctors and patients at remote clinics," Dr. Cates said. "We were bottlenecked. Once we were able to get symmetrical gigabit service, a gig up, a gig down, we were easily able to send imaging scans and receive reports while having multiple physicians treating patients and getting more care to our remote clinics."
Satellite Med isn't in competition with local physicians but views its telemedicine service as a partner with them. "It's safer for patients and providers," said Dr. Cates. "By our criteria, a patient should have been seen by a doctor within the past year. We want to maintain continuity of care for the patient with the primary care provider knowing the patient has medical records and doesn't fall through the cracks. We believe our model greatly reduces the provider's time by more than half over a large number of visits."

Cates says Satellite Med's approach to telemedicine saves time and money, with providers able to cut physician time for a visit from 20 to 30 minutes down to five to 10 minutes without compromising quality. "I believe what we're able to see is 50% faster time to final outcomes and 50% fewer expenses, delivering quality care at a lower cost to the patient."

Satellite Med's localized approach extends to the development of its workplace and mobile telemedicine systems developed by Intellectual Care, co-founded and run by J. Wilson Cates III. Intellectual Care is a healthcare software company founded to help healthcare companies like Satellite Med launch their own telemedicine platforms. Maintaining HIPAA compliance, while seamlessly integrating into every electronic medical record (EMR) is just one aspect of their model. "We want to ultimately unify and localize telemedicine systems by equipping physicians and their local practices with software that maximizes their time and increases their quality of care," said J. Wilson Cates.

Telemedicine practitioner Dr. James Cates at Satellite Med in Cookeville, TN.
Photo courtesy of Satellite Med and Intellectual Care, LLC

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Dr. James Cates M.D., Satellite Med.

Wearable devices are becoming increasingly important in telehealth applications

Boosting telemedicine with telehealth

One in five Americans uses health apps or wears a fitness tracker, according to Gallup's 2019 Health and Healthcare Survey. Wearable devices such as the Apple Watch and Google's Fitbit are being used today to monitor an individual's fitness levels and heart rate changes, with some able to provide more detailed electrocardiogram information and blood oxygen levels. The latest application of fitness and health technology leverages "Big Data" collection and sophisticated analysis to monitor heart rate changes for indications of coronavirus and flu infections, according to a May 28, 2020, article in ***The Washington Post***.

J. Wilson Cates and Intellectual Care are already looking forward beyond telemedicine to the age of telehealth, with the ability for the EMR system to take in information from consumer-tech based devices. "We're building for the future from a software perspective," said Cates. "We're using our data to create systems that will benefit both the patient and the provider. As hardware devices become more accurate and available, our ability to accurately treat and diagnose patients will improve even more. We're waiting on devices to be more affordable, where patients can take more responsibility for their health care, collecting data on things like O2 stats and blood glucose monitors."

New ideas and concepts to deliver telehealth aren't limited to wearable devices. For example, the Plume Smart Home Wi-Fi Platform can use its mesh network as a residential motion monitoring system, providing alerts when there is a lack of motion or if someone has fallen and could be hurt. For at-risk individuals with preexisting conditions or the elderly, this type of off-the-shelf consumer technology provides another layer of safety without the expense of customized hardware and software.

Introducing new technologies into health care is driving technology companies like Microsoft to hire a Chief Medical Officer for navigating the gulf between potential hardware and software applications generated by consumer technology and the more conventional practices of the medical community at large. However, there are numerous grassroots telehealth efforts working to leverage the capabilities of gigabit fiber and off-the-shelf hardware for improving health care.

Smarter homes, healthier people

Northwest of Baltimore, the Mid-Atlantic Gigabit Innovation Collaboratory (MAGIC) is operating the Healthy Smart Home project. The Westminster, Maryland, economic non-profit is collaborating with Target Community and Educational Services to turn two of Target's residential facilities into medical smart homes, using IoT technologies as a foundation for community-based data collection and analysis. This innovative approach has the potential to transform care delivery, enabling aging in place and more effective preventive care in a residential setting.

"We're trying to create technology that can gather relevant health information that isn't creepy and not intrusive, controlled by residents in the home," said Dr. Robert Wack, MAGIC's President and Chief Medical Information Officer of Frederick Health. "We're using sensors and software to collect data on clients' daily activities, diet, and behavior. We're trying to create technology to generate insights into their health status, keep them out of the E.R. and hospital, and help them lead healthier lives."

The residential group homes work with adults with disabilities, placing two to three staff members at each home to care for three clients. Healthy Smart Home started as a proof of concept collecting basic environmental data, such as temperature, light, humidity and movement and is now moving to the next step using open source wearable devices to gather basic physiological data such as heart rate, activity, and pulse oxygen levels.

"Hospitals are starting to use predictive analytics differently, on a minute-to-minute, hour-to-hour basis," Wack stated. "Inside the home we're moving to weeks, to months, to years. We're trying to create a new paradigm where you deploy the system in your own home, you gather the data, you control that data similar to what is going on inside of hospitals. There are a lot of health care apps built around a predatory data harvesting model where they collect the data and mine it or sell it to someone else."

The best healthcare requires the best network

While broadband access is naturally associated with quality of life issues such as ecommerce, better access to education, and remote work, it is increasingly clear high-speed networks are also necessary for delivering and enhancing health care. Gigabit, symmetrical connectivity is necessary not only for hospitals, emergency rooms, and point-of-care clinics, but needs to be widely available so individuals can communicate with their doctors and healthcare systems, have access to specialized resources and exchange real-time information.

High-speed broadband is also key to enabling telehealth solutions that leverage commercial off-the-shelf consumer devices. From measuring personal fitness and health on the go to providing independence and safety for at-risk populations in the home, telehealth can minimize expenses while lowering the overall cost of healthcare through proactive monitoring and by averting emergency medical situations.

Delivering the best health care requires building the best network possible, not just for primary care medical facilities and doctors, but the entire community. Broadband has been underappreciated for its role in improving the health and wellbeing of communities, but when it isn't available its effects are real.

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Dr. Robert Wack, M.D., MAGIC President

FROM BROADBAND TO BETTER HEALTH CARE

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J. Wilson Cates III, co-founder and CEO, Intellectual Care, LLC, Cookeville, TN

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