UNITED CENTER

The largest indoor arena takes fan experience to new heights thanks to Wi-Fi redesign by RUCKUS Networks.

RUCKUS®
COMMSCOPE

The United Center is the largest NBA indoor arena and the second-largest NHL venue by capacity. Home to the Chicago Bulls and the Chicago Blackhawks, this 960,000-square-foot facility hosts more than 200 events a year, including concerts, conventions, ice skating shows and professional wrestling. Depending on the seating configuration, it can accommodate nearly 20,000 hockey fans or more than 23,000 concertgoers at a time.

Challenge

- Legacy Wi-Fi® network was designed for lower capacity and throughput
- Wi-Fi hardware was at end of life
- Maintaining existing Wi-Fi network became too expensive

Requirements

- Upgrade Wi-Fi network to meet or exceed the latest large public venue (LPV) standards
- Provide full coverage, including to the new atrium and staff offices
- Improve analytics on network performance
- Make it scalable, to include practice facilities and outdoