



Boston Children's Hospital Business Case

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CONTENTS

The Case for Re-Designing the Network at Boston Children's Hospital	1
Advancing Waves of Healthcare Technology Necessitates an Upgrade to Boston Children Hospital's Infrastructure	2
Straining Connectivity: Battling the Surge in Demand of Critical Care Devices	2
Struggling to Reach Beyond Hospital Walls	3
<hr/>	
T-Mobile for Business vs. Competitors	4
<hr/>	
The T-Mobile for Business Solution	6
5G Takes the Helm: Revolutionizing Boston Children's Connectivity Strategy	6
Unleashing Synergy: How T-Mobile's 5G Solution Will Transform Connectivity	8
5G-Powered Patient Monitoring Revolutionizes Pediatric Care at Home	8
A Full Spectrum Effort: How Diverse Teams Shaped Success	9
<hr/>	
Healthcare Reimagined	10
<hr/>	
Conclusion	11





The Case for Re-Designing the Network at Boston Children's Hospital

Boston Children's Hospital is a renowned pediatric medical center located in Boston, Massachusetts, known for providing world-class healthcare to children from around the globe. With a legacy of excellence spanning over a century, it is a leading institution in pediatric care, research, and innovation. Boston Children's Hospital was facing significant challenges related to strategic priorities that would stress their critical connectivity infrastructure. Urgent attention was devoted to identify the best solution. Touching the lives of thousands of vulnerable families on a daily basis, Boston Children's Hospital made plans to:

- Migrate their electronic health record (EHR) to Epic to position the organization for future strategic priorities.
- Leverage the expanded functionality of the new EHR to deploy new clinical workflows to improve team collaboration, efficiency, and help improve patient outcomes.
- Identify a funding model that supported both streamlined project implementation and optimal financial health of the organization.

Pixel Health is a leading digital health consulting firm who has cultivated a strong reputation in the healthcare sector. Pixel Health focuses on streamlining technology to catalyze IT transformation and developing purpose-built solutions that enhance the healthcare experience for both patients and providers. Boston Children's Hospital brought in Pixel Health to help execute on their clinical mobility strategies who in turn, partnered with T-Mobile for Business to align their network infrastructure for successful digital transformation.



Advancing Waves of Healthcare Technology Necessitates an Upgrade to Boston Children Hospital's Infrastructure

In 2022, Boston Children's Hospital found itself at a pivotal juncture regarding its digital infrastructure. While their Wi-Fi network had supported basic communications and data transfer, their data needs were growing exponentially and threatened to overwhelm the current network architecture. Leadership recognized that demands on the network would continue to grow rapidly and looked to Pixel Health and T-Mobile to offer solutions to address their near- and longer-term goals.

The healthcare industry as a whole is navigating the acceleration of technology adoption, demands for greater mobility and access to care, and innovation that is steadily increasing network traffic and demanding lower latency, higher reliability, and speed. Boston Children's Hospital's need to address their network architecture became a short-term priority related to migration to a single EHR



(Epic) in 2024. They recognized their existing Wi-Fi infrastructure would be insufficient to support the enhanced features and functionality the EHR would enable. Additionally, there was an opportunity to upgrade and streamline the technology utilized by the clinicians and staff to care for patients.

Straining Connectivity: Battling the Surge in Demand of Critical Care Devices

As more and more clinical solutions emerge to support mobile and agile workflows, it became evident the Wi-Fi network at Boston Children's Hospital needed to be enhanced. Wi-Fi was designed to support activities that were conducted in a defined space. While generalized Wi-Fi could readily support

PCs and laptops based in an office or at the nurses' station, some medical devices required a network that could reliably connect devices in transit. Greater numbers of devices and medical equipment were added to the network, and over time, the Wi-Fi system neared capacity.



