



## Santa Fe Public Schools New Mexico: Data-Driven Decisions Connecting All Students

With funds provided by the [Chan Zuckerberg Initiative](#) (CZI), [CoSN](#) has undertaken a [2021 Home Internet Connectivity Study](#) with thirteen school districts to address home bandwidth, device, and related guidelines for students learning in a remote or hybrid environment. This first-of-its-kind study employed recent de-identified student data to capture students' experience using computing devices and accessing the internet at home. [Santa Fe Public Schools](#), New Mexico, had an advantage when participating in this study. They already had questions about home connectivity, including performance differences in student devices, hotspot, wireless router options, and how to drive community and statewide involvement. This study provided them with answers and solutions with long-term impact.

Tom Ryan, former Chief Information and Strategy Officer, Santa Fe PS, highlighted that data collected in this study reflected the disparities in reliable and sufficient connectivities in homes across the district. "You just cannot assume that everyone has internet," said Ryan. "Everybody doesn't have internet, and it's just too complex to take that simplistic approach to it." Instead, Ryan said, connectivity data needs to be drilled down to determine if and what connectivity is necessary to ensure students can access online resources for class and home assignments.

### **The Device Matter**

The CoSN study determined that upload and download speeds significantly classes/ meetings can vary by age, type, and quality. In addition, students that received newer devices with limited specifications (e.g., memory and processor) also had more challenges than students provided with better specifications for classrooms and at-home use. This vital information led Ryan and his team to question whether the district-owned devices provided Santa Fe students with the speed, performance, and reliability that the study identified as critical. By assessing the three different versions of thousands of Dell devices provided to students for in-person and remote learning, the team discovered that the varying degrees of performance and capacity impacted student access. Multiple device filters devices, district-level filters, and applications such as GoGuardian and Catchon loaded on the devices ate up bandwidth and contributed to overhead. By reducing the number of filters on devices, the team saw throughput speed increase significantly at home. Santa Fe PS also compared the numerous Chromebook brands, which determined that an LTE-enabled Chromebook had a better antenna and connected directly to the computer's processor and RAM. While

these devices are more expensive than non-LTE-enabled devices, Ryan has data to back up the theory that an LTE-enabled device may solve connectivity issues for students and pay for themselves in the long run.

### **Challenging Areas**

Through a review of ISP data (i.e., [Form 477 data](#) obtained from the FCC) and [Ookla Speed Test](#)<sup>®</sup> data, the Home Internet Connectivity Study identified that students in more rural areas or on the edges of suburban areas could have minimal internet availability and access. Likewise, users within high population areas of a city also experience limited internet speeds. With its mountainous terrain 7000 feet above sea level, the Santa Fe district offers Ryan's team unique challenges regarding reliable, sufficient, and consistent connectivity for families, staff, and students. In addition, the study's data identified community areas that had different connectivity needs: large student population communities that needed enhancement of cellular towers and remote communities that required the development of mesh networks.

Communities with a high concentration of students living in the same household in Santa Fe PS included mobile home parks, subsidized apartment buildings, and daycare centers. The data collected from the study identified the connectivity options in these areas as not meeting the minimum standard for online learning of 25 Mbps download, and 12 Mbps upload speed per student. Honing in on the challenges in these areas and using the data from the study, Ryan and his team began asking the question, "What can we do specifically to locations that need connectivity that might be different than just giving them a hotspot?"

According to the Home Internet Connectivity Study, concurrently supporting multiple students using video from the same internet connection is problematic when bandwidth availability is low. This data reinforced for Ryan and his team that the one hotspot per family program was insufficient for even one device in a home. Additionally, understanding the specifications and performance of hotspots and wireless routers of online learning resulted in Ryan's team working with families on how the location of the WIFI access devices in the home, device setup, and outdated device software can significantly impact performance.

The Santa Fe PS team also attributed the inequity of access in the highly populated areas to capacity issues of ISPs brought about by oversubscribing or related to overloaded network switching equipment. As a result, they began questioning the performance of the cheap Wi-Fi that the district has been buying and leveraged the study's data in conversations with service providers regarding necessary internet speed and performance upgrades.

Due to rugged terrains, mountainous regions where homes, city, and school district buildings are located struggled with cellular service and needed robust and sustainable connectivity

solutions. Using the CoSN Home Internet Connectivity Study data, Santa Fe PS determined the parts of their community that were still underserved and strategized how to get 90 percent of them connected. A trifold approach to home internet connectivity to these areas included partnering with local businesses and city officials to install outdoor wireless access points and public access points in libraries and community centers. Secondly, a public-private partnership with the school district developed a system of point-to-point mesh networks requiring the installation of a three-foot antenna on private company's buildings. This solution gives most of the Santa Fe community a line of sight, including the fire stations, community centers, and other establishments in those areas. Finally, the school district worked with specific organizations to provide low-cost and free Wi-Fi options for families to ensure that everyone in the community has affordable access.

Now Santa Fe PS has a way to get WIFI signals out to most homes using various technologies, including hotspots, wireless routers, and mesh networking. Ryan said. "[We] started with hotspots that were solutions for some families but not all. So now we are not doubling down on hotspots. Instead, we are reducing the number of hot spots, which allows us to invest in other tools to give students and families the connectivity they need."

### **State and Local Involvement**

"If my state had this data on every child in the state, they could make better decisions about how we provide the connectivity that students and families need," highlighted Ryan. Santa Fe PS was the only school district in New Mexico with actual data on every student who did and did not have access to reliable WIFI and internet. The valuable data from Home Internet Connectivity Study shared with the local school board, community members, and state legislators, informed the adoption of the 2020 [Connect New Mexico Fund](#), a broadband infrastructure state-funded initiative with appropriation totaling \$100 million.

In conclusion, Ryan said the CoSN Home Internet Connectivity Study provided his districts with valuable data that led to new questions. These questions then led them to make further improvements that led to more questions. "It was a waterfall or domino kind of a thing that led us to some significant progress for our kids that was based on data and not based on an opinion."