



SUMMARY

CHALLENGE

- One of the largest U.S. health systems was adding a six-story 228,338-square-foot hospital tower to an existing facility in Oklahoma City
- Due to the new building's geography and building materials, it was anticipated that doctors would experience cellular reception problems for all carriers inside the new facility
- Project managers wanted to proactively address any cellular coverage problems before they became an issue for doctors

SOLUTION

- Cel-Fi QUATRA

RESULTS

- No project delays
- Consistent cellular coverage for all major carriers
- Saving on operational costs

THE CHALLENGE

A large, top five U.S. health system had expanded its facilities in Oklahoma City with a new six-story 228,338-square-foot hospital tower on the west side of its campus. The new building has 44 patient beds; eight cardiac care unit beds; a catheterization lab; two inpatient pharmacies; imaging, prep and surgery areas; a post-anesthesia care unit; a chapel; a lobby and registration area; and administration and shell space.

Before construction began, project managers anticipated that doctors and nurses would encounter challenges with cellular reception while working inside the building – a common issue in healthcare facilities that is often due to geography and/or building materials such as multiple layers of sheet rock.



"Many parts of the building, surgical areas especially, are either partially underground or they're surrounded by walls that are especially thick due to the safety requirements of hospitals. To protect patients and staff, they build walls that are three to five layers of very heavy sheet

rock that provide fire barriers throughout these facilities,” explains Jerry Bickle, President, RF Design Services, an Edmond, Oklahoma-based provider of cellular and wireless network services including Distributed Antenna Systems (DAS).

Bickle’s wife has been a labor and delivery registered nurse for 35 years so he’s heard firsthand how vital cellular coverage is and how a life threatening situation can occur when a doctor fails to receive a page due to poor coverage. He recounts an emergency situation that became a life-changing tragedy by the time an obstetrician who didn’t get a page, returned to a unit. A time delay in the doctor’s response meant the baby was compromised and had to spend considerable time in the ICU. Unfortunately, this family and their child have unnecessarily suffered their entire lives because the doctor couldn’t get notified and perform an emergency C Section in time.

“Our clients were trying to prevent cellular coverage issues and ensure doctors and nurses and staff could use their phones to call and text. They wanted to address this up-front during construction. They knew they would be better served to install a DAS solution to guarantee consistent coverage throughout the building when it opened,” says Bickle.

RF DESIGN SERVICES

- Established in 2013 with more than 30 years in the telecom industry
- Based in Edmond, Oklahoma
- Services include cellular and wireless, microwave design, DAS consulting, and WISP marketing
- Customers include Sandridge Energy, Chesapeake Energy, the City of Oklahoma City, Chesapeake Energy Arena, University of Oklahoma Medical Center, Mercy Hospitals, Pioneer Cellular, Oklahoma Western Telephone Company, Hilliary Communications, Advantage Cellular, Cross Wireless, XL Broadband, Oklahoma Department of Transportation, Kinney County, TX, Science Applications International Corporation and many Wireless Internet Service Providers.

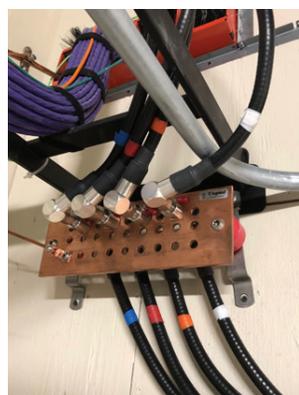


THE SOLUTION

Since the hospital tower was not yet built, there was no opportunity for Bickle to do a walk through to determine where cellular coverage problems might exist. As experts in DAS, RF Designs drew from its previous experience working with clients who were in a similar situation, and recommended Cel-Fi QUATRA 2000, an active DAS hybrid that delivers uniform in-building cellular coverage for multiple carriers.

Cel-Fi QUATRA 2000 specifically addresses the challenges of poor voice quality, dropped calls, and black holes in large commercial buildings. Unlike older analog cellular amplification technology, QUATRA delivers a cellular signal that is up to 1000x stronger, offering a much larger coverage footprint. QUATRA uses CAT 5e or better cabling with Power over Ethernet, so there is no need to install additional power outlets for the internal remote antennas. Each QUATRA 2000 Network Unit (NU) – the head end of the system – provides signal amplification for two networks, either AT&T/Verizon or Sprint/T-Mobile. Each NU serves four Coverage Units (CUs) – which are the remote internal antennas that rebroadcast the cellular signal to occupants.

RF Designs provided the design criteria to the construction team for the cabling. Because there’s a lot of cabling and many NU’s and CU’s, labeling each cable specifically at every end point and patch panel was a very important step to maintain and troubleshoot the system moving forward. Once the cabling was done, RF Designs installed 20 Cel-Fi QUATRA 2000 NUs to enhance the outdoor signals for all major carriers, and digitally re-transmit them with zero signal loss via Cat 6 shielded cabling to 80 Cel-Fi QUATRA CUs. Four external high-gain LPDA donor antennas – one for each carrier – were also installed.



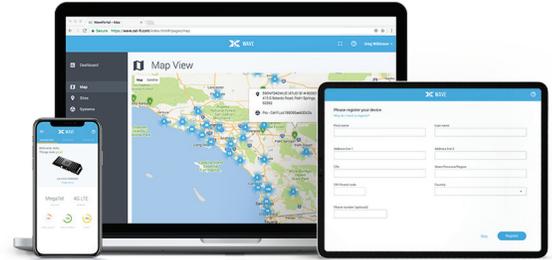
"Cel-Fi QUATRA is the only system that I am aware of that is carrier-approved and doesn't cause network interference. We can install it with confidence knowing there won't be project delays," says Bickle. "With other solutions that are not carrier pre-approved, at least eight to nine months are added in the deployment timeline as you have to involve each of the cellular carriers and coordinate with their project managers, engineering staff and the budgets, priorities and workloads of each of their companies."

THE RESULTS

A two-person team from RF Designs installed the Cel-Fi QUATRA system over two months, working around the construction schedule. Bickle explains the category cable used in the installation is less "lossy" and easier to install than the coax cable used in other system configurations, resulting in better signal coverage at a lower installation cost.

"You get consistent coverage with the Cel-Fi QUATRA 2000. We put eight coverage units on each floor and the signal is propagating the same out of every coverage unit., "It also doesn't have the huge equipment footprint typical of other equipment and doesn't generate the heat, electrical load, or air conditioning load that a carrier fed DAS does, says Bickle. "I can also monitor and manage the system from my phone and get emails if something has an alarm. I love the visibility that the WAVE portal provides for all the Quatra systems that I manage."

"The total cost of deploying Cel-Fi QUATRA is a big benefit of the solution. We probably saved them at least a half of what they would have paid for any other kind of DAS system, Bickle adds. "From the time we got the go ahead to order equipment in February, we were on the air in time for their soft opening in May."



Cel-Fi WAVE portal



CEL-FI QUATRA

**BEYOND
BETTER
COVERAGE**

- High-quality solution for the middleprise
- Supports multi-carrier voice and data
- Carrier-approved and unconditionally network safe
- Can be monitored and managed using Cel-Fi WAVE