

A large, modern hospital building with a glass facade and a blue sky background. The building has the 'University Hospital' logo on its upper section. The logo consists of a blue gear-like icon followed by the text 'University Hospital' in a blue, sans-serif font.

PHILIPS

MX40 WLAN
deployment Q&A

Implementing **patient-worn monitoring** on a WLAN

An interview with Gene H. Winfrey and Jim Magers, University Health System



Gene H. Winfrey

Hospitals are increasingly turning to WLAN to support their medical devices.¹ One of the key advantages of this new trend is a shared infrastructure cost.² When University Health System (UHS) (San Antonio, Texas, USA) added a new million-square foot building to its complex in 2012, its leadership chose a WLAN infrastructure to support its 325 IntelliVue MX40 patient-worn monitors, as well as its other monitoring and healthcare IT needs.



Jim Magers

Gene H. Winfrey, UHS IT director for ten years, and **Jim Magers**, UHS information systems manager for medical device integration for eight years, share their decision-making process, details of the deployment, and factors of success.

What was the impetus for deploying patient-worn monitoring on WLAN?

Our older hospital building had a proprietary telemetry monitoring network, as well as a WLAN for other applications. We first considered WLAN for the new building when we discussed distributing defibrillators for the trauma team and addressing mobility issues for cath lab transfers. Clinically, there is no difference between a proprietary network and WLAN, and after reviewing network drawings and layouts and completing lean processes, we determined that an 802.11 network could support not only the defibrillators, but also the IntelliVue MX40 monitors, IntelliVue X2 monitors, and additional monitoring. We like to focus on industry standards, and in this case, it was really a new way of approaching patient monitoring technology.

WLAN provided a lot of freedom and had potential to save time moving patients between our new emergency department and the older building. We built a robust network with a lot of redundancy that is able to carry all the traffic and handle when access points go down.

We had recently placed our data center offsite, so a lot of networking had to be put into place. We are building a real enterprise network, and we decided to leverage our enterprise network investment.

How did you prepare for the transition to the new network and monitors?

It took about two years just for the technology assessment part of the project. We knew that we had to ensure that the 802.11 network was robust and was going to work. So we followed the IntelliVue Network Specification and thoroughly tested with multiple CAVs (coverage area verifications). We did mini-surveys with simulators throughout the building to understand coverage densities, and we repeated the surveys at various stages of the construction.

We looked at the clinical workflow, and then we solved it with the technology. I'm a firm believer of showing the nursing director and CNO that we can support their clinical needs. We literally took an MX40 monitor and a simulator to the farthest bathroom in the back of the care unit to show them that a patient can go anywhere within the coverage area and remain monitored.

On the day we transitioned to the new network, we had to move 280 patients to the new building. We planned everything from the utilization of elevators to the swapping of beds. We worked with the trauma fellows and physicians to determine how we could successfully transfer patients to hundreds of locations, considering things like procedure types and patient population. Our CIP (Capital Improvement Plan) group spent countless hours with various teams including emergency management, equipment planning and value analysis, and Philips.

How did you prepare the clinical staff?

In addition to planning the network, we needed to get our clinicians aware of the new technology that they would be using. We developed a simulator lab with new equipment. We had training for nurses, physicians, and technicians. When the day came for the move, everyone was ready to use the new technology.

How have the roles of biomedical engineering and IT changed?

Seven years ago, we moved our biomedical engineering department from facilities management to IT. That move was in line with the role biomed plays today.

Years ago, biomed was the equipment repair group. But with the technology we have today, there's a convergence of biomed and IT. With patient monitoring, the biomedical engineering department utilizes networking, server teams, interface teams, and clinical and business applications. Moving biomed to IT has been beneficial, because it allows biomedical engineering to have relationships with the other IT disciplines.

Concerning IT, I used to say that a networking team could work in any industry and find very few differences. But that's no longer true. Healthcare has specific needs, and it is important to be aware of those needs.

We work together so we can use our strengths to create a better solution.



Did you implement a change management policy to support the unique demands of WLAN?

Our IT group follows the ITIL processes for change management. (ITIL is a set of practices for IT Service Management.) We meet on a weekly basis to review changes to clinical applications, environment servers, interfaces, reports, etc. We discuss when the desired change will happen, what kind of communication is required, and to whom. When that's all vetted by the area director then it gets presented to the change management group, and we ensure documentation meets our standards. We have the ability to stop any change if we feel that something wasn't done correctly.

We present changes to our environment of care process or our quality group, and we focus on making sure that our different IT disciplines are communicating with each other and with clinical end users. We consider the impact of a project on care processes, consider risk management, and discuss with our quality group what we want to accomplish.

As you've noted, operating medical devices on a WLAN network requires close collaboration between IT and biomedical engineering departments, as well as continuous monitoring and fine-tuning of the network performance to support the required signal strength. What advice would you give other hospitals interested in implementing MX40 monitors using a WLAN?

Whether you're building a new building or doing a full change-out of technology in an existing building, it is important to consult all of your disciplines so that you build the infrastructure correctly. That's key to making this a success. Networking people are going to compare an MX40 monitor to a tablet in the way that it connects, but it is very different and they have to take that into account.

From a financial standpoint, it is important to have the infrastructure in place. We had planned to have our new building 100% outfitted from day one, but due to financial reasons, we couldn't implement that. But we made sure that the infrastructure was funded, because reconstruction is costly. Now that we have the infrastructure in place, it is basically a plug and play program.

Our network team was engaged the entire time, even though we had one vendor designing the network, and another delivering the network. But if this project had been done strictly from a network standpoint, we would not have had success. Biomed helped to integrate all the pieces: making sure that physicians and nurses have access to information, ensuring that the consultants and the networking team were doing their part, and verifying the installation was meeting expectations, because the end result is that we've got to deliver care to the patient. No matter what kind of wireless densities and network distribution panels you're using, if you cannot provide care to the patient, then it's a futile exercise.

1. HIMSS Analytics WLAN Hospital Report. December 2015.
2. Healthcare and Medical Device Connectivity and Interoperability. Frost and Sullivan. April 2015.

What role did Philips play?

We expect vendors to be the expert in whatever they are providing, and it is important that they review and understand what our organization is doing. I don't give kudos often, but this particular group of people have been very effective. Philips was very engaged, and they provided that technical expertise so they could help us stay on the right path.

Philips networking, installation, and field service personnel all totally embraced doing what was needed to make this a robust, cost-effective, useful setup.



IntelliVue MX40 monitors provide durability and freedom of movement

Light and small enough to be worn by ambulatory patients, the IntelliVue MX40 wearable patient monitor can continuously monitor ECG, SpO₂, and impedance respiration in real time. MX40 offers a wireless choice of 802.11 a/b/g/n or IntelliVue Smart-hopping. MX40 is also Wi-Fi CERTIFIED™ demonstrating its conformance to standards and interoperability.

Magers points out that the MX40 monitor is also remarkably durable. "I believe in evaluating equipment not only on the technical aspects, but also on the physical aspects," he says. "I'm going to be supporting this equipment for a long time, and when equipment isn't durable, it doesn't work for us in the long run."