Many of the medical devices Boston Children’s Hospital considered were 5G SIM enabled, which would necessitate a considerable upgrade to the hospital’s existing distributed antenna system (DAS) and the implementation of a purpose-built 5G hybrid cellular network. Boston Children’s Hospital recognized the limitations of Wi-Fi for critical medical devices, opting instead to integrate and deploy them with 5G SIMS. This ensured reliable connectivity for real-time data transmission and adherence to stringent quality requirements vital for patient well-being. However, the hospital’s existing infrastructure lacked the necessary capabilities to fully support these advanced technologies. It became evident that Boston Children’s Hospital would benefit from 5G deployment and integration with its current Wi-Fi system for network redundancy to support crit-

ical functions. It was also identified there would be benefit in separating mission critical functionality from other network traffic to enhance reliable performance.

The Pixel Health team identified that the density of access points (APs) needed in Boston Children’s Hospital was two to three times that of a typical business office. While residents of an office building may be inconvenienced and even lose money in the event of a network failure, a similar event at Boston Children’s Hospital could negatively impact patient care. An evaluation by Pixel Health found that 50% of Boston Children’s Hospital’s connectivity traffic was mobility based. Further, the strategic priorities of the hospital included an expansion of services into the community and home, which would increase the demand for a network that embraced and secured mobile healthcare delivery.

Ethernet	PCs	Printers	Blood Analyzers
Wi-Fi	Patient Monitors	Imaging	Insulin Pumps
Cellular	Ambulances	EHRs	Robots

Struggling to Reach Beyond Hospital Walls

As a world-renowned pediatric facility, Boston Children's Hospital serves an expansive, diverse population of children and adults from all over the world. Historically, children sent home with medical devices that required close surveillance by the medical team required

extraordinary solutions to ensure safe and effective treatments at home. The Boston Children’s Hospital team, committed to safe, top-quality care, enlisted extreme measures to accomplish this aim, including setting up VPN systems to the patient’s home.



For children living in rural or international communities, these solutions were virtually impossible. In addition to ensuring safe, reliable care delivery at home, security of patient data is a top priority. Together, Pixel Health, Ingram Micro, and T-Mobile for Business recognized these

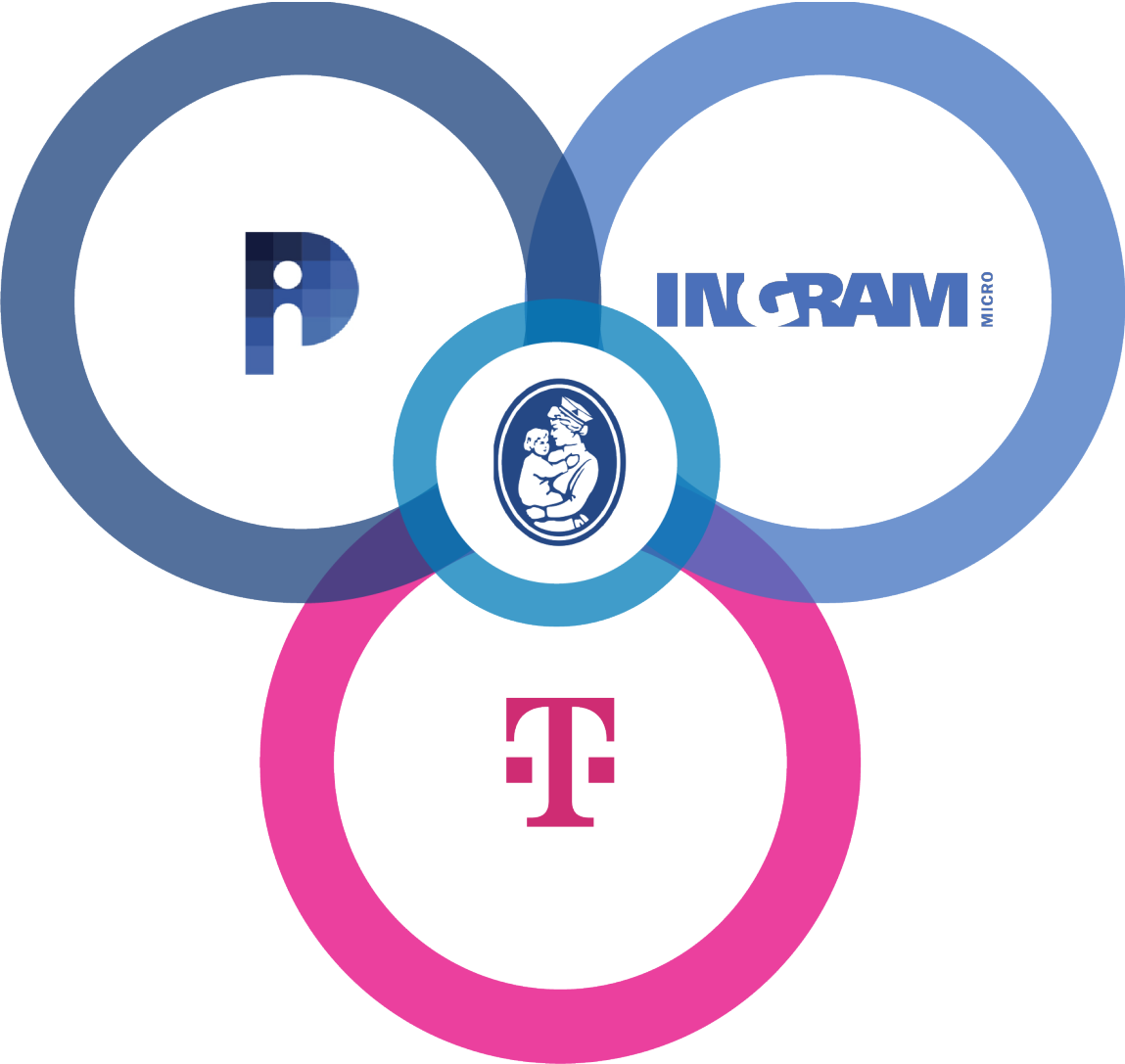
challenges and provided Boston Children's Hospital with a solution that addresses the identified pain points while positioning Boston Children's Hospital for future growth and innovations in care delivery.



T-Mobile for Business vs. Competitors

Members of Pixel Health's leadership had previously worked within the telecom industry and with various vendors, including Verizon, Sprint, and AT&T, but notably not with T-Mobile. At the time, they perceived that T-Mobile was predominantly a residential phone company, an assumption that was later corrected. When Pixel Health began considering options for the digital transformation project at Boston Children's Hospital, they were introduced to T-Mobile by Ingram Micro, Pixel Health's distribution partner. Early in the collaboration, it was identified that

creating a hybrid architecture for simultaneous 5G and Wi-Fi connectivity in 2.9 million square feet of Boston Children's Hospital's primary and secondary campuses to support optimal mobility would require a custom-built architecture. While the original request from Boston Children's Hospital was to expand the Wi-Fi network to support the Epic migration and create a redundant cellular network to serve as failover in the event of a Wi-Fi network failure, a new path forward was recognized. Critical communications and secure data transfer processes that



supported patient care operations would be best supported by a primary cellular network for optimal mobility, reliability, and speed. Simultaneously, other important network traffic, like patient and visitor communication, would remain on the Wi-Fi network, without the previous congestion and competition for bandwidth, which improved patients' and visitors' ability to stay connected.

As Boston Children's Hospital looked to construct a comprehensive network platform to service their entire campus and help ensure coverage extended across

the facility, it became quickly evident to Pixel Health that T-Mobile's modern 5G standalone architecture, hybrid deployment capabilities, 5G spectrum holdings, and service offerings put T-Mobile ahead of the competition. The T-Mobile commitment to a partnership culture centers on helping customers achieve their goals and resolve their pain points through purpose-built solutions. That, along with the demonstrated technical expertise to achieve the desired result, solidified the partnership between Boston Children's Hospital, Pixel Health, Ingram Micro, and T-Mobile for Business.

