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Wi-Fi's Critical Role in Modern Healthcare

Case Study: Sidra Medicine, Doha, Qatar

AUGUST 2025

Executive Summary

Sidra Medicine, one of Qatar's leading hospitals, relies upon Wi-Fi for a wide range of clinical and operational practices. In April 2025, Sidra was using 65% of the available bandwidth on its Wi-Fi networks at peak times, up from approximately 42% one year earlier. The surge in traffic has been driven by a jump in the number of concurrently connected devices from about 5,000 to 13,000.

This rapid growth highlights the need for future-proofing the wireless infrastructure, ensuring that capacity, coverage, and quality-of-service mechanisms can scale with the evolving digital healthcare environment. The existing 2.4 GHz and 5 GHz Wi-Fi bands are at capacity and limit Sidra's options. Access to the full 6 GHz band for Wi-Fi would provide a step-change in capability, relieving the pressure on the current spectrum, allowing for traffic segmentation to custom match the spectrum resources to the service needs, and providing a robust foundation for Sidra to continue to evolve its services and practices.

Sidra says the rise in the number of connected devices and traffic is due to several factors:

- Increased adoption of mobile clinical applications
- Deployment of additional IoT-enabled medical equipment (e.g., wireless infusion pumps, patient monitors, and telemetry systems) that now rely on Wi-Fi for real-time data transmission.
- The wider rollout of a bring your own (BYO) device policy for staff.
- Expansion of clinical operations and new service lines within Sidra Medicine.

"Given the growing reliance on wireless connectivity for both clinical and operational workflows, this upward trajectory is expected to continue, especially as more systems become digitised and remote device monitoring increases," says Mahmoud Abu Ghaida, Senior Network Engineer at Sidra Medicine.

Sidra Medicine relies upon Wi-Fi to support electronic health records, advanced imaging diagnostics, critical environmental monitoring, intelligent building management systems, logistics handling by automated guided vehicles, high-definition AV systems for internal coordination, education, and remote patient care, increasing Internet of Things devices, and the use of artificial intelligence solutions to monitor and optimise treatment and operations.

Sidra Medicine plans to refresh its Wi-Fi infrastructure based on access to the 6 GHz band. However, to date, Qatar has only made the lower 6 GHz band (5925-6425 MHz) licence-exempt. If access to the full 6 GHz band (5925-7125 MHz) was authorised, Sidra envisions a major transformation of the Wi-Fi system, enabling wider channels (with greater throughputs) and traffic segmentation for critical services. Instead of deploying all SSIDs on all frequency channels, certain channels could be dedicated to bandwidth-hungry services such as medical imaging, while others could be reserved for lower-throughput but latency-sensitive services such as voice communications.

"The opening up of additional spectrum for Wi-Fi is not a technical, but a strategic requirement in the creation of digitally advanced, operationally effective, and mutually networked hospitals in Qatar, of which Sidra Medicine is a prime example," explains Mahmoud Abu Ghaida. "The investment in additional Wi-Fi capacity, backed by adequate spectrum, is an investment in the very fibre of cost-efficient and high-quality healthcare delivery in Qatar, with Sidra Medicine at the forefront."

Introduction

Like virtually every other sector in society, healthcare increasingly relies on wireless connectivity. Wi-Fi is used to provide advanced patient care, facilitate critical communication and collaboration among healthcare professionals, optimise operational efficiencies, and support general internet connectivity for patients and their guests. In healthcare facilities, ensuring reliable and robust connectivity can literally be a matter of life and death.

Healthcare leaders, in both the clinical and information technology realms, face a relentlessly increasing demand to support new wireless services and devices, while ensuring that the connectivity they rely upon remains always available and is sufficiently responsive to support real-time applications. With access to sufficient spectrum, the latest generations of Wi-Fi technology, coupled with the new spectrum available in the 6 GHz band (5925-7125 MHz), are fully capable of meeting today's needs and scaling into the future.

Sidra Medicine – Embracing Digital Healthcare

Based in Doha, Qatar, Sidra Medicine is committed to providing women, children and young people in Qatar with world-class tertiary healthcare services. As well as delivering patient care, Sidra's high-tech facility conducts scientific research, and provides educational resources. Sidra Medicine is part of a dynamic research and education environment known as Education City, which includes leading international institutions, such as Weill Cornell Medicine-Qatar, Georgetown University, Carnegie Mellon University, and HEC Paris.

