



Case Study

Royal Devon University Healthcare NHS Foundation Trust

Secure Wireless Connectivity for Medical Devices

silex
technology

Royal Devon University Healthcare NHS Foundation Trust

Executive Summary

The landscape of modern healthcare is increasingly defined by the integration of connected medical devices, which offer significant potential for improving patient care and operational efficiency. However, ensuring secure and reliable wireless connectivity for these devices within the complex infrastructure of a hospital presents considerable challenges. The Royal Devon University Healthcare NHS Foundation Trust has proactively addressed these challenges through the implementation of Silex wireless bridge solutions. This strategic initiative has yielded substantial benefits, including enhanced security protocols, improved reliability of network connections, streamlined integration with the Trust's Electronic Patient Record (EPR) system and progress towards a more cableless operating room environment.

Contents

1. Introduction	2
2. The Connectivity Challenge at Royal Devon University Healthcare NHS Foundation Trust	2
3. The Silex Solution: A Secure and Reliable Bridge	3
4. Implementation Narrative: A Real-Time Account	5
5. Empowering Medical Devices with Silex Wireless Bridges	6
6. Silex Technology in Great Britain	6
7. Conclusion: Enhanced Security and Reliability for Medical Device Connectivity	7

1. Introduction

Connected medical devices are playing a transformative role in healthcare, offering the potential to elevate patient care, enhance diagnostic precision and optimize hospital workflows. To fully realize these advantages, a robust and secure wireless infrastructure is essential, enabling seamless data exchange while protecting sensitive patient information and ensuring the consistent operation of medical equipment. Healthcare environments present unique complexities for wireless networking. The density of connected devices, the potential for signal interference from various sources, stringent security regulations and the necessity for uninterrupted connectivity for mobile medical equipment all contribute to a challenging environment. The Royal Devon University Healthcare NHS Foundation Trust, located in the southwest of the UK, has emerged as a forward-thinking institution, actively exploring and adopting technologies to enhance its healthcare delivery capabilities. In its pursuit of a more connected and efficient healthcare ecosystem, the Trust recognized the need for a specialized solution to address the wireless connectivity requirements of its growing fleet of medical devices. Silex Technology, a global provider recognized for its expertise in reliable and secure wireless connectivity solutions tailored for mission-critical applications, including the medical sector, became a key partner in this endeavor.

2. The Connectivity Challenge at Royal Devon University Healthcare NHS Foundation Trust



The Royal Devon University Healthcare NHS Foundation Trust encountered several specific challenges as it sought to securely integrate an increasing number of medical devices into its existing hospital network. A primary concern revolved around the limitations inherent in the original Wi-Fi capabilities integrated into some of the medical equipments. This embedded Wi-Fi often proved to be outdated, lacking the advanced security protocols and current Wi-Fi standards necessary to protect sensitive patient data. Furthermore, these integrated wireless connections frequently exhibited a lack of

reliability and stability, leading to potential data loss or disruptions in critical clinical applications. Also, devices manufactured by different companies have different user interfaces, and handling them requires a significant workload for its IT personnel. Beyond the need for basic connectivity, the Trust also harbored the strategic goal of establishing a more "cableless" or "free" operating room environment. This ambition was driven by the desire to improve ergonomics for surgical staff, minimize tripping hazards associated with numerous cables and ultimately enhance the efficiency of surgical procedures. Seamless and secure communication between medical equipment and the Trust's Electronic Patient Record (EPR) software represented another critical requirement. Accurate and timely data management is paramount in healthcare, and the ability for medical devices to directly interface with the EPR system was seen as essential for improving data accuracy and providing clinicians with a comprehensive view of patient information. Finally, the Trust had to consider the complexities associated with Medical Device Regulation (MDR) re-certification. Replacing the integrated Wi-Fi within medical devices could trigger costly and time-consuming re-certification processes. Therefore, the Trust sought a solution that could enhance connectivity without necessitating significant modifications to the medical devices themselves.

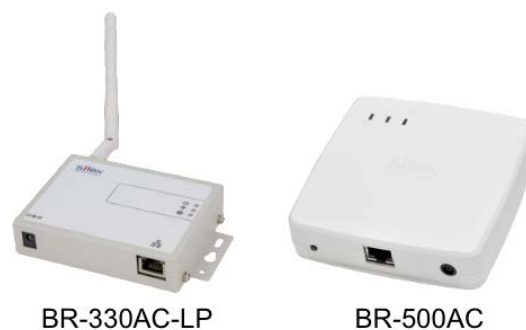
3. The Silex Solution: A Secure and Reliable Bridge

Silex Technology, recognized as a validated NHS supplier of wireless bridge solutions, offered a compelling answer to the Royal Devon University Healthcare NHS Foundation Trust's connectivity challenges. With a proven track record in providing reliable wireless connectivity for medical devices, Silex presented a solution that could address the Trust's specific needs.