The T-Mobile for Business Solution



T-Mobile embarked on an extensive discovery phase to meticulously document and explore the unique needs of Boston Children's Hospital. First, they comprehensively assessed the hospital's requirements on an application-by-application basis, considering the necessary integrations for the Epic installation, in addition to the requirements of other critical applications like Vocera/Stryker, that would be deployed to mobile devices. Boston Children's Hospital needed the network to support the communi-

cation needs of the workforce by automating workflows that were previously manual, enabling more time to engage in direct patient care. Designing these customized workflows took T-Mobile engineers many iterative sessions with clinical and operational staff. While the T-Mobile team walked the halls, discussed requirements, and repeatedly validated the design requirements they developed – always with an eye to security – a tailored solution began to take shape.

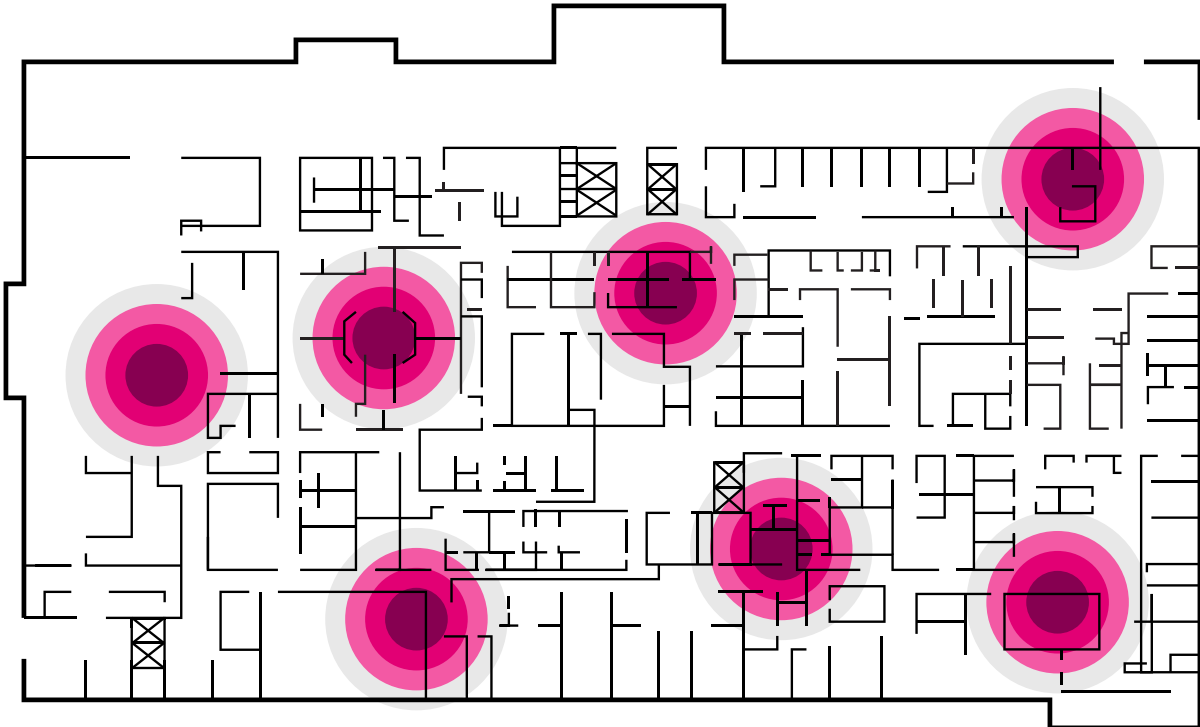
5G Takes the Helm: Revolutionizing Boston Children's Connectivity Strategy

Ultimately, the pivotal decision was made to replace conventional Wi-Fi as the primary network with a 5G cellular network. T-Mobile provided 3D and heat maps, offering a visual representation of current coverage, highlighting signal strength and connectivity quality. After a thorough review of the options available, T-Mobile, Pixel Health, and Boston Children's Hospital arrived at the decision that the network needs for clinical care and mobility were beyond the capabilities of the Wi-Fi network, and that a 5G network would take its place as the primary network for Boston Children's Hospital's care team.