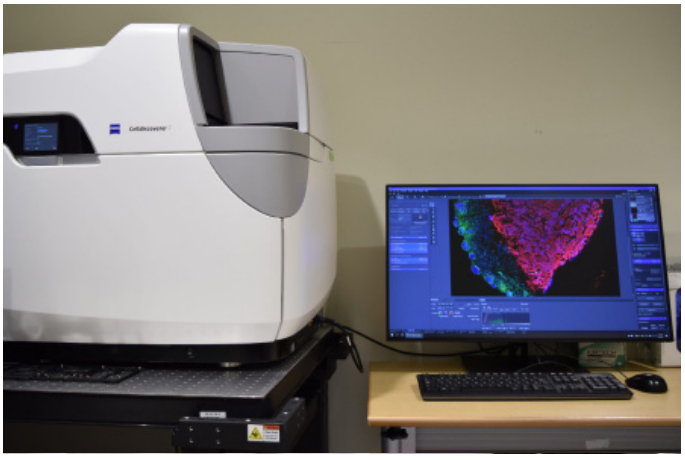
Sidra Medicine is navigating the transformation of healthcare into a fully digitalised and interconnected environment. Some of the latest innovations that Sidra Medicine have integrated into its clinical and operational practices include fully electronic health records, advanced imaging diagnostics, critical environmental monitoring, intelligent building management systems, logistics handling by automated guided vehicles, high definition AV systems for internal coordination, education, and remote patient care, Internet of Things devices, and artificial intelligence solutions to monitor and optimise treatment and operations.

The connectivity foundation for all of these services and innovation is Sidra's enterprise-class Wi-Fi network. Sidra relies upon Wi-Fi to provide a huge array of medical and business services:

- **Electronic health records (EHR) access:** Secure and reliable Wi-Fi makes it easy for clinicians throughout Sidra Medicine to access patient data on demand from any location.
- **Patient monitoring systems:** Wireless medical devices constantly transmit vital patient telemetry data, enabling proactive care and timely interventions for patients.
- **Medical imaging:** High-bandwidth Wi-Fi enables rapid transfer and review of very high-resolution diagnostic images for timely diagnosis, and enables collaboration among Sidra Medicine's medical team and partner institutions.
- **Telemedicine and remote consultations:** Wi-Fi enables real-time virtual healthcare interactions, improving access to specialist care for Sidra Medicine patients and the Qatari community beyond.
- **Asset location:** Wi-Fi tags assist in asset tracking of essential medical devices at Sidra Medicine, maximising resource utilisation and accountability.
- **Lab, freezer and cold room temperature monitoring:** Wi-Fi sensors maintain the quality of sensitive drugs and medical products by continuously monitoring their environment and alerting staff proactively as needed.
- **Automated guided vehicles (AGVs):** AGVs rely upon Wi-Fi to navigate autonomously and perform logistic tasks such as delivering supplies.
- **Building management systems (BMS) and smart building systems:** Remote monitoring and control of building operations and smart environmental management of the facilities are made possible through wireless connectivity.
- **Audio-visual (AV):** Wi-Fi makes it possible to stream HD content, and control and integrate AV applications for education, communication, and patient entertainment in Sidra Medicine.
- **Internet of Things (IoT):** There are an enormous number of connected devices, from smart beds to wearable patient monitors to environmental sensors, that rely on Wi-Fi for data transfer and communication throughout the hospital.
- **Artificial intelligence (AI):** Sidra is increasingly utilising AI for diagnostics, predictive analytics, and operational optimisations, which rely upon the secure wireless transfer of large datasets and real-time data streams.
- **Team collaboration solutions:** Modern healthcare demands seamless communication and cooperation among multidisciplinary teams. Wi-Fi accommodates several team collaboration platforms with secure instant messaging, video conferencing for virtual team meetings and consultations, viewing shared documents, and real-time patient status updates – all from mobile devices.
- **Voice over IP (VoIP) requirements and utilisation:** Sidra is making greater use of VoIP for internal voice communication, ensuring cost benefits as well as superior features compared to traditional wired phone infrastructure. Robust Wi-Fi is necessary to facilitate high-quality, uninterrupted voice calls throughout the hospital, making it possible for rapid communication among doctors, nurses, and other employees, especially in emergency circumstances.