The Silex portfolio has 2 wireless bridge models targeting the medical clients, BR-330AC-LP and BR-500AC.

BR-330AC-LP model is characterized by its low power consumption, making it particularly well-suited for medical devices that rely on battery power. This low power operation ensures extended uptime for portable devices without requiring frequent recharging. The BR-330AC-LP also supports robust enterprise-grade security features, including 802.1x authentication and WPA2 Enterprise encryption, ensuring the secure transmission of sensitive patient data. Additionally, its fast roaming capability facilitates seamless transitions between Wi-Fi access points, crucial for maintaining continuous connectivity for mobile medical equipment.

The BR-500AC model, on the other hand, offers high-performance capabilities,



supporting the latest Wi-Fi standards, including 802.11ac Wave 2 and MU-MIMO. This advanced Wi-Fi technology ensures efficient network utilization in environments with a high density of connected devices, providing the necessary bandwidth for demanding applications. The BR-500AC also incorporates robust security features, including WPA3-Enterprise, offering advanced protection for sensitive data. Similar to the BR-330AC-LP, the BR-500AC supports fast roaming, making it ideal for mobile applications such as medical carts that require uninterrupted network access as they move throughout the hospital.

Both Silex bridge solutions are equipped with key security features crucial for healthcare environments. Enterprise Security 802.1x, or certification-based authentication, provides a robust and centralized mechanism to verify the identity of devices before granting them access to the hospital network. This strong authentication is vital for protecting sensitive patient health information and complying with relevant regulations. WPA2 and WPA3 data encryption standards are also supported, ensuring that data transmitted wirelessly remains confidential and its integrity is maintained. Furthermore, the MAC address binding feature adds an extra layer of security by restricting the Silex bridge to communicate only with a specific, designated medical device.

Table 1: Silex Wireless Bridge Model Comparison

Feature	BR-330AC-LP	BR-500AC
Wi-Fi Standard	802.11a/b/g/n/ac (Wi-Fi 5)	802.11a/b/g/n/ac Wave2 (Wi-Fi 5)
Security	Authentication: WPA2-Enterprise, WPA-Enterprise, WPA2-Personal, WPA-Personal, Open Encryption: WEP, AES, Auto	Authentication: WPA3-Enterprise, WPA2-Enterprise, WPA/WPA2-Enterprise, WPA3-Personal, WPA2-Personal, WPA/WPA2-Personal, Open Encryption: WEP, AES, Auto
MAC Binding	Yes	Yes
Fast Roaming (802.11r)	Yes	Yes
Power Consumption	Low (External Power Supply / USB Powered Option)	Standard (External Power Supply / USB Powered Option)
MU-MIMO Support	No	Yes (2x2)
Typical Applications	Portable Medical Devices, Low Power Mobile devices	High-Performance Devices, Medical Carts

In terms of reliability, the Silex bridge solutions incorporate features designed to ensure consistent connectivity for critical medical applications. Fast Roaming, based on the 802.11r standard, allows mobile devices to seamlessly transition between Wi-Fi access points without experiencing connection loss. This is particularly important for devices used by medical staff on the move or for continuous patient monitoring. Silex Technology's core commitment, encapsulated in their "When It Absolutely Must Connect" philosophy, underscores their dedication to providing highly stable and reliable wireless connections for mission-critical applications in industries like healthcare.

4. Implementation Narrative: A Real-Time Account

The journey towards enhanced wireless connectivity at the Royal Devon University Healthcare NHS Foundation Trust began with the Trust's EPR project team and IT Infrastructure department. Network Manager Ty Baines recognized the escalating need for a more robust and secure wireless infrastructure to support their growing reliance on connected medical devices. After a thorough evaluation of various options available in the market, the IT team selected Silex wireless bridge solutions. Silex's strong reputation within the healthcare industry, their demonstrated expertise in providing secure and reliable connectivity for medical devices, and their validation as an NHS supplier instilled confidence in the Trust's decision-making process.

The initial deployment phase involved meticulous planning and configuration. The IT team carefully configured the Silex bridges according to the Trust's specific network requirements and security policies. Connecting the bridges to the existing hospital network infrastructure proved to be a straight forward process, facilitated by the user-friendly design of the Silex devices. Reflecting on this initial phase, Ty Baines commented,

"Integrating the Silex wireless bridges into our existing network was surprisingly straightforward. The security features, especially the 802.1x authentication and MAC address binding, gave us the confidence we needed to connect our critical medical devices wirelessly. The reliability has been excellent, and the fast roaming ensures our mobile equipment stays connected as staff move around the hospital."

While the implementation was generally smooth, the IT team encountered minor challenges related to the initial configuration of certain legacy medical devices to work seamlessly with the new wireless bridges. However, with support from Silex's technical documentation and the expertise of their support engineers, these challenges were quickly resolved. The Trust adopted a phased rollout strategy, starting with critical care units and diagnostic imaging departments before expanding to other areas. This approach allowed the IT team to monitor performance, gather feedback and fine-tune the deployment process as needed.

5. Empowering Medical Devices with Silex Wireless Bridges

The implementation of Silex wireless bridge solutions has empowered a range of medical devices at the Royal Devon University Healthcare NHS Foundation Trust, enhancing their functionality and integration within the hospital ecosystem.

Portable ultrasound machines, essential tools for diagnostic imaging across various departments, have benefited significantly from the reliable connectivity provided by Silex BR-500AC – BR-330AC-LP wireless bridges. The wireless connection facilitates the seamless transmission of high-resolution ultrasound images directly to the hospital's EPR system, ensuring that patient records are updated promptly and accurately. This capability also enables remote consultation with specialists, improving diagnostic efficiency and patient care coordination.

Caption: "A portable ultrasound machine securely connected to the hospital network via a Silex BR-330AC LP wireless bridge. This enables seamless transmission of high-resolution images to the EPR system and allows for remote consultation with specialists."



Multi-parameter patient monitors, crucial for continuous tracking of vital signs in critical care units, have been connected using Silex BR-330AC-LP wireless bridges. This wireless connectivity ensures the continuous and secure transmission of vital patient data to both the central monitoring system and the EPR, allowing for timely interventions by medical staff. The fast roaming capability of the Silex bridges is particularly beneficial for patient monitors that may need to be moved within the ICU or to other areas of the hospital.

These devices are now connected with Silex wireless bridges. It allows the IT department to use one Wi-Fi user interface instead of dealing with the different Wi-Fi user interfaces of various devices, as they can simply deactivate the integrated Wi-Fi and connect such devices to the bridges.

6. Silex Technology in Great Britain

The Royal Devon University Healthcare NHS Foundation Trust and other healthcare organizations in Great Britain can procure Silex wireless bridge solutions through various channels. Silex Technology maintains a European office in Germany, which serves the UK market, providing sales and technical support. A key partner and distributor of Silex products in the UK is Solsta (solsta.co.uk). Solsta specializes in offering connectivity solutions for a wide range of industries, including healthcare, and provides a local point of contact for procurement and support.

7. Conclusion: Enhanced Security and Reliability for Medical Device Connectivity

The implementation of Silex wireless bridge solutions at the Royal Devon University Healthcare NHS Foundation Trust has yielded significant benefits, notably in enhancing the security and reliability of wireless connectivity for critical medical devices. The adoption of features such as 802.1x authentication, WPA2/WPA3 encryption and MAC address binding has demonstrably strengthened the Trust's security standard. Furthermore, the improved reliability of wireless connections, facilitated by fast roaming and Silex's core technology, ensures uninterrupted data flow, which is paramount for supporting mobile healthcare workflows and delivering consistent patient care. The Silex solution effectively addressed the challenges posed by outdated Wi-Fi in existing medical equipment and provided a pathway to upgrade connectivity without the complexities associated with MDR re-certification. Ultimately, this case study underscores the vital role of reliable and secure wireless connectivity, enabled by specialized solutions from providers like Silex Technology, in driving the ongoing evolution of healthcare and contributing to improved patient outcomes within the modern hospital environment.

Background Information

The **Royal Devon University Healthcare NHS Foundation Trust** was established in April 2022 through the merger of the Royal Devon and Exeter NHS Foundation Trust and the Northern Devon Healthcare NHS Trust.¹ It is one of the largest employers in Devon, serving a population of over 615,000 people across a significant geographical area.² The Trust provides a comprehensive range of emergency, specialist, and general medical services through multiple hospital sites, including the Royal Devon and Exeter Hospital (Wonford) and North Devon District Hospital, as well as community settings. The organization is renowned for its commitment to research, innovation, and its strong affiliations with universities.³ In 2018, the Trust demonstrated its commitment to digital transformation by implementing a single Epic Systems electronic patient record system.

Silex Technology is a global provider of reliable and secure wireless connectivity solutions. With over 20 years of expertise in healthcare connectivity, the company specializes in providing solutions for mission-critical applications. Silex focuses on delivering high-quality, always-on connectivity, embodied in their philosophy "When It Absolutely Must Connect". Their product portfolio includes a wide range of embedded wireless modules, platform & SOMs, and network system solutions. Silex Technology has established strong partnerships with leading technology providers such as Qualcomm and NXP. Their NetSys business focus is centered on providing secure and reliable wireless connectivity for medical devices and hospital IT infrastructure.

Works cited

1. Royal Devon University Healthcare NHS Foundation Trust, accessed May 5, 2025, (onedevon.org.uk)
2. Royal Devon University Healthcare NHS Foundation Trust - Black Leadership Job Board, accessed May 5, 2025, (www.blackleadershipjobboard.com)
3. About us - NHS Royal Devon, accessed May 5, 2025, (www.royaldevon.nhs.uk)