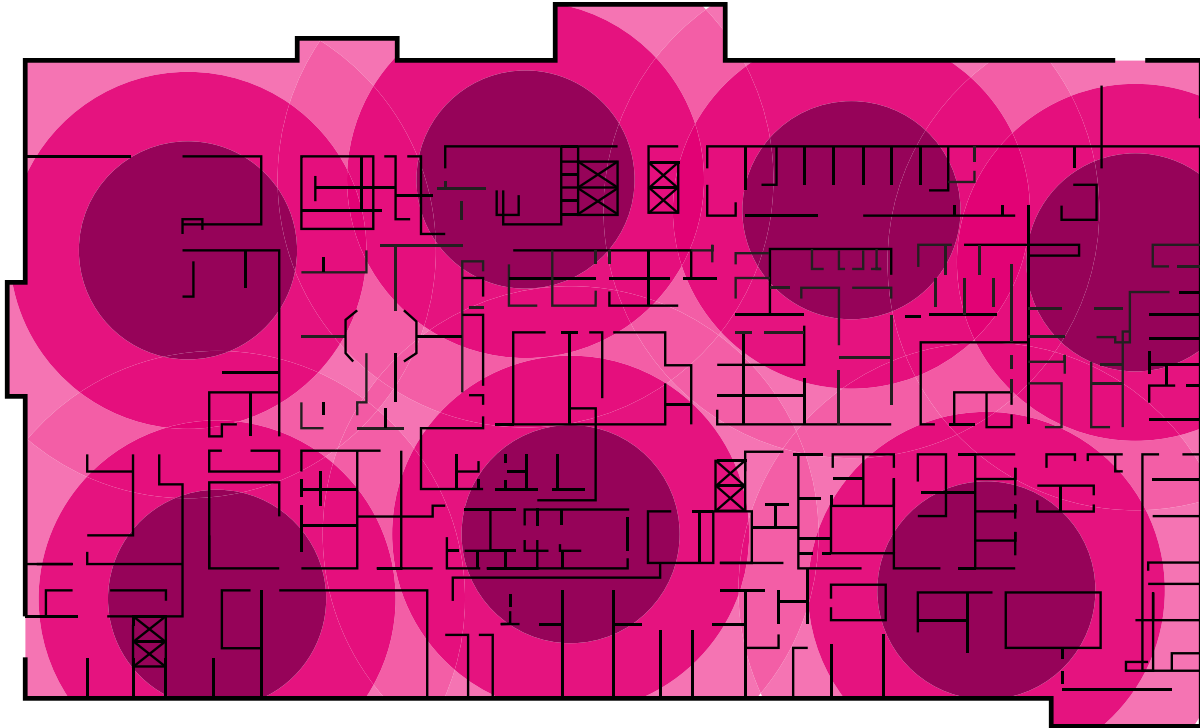


With this key decision made, the three teams were able to develop a detailed work-plan within three weeks. The T-Mobile managed solution encompassed mobile device management (MDM) and application management within the end user ecosystem. This holistic approach facilitated a robust and customized solution tailored to Boston Children's Hospital's unique requirements.