- **Voice wearables:** Vocera badges are wearable, specialised products employing Wi-Fi for instant, hands-free communication with specific people or groups with simple voice commands. Vocera badges are heavily utilised in Sidra Medicine for urgent, critical communication, such as in cases of emergency or when staff need assistance immediately without interrupting the care of the patient or searching physically for an available colleague. The reliability and low latency of the Wi-Fi network are critical to the effective use of Vocera badges throughout Sidra Medicine, ensuring clear and timely communication.
- **Real-time location systems (RTLS):** Wi-Fi infrastructure supports RTLS, enabling the tracking of the location of critical medical equipment, staff and even patients within Sidra Medicine. This enhances asset management, improves workflow efficiency, and contributes to patient safety.
- **Wireless synchronised clocks:** Many modern hospital systems, including those at Sidra Medicine, utilise wireless synchronised clocks that rely on a stable Wi-Fi connection to maintain accurate and consistent timekeeping throughout the facility, crucial for scheduling, documentation, and operational coordination.
- **Support for wearable health devices:** Patients may bring their own wearable health trackers or monitoring devices. Reliable Wi-Fi ensures these devices can connect and potentially share data (if integrated with hospital systems), providing a more holistic view of their health and ensuring activities are scheduled and synchronised appropriately.
- **Wayfinding and hospital services:** In a large complex like Sidra Medicine, Wi-Fi can support wayfinding apps for patients and visitors, helping them navigate the hospital, locate amenities, and find their way to appointments. Access to online information about hospital services, visiting hours, and other practical details also enhances the patient and visitor experience.

In the first quarter of 2025, Sidra Medicine's wireless network supported an average of 13,000 concurrent wireless clients during peak hours. This included approximately 7,148 staff devices (laptops, tablets, smartphones), 6,306 guest devices (patient and visitor smartphones and tablets), 1,327 medical devices (monitoring systems, imaging workstations), 3,086 IoT devices (sensors, building management systems) and 1,100 Vocera badges.



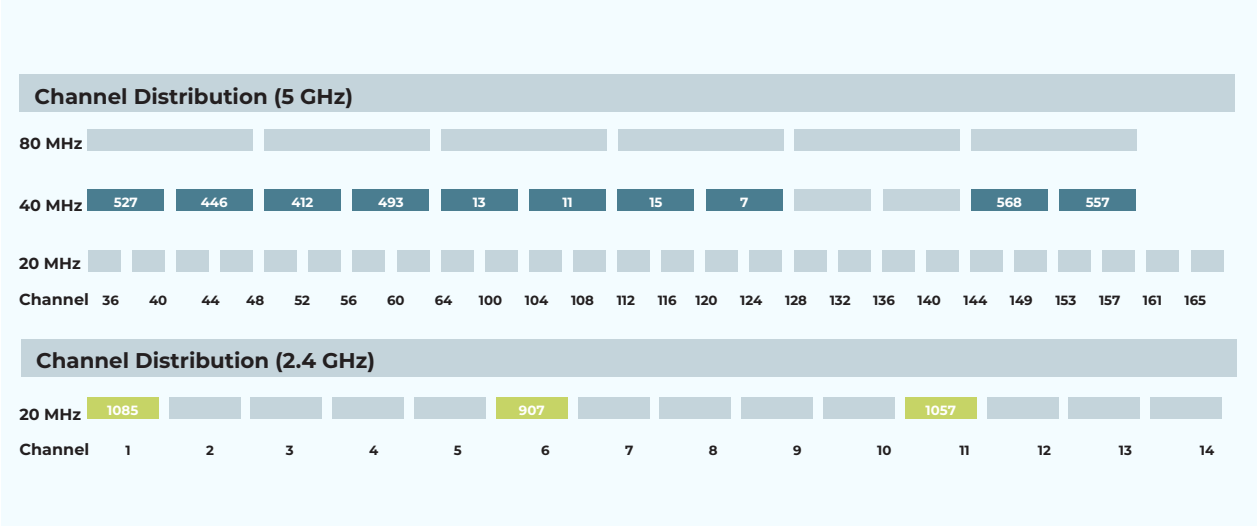
The Sidra Wi-Fi Solution

Sidra Medicine has invested in an advanced Wi-Fi network to support all of these critical services and as a foundation for future growth. With periodic updates based upon newer generations of Wi-Fi technology, the Sidra Wi-Fi network today is comprised of over 3,000 access points along with the supporting control, user management, and security platforms. Sidra has deployed five discrete SSIDs (i.e. Wi-Fi virtual networks) to support the range of users and services.

- **SIDRA-MEMBER:** This SSID is dedicated to Sidra Medicine's staff, providing access to critical hospital resources, such as EHR, internal applications, and internet access. Role-based access control ensures that different staff categories (e.g., doctors, nurses, administrative personnel) have appropriate levels of access to sensitive data and systems.
- **SIDRA-GUEST:** This SSID provides internet access for patients and visitors. Access is typically limited to web browsing and basic online services, with stringent security measures in place to prevent unauthorised access to hospital systems.
- **SIDRA-MEDICAL-DEVICES:** This SSID is exclusively for medical devices, including patient monitoring systems, medical imaging equipment, and other connected healthcare technologies. Traffic on this SSID is often prioritised to ensure reliable and low-latency communication for critical patient care applications.
- **SIDRA-UTILITY-DEVICES:** This SSID is designed to support the growing number of Internet of Things (IoT) devices within the hospital, such as environmental sensors, smart building systems, and asset tracking tags. Access is restricted to the specific communication needs of these devices.
- **SIDRA-VOIP:** This dedicated SSID is optimised for VOIP communications and it serves Vocera communication badges, ensuring seamless and reliable real-time voice communication for critical staff coordination and emergency response. This SSID is configured for low latency and high reliability to guarantee the effectiveness of Vocera devices.

Due to the number of different services and Wi-Fi users (both people and devices) Sidra has defined 160 different roles which determine the security access and resources for each Wi-Fi user.

Sidra's Legacy Wi-Fi Bands and Channel



All five SSIDs are deployed across all of these 2.4 GHz and 5 GHz channels, with the exception of the mission critical SSIDs – which do not operate in the 5 GHz channels subject to dynamic frequency selection (DFS), as they can be interrupted due to radar events. Due to the high density of the network, which creates the need for more channels for spectrum reuse, Sidra utilises 40 MHz wide channels in the 5 GHz band (shown in blue above).

Rapid Growth in Wi-Fi Usage and Traffic

In the past year, the average aggregate network utilisation during peak hours (the most important metric to monitor in a mission/life critical environment) has increased 54.7%. In April 2025, Sidra Medicine was using 65% of the available bandwidth on its Wi-Fi networks at peak times, up from approximately 42% one year earlier.

During peak hours the following services are generating the most traffic:

- Clinical applications and EHR transfers: 46% (high priority / high volume)
- Medical imaging transfers: 23% (high priority / increasing volume)
- Guest internet usage: 15% (lower priority / moderate volume)
- VoIP and Vocera traffic: 8% (highest priority / lower volume)
- IoT data transmission: 8% (high priority / lower but increasing volume)

The surge in traffic has been driven by a jump in the number of concurrently connected devices from about 5,000 to more than 13,000 in the 12 months to April 2025.

This rapid growth highlights the need for future-proofing the wireless infrastructure, ensuring that capacity, coverage, and quality-of-service mechanisms can scale with the evolving digital healthcare environment. The existing 2.4 GHz and 5 GHz Wi-Fi bands are at capacity and limit Sidra's options. Access to the full 6 GHz band for Wi-Fi would provide a step-change in capability, relieving the pressure on the current spectrum, allowing for traffic segmentation to custom match the spectrum resources to the service needs, and providing a robust foundation for Sidra to continue to evolve its services and practices.

Sidra says the rise in the number of concurrently connected devices and traffic is due to several factors:

- New clinical, collaboration, monitoring, and logistics management applications require very high throughputs – particularly for medical imaging transfer and streaming video.
- Deployment of additional IoT-enabled medical equipment (e.g., wireless infusion pumps, patient monitors, and telemetry systems) that now rely on Wi-Fi for real-time data transmission.
- The continuing proliferation of mobile devices, both Sidra managed for staff and personal/BYOD for patients/visitors.
- The high density of Wi-Fi devices requiring varying levels of throughput and latency depending upon their use case.
- Strict low latency requirements for critical staff communications (e.g. the use of a Vocera badge to call for emergency response) and patient monitoring systems.
- Expansion of clinical operations and new service lines within Sidra Medicine.

"Given the growing reliance on wireless connectivity for both clinical and operational workflows, this upward trajectory is expected to continue, especially as more systems become digitised and remote device monitoring increases," says Mahmoud Abu Ghaida, Senior Network Engineer at Sidra Medicine.

The Entire 6 GHz Band Would Transform Sidra's Capabilities

Sidra Medicine has begun a Wi-Fi infrastructure refresh project based on access to the 6 GHz band. Planning is underway to leverage the 6 GHz spectrum as soon as it becomes available.

If access to the full 6 GHz band (5925-7125 MHz) was authorised by the regulator, Sidra's IT leadership envisions a major transformation of the Wi-Fi system, enabling wider channels (with greater throughputs) and traffic segmentation for critical services.