Current



Proposed





Unleashing Synergy: How T-Mobile's 5G Solution Will Transform Connectivity

The assessment at Boston Children's Hospital surfaced that Wi-Fi and 5G were not mutually exclusive, but complementary systems. Wi-Fi remains essential for various hospital functions, while 5G serves as a critical element for supporting clinical mobility and real-time requirements. With demonstrated expertise in engineering and network design, T-Mobile was able to develop a purpose-built to create a purpose-built, reliable network architecture tailored to Boston Children's Hospital's specific needs. The T-Mobile solution includes:

- 5G Advanced Network Solution, including a 5G hybrid network and leveraging the hospital's existing Wi-Fi as a backup.
- Network design, implementation, and ongoing OpEx model.
- Deployment of approximately 4,000 Apple iOS devices, with flexibility for Bring-Your-Own-Device (BYOD) usage.
- Deployment of T-Mobile SASE with T-SIM Secure to ensure security and privacy for patients and providers.

By deploying thousands of iPhones loaded with essential applications and features, T-Mobile will eliminate the need for doctors and nurses to juggle personal and work devices while ensuring necessary levels of security and compliant communications. This technology redesign will streamline workflows, reduce the number of devices per person, and enhance overall efficiency, improving patient care. With device management capabilities (mobile device management, or MDM), T-Mobile will be able to control and manage these devices effectively, removing logistical challenges of maintaining connectivity with encrypted external hardware. Once deployed, this device infrastructure will provide expanded protection against cyberattacks while securing compliant workflows that protect patient privacy. In addition, lost or compromised devices will be remotely wiped, adding another layer of security. With the majority of clinical and operational traffic being shifted to the 5G network, the Wi-Fi system can become dedicated to communications between hospitalized patients and their support network.

5G-Powered Patient Monitoring Revolutionizes Pediatric Care at Home

For patients, devices such as Apple iPads provided by Boston Children's Hospital for remote patient monitoring, will now be rigorously encrypted and have the ability to securely communicate using

5G. Additionally, these remote devices will be bolstered by a unique identification number (APN) that seamlessly connects to any tower within the nationwide T-Mobile network, helping to ensure a



direct and private channel to Boston Children's Hospital. With security and reliability for data transmission, remote patient monitoring and virtual care can be offered reliably, enabling children to recuperate safely, in a familiar environment, without compromising the quality of care.

Remote patient monitoring offers numerous benefits for children's healthcare. It enables healthcare providers to closely monitor a child's biometrics and activities as they eat, sleep, and play. Monitoring and identifying trends over time can be particularly informative in the management of chronic diseases like asthma or diabetes, where triggers to a condition escalation or decline may be-

come more apparent to the care team. This continuous monitoring can lead to early intervention and timely adjustments to treatment plans, reducing the incidence of condition escalations or complications. Additionally, remote monitoring provides a sense of comfort and convenience for parents, as they can actively participate in their child's care without frequent hospital visits. It also enhances the child's quality of life by allowing them to stay at home in a more comfortable and familiar environment. Remote patient monitoring will empower the Boston Children's care team and patient families alike to ensure the well-being and optimal health of children, promoting better outcomes and experiences

A Full Spectrum Effort: How Diverse Teams Shaped Success

The unique team approach T-Mobile for Business took in providing a network solution for Boston Children's Hospital brought together a dynamic ensemble of valuable resources and players. The T-Mobile 5G Advanced Network Solutions (ANS) team is a blend of specialists and engineering experts who collaborate closely with the product and design teams to lead custom architecture efforts. Simultaneously, the sales team oversees the overarching process, ensuring seamless communication and accountability among all stakeholders. This harmonious synergy extends to the Service-Eligibility Server (SES) team, which collaborates with the frontline System Engineering (SE) team, fostering a rich



exchange of insights – ones that proved invaluable for implementing Boston Children's Hospital's new system. Furthermore, the inclusion of accounting, legal expertise, and steadfast executive support underscored the multifaceted approach that propelled this endeavor to its success. Each team's dedication

and contribution played an integral role in shaping a robust and tailored solution for Boston Children's Hospital.