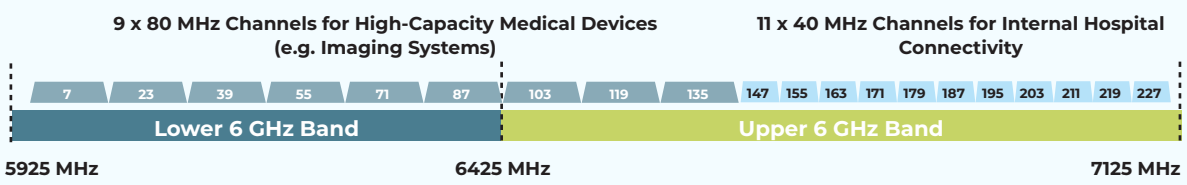
If Upper 6 GHz becomes available in Qatar:

- Sidra would evaluate the use of wider channels (e.g., 80 MHz) for high-throughput, low-latency applications like medical imaging or telemetry.
- Channel dedication per SSID or application would become more feasible, for example:
  - ▶ 80 MHz channels for medical devices
  - ▶ 20 MHz channels with minimal interference for Vocera
- This would allow for better performance isolation, reduce co-channel interference, and improve reliability for critical applications.
- Network segmentation could expand through multi-BSSID support and scheduled access features.

Instead of deploying all SSIDs on all frequency channels, certain channels could be dedicated for bandwidth hungry services such as medical imaging, while other channels could be dedicated for lower throughput but latency-sensitive services such as clinical voice communications.

Here is a generic illustration of how such traffic segmentation could be implemented in a hospital environment:

Possible 6 GHz Traffic Segmentation in a Hospital Environment



*General internet access for hospital patients and guests can now be confined to the 5 GHz band where it will not interfere with either of these critical services in 6 GHz.

While this is a general representation of how traffic segmentation by channel can be done in a hospital, it is not specific to Sidra's situation. Given the widespread use of VoIP services for critical staff communications, it's likely that Sidra would dedicate some narrow channels for these services. Access to the full 6 GHz band would give the hospital the flexibility to do so.

For example, the hospital might decide that seven of the 40 MHz wide channels are sufficient for the SIDRA-MEMBER SSID if the VoIP is moved to a different set of channels. It could then take four of the 40 MHz channels shown above (let's say channels 203, 211, 219, and 227 at the upper end of the band), convert them into eight channels of 20 MHz width and dedicate them for the SIDRA-VOIP SSID. Now the VoIP services would not only be prioritised in terms of access control, but actually have dedicated frequencies in which to operate, while the high bandwidth services would likewise have their own set of wide channels to support their needs.

The benefits of this traffic segmentation to Sidra would include better overall performance, reduced network utilisation (and resulting co-channel interference), improved reliability for critical applications, and the capacity and flexibility to support future services as they emerge.

Conversely, Sidra says that inadequate Wi-Fi capacity within Sidra Medicine results in:

- **Communication bottlenecks:** Latency and dropped connections in team collaboration platforms, voice quality and dropped calls on VoIP, and inconsistent performance of Vocera badges have the potential to severely degrade communication and coordination within Sidra Medicine, which could impact patient care.
- **Impaired function of critical applications:** Network congestion can have a negative effect on the functioning of all devices on the network at Sidra Medicine, including medical monitoring systems, AGVs, and AI applications, and on the responsiveness of BMS and smart building systems.
- **Blocked adoption of collaborative technologies:** Unreliable Wi-Fi can discourage the effective utilisation of team collaboration platforms, VoIP, and Vocera at Sidra Medicine, limiting their potential to improve communication and efficiency.
- **Slower response time and chances of errors:** Latency induced due to networking issues can slow down response times of emergency situations within Sidra Medicine as well as expose it to error and miscommunication.
- **Lowers staff morale:** Being disgruntled about malfunctioning communications equipment is detrimental to employee satisfaction and effectiveness at Sidra Medicine.

"The opening up of additional spectrum for Wi-Fi is not a technical, but a strategic requirement in the creation of digitally advanced, operationally effective, and mutually networked hospitals in Qatar, of which Sidra Medicine is a prime example," notes Mahmoud Abu Ghaida. "The investment in additional Wi-Fi capacity, backed by adequate spectrum, is an investment in the very fibre of cost-efficient and high-quality healthcare delivery in Qatar, with Sidra Medicine at the forefront."

Summary

Sidra Medicine is at the cutting edge of advanced healthcare delivery, with its Wi-Fi network as the foundation for digital transformation. The existing 2.4 GHz and 5 GHz Wi-Fi bands are at capacity and limit Sidra's options. The introduction of the full 6 GHz band for Wi-Fi would be a step-change in capability, relieving the pressure on the current spectrum, allowing for traffic segmentation to custom match the spectrum resources to the service needs, and providing the space for Sidra to continue to evolve its services and practices on a robust foundation.