Healthcare Reimagined

With the power of the T-Mobile network resources, Pixel Health's digital healthcare expertise, and Ingram Micro's channel partners, Boston Children's Hospital is positioning itself at the cutting edge of the intersection of healthcare and technology. Once fully deployed, the transformation T-Mobile delivered will bring:

- Secure and scalable 5G infrastructure that meets current demands of the EHR and the future needs of the hospital as it evolves its digital footprint.
- The use of an OpEx model that will allow for better financial predictability and control without large upfront cash outlays.
- Consolidation of infrastructure, devices, and support under one partnership to streamline operations and the path to enhanced patient care.

The integration of existing Boston Children's Hospital systems into Epic will in part be funded through technology infrastructure savings identified during this initiative. Technologies that have been deployed over prior years have been evaluated for their continued need; redundant and ineffective solutions have been identified and mitigated, producing substantial savings and eliminating technical debt for Bos-



ton Children's Hospital. While this offset may not be identical for every hospital, it is a testament to the full impact of the Pixel Health and T-Mobile collaboration. The program assessment conducted by Pixel Health to identify cost offsets, can be replicated for similar projects. In fact, Pixel Health has estimated most clients can expect to offset a substantial portion of their expenses through this comprehensive assessment.

The unique needs of Boston Children's Hospital required the unwavering commitment of the entire team. For many hospitals in the United States similar in size or larger than Boston Children's

Hospital, Pixel Health, Ingram Micro, and T-Mobile for Business are well positioned to offer customized network solutions and agile workflows that meet the greatest challenges of the day. The T-Mobile expertise in engineering, combined with Pixel Health's deep healthcare provider expertise and analytical capabilities, plus Ingram Micro's knowledge of the channel of products and services, all played a pivotal role in updating Boston Children's Hospital's infrastructure to address near and longer-term priorities. This unique partnership affords T-Mobile a competitive edge in the healthcare market.



Conclusion

T-Mobile was honored and ready to serve as a solutions partner in addressing complex challenges alongside Pixel Health and Ingram Micro for a prestigious hospital like Boston Children's Hospital. The collaborative effort also amplifies the T-Mobile rep-



utation as a trusted partner in the health-care arena. This transformative project will not only yield immediate benefits to the Boston Children's Hospital system, but is a repeatable, scalable model that can be used to assist other healthcare organizations in their digital transformation journey. In this partnership:

1. Boston Children's Hospital is undertaking an EHR migration that will require a redesign of its connectivity infrastructure.
2. Boston Children's Hospital has chosen to leverage an attractive OpEx financial model to fund these important infrastructure improvements while protecting their financial position.
3. T-Mobile for Business provides a unique 5G-based connectivity solution that will complement existing Wi-Fi, addressing Boston Children's Hospital's specific needs, which has set them apart from other carriers.
4. The implementation of the T-Mobile solution will significantly improve the performance of top-quality pediatric care by ensuring reliable connectivity within the hospital and enabling secure remote patient monitoring, streamlining workflows, and enhancing overall healthcare efficiency.

Thanks to T-Mobile for Business and their partnership with Pixel Health and Ingram Micro, Boston Children's Hospital will be positioned for extraordinary success in implementing strategic priorities while accelerating their provision of world class pediatric care. The success of this partnership demonstrates the unwavering commitment T-Mobile has to being customer-centric. By actively seeking to develop a comprehensive understanding of the technological transformation occurring at Boston Children's Hospital, T-Mobile is engineering a purpose-built solution to address both current and future requirements for connectivity optimization. As a result, the changes being made to Boston Children's Hospital's connectivity architecture will continue to safeguard patient data and enable agile clinical mobility. It will also empower healthcare professionals to fully leverage all sources of patient data and the collective resources at their disposal to improve individual outcomes for each child they serve. This collaborative endeavor exemplifies the power of innovation, adaptability, and customer-centricity in driving positive transformation within the healthcare industry.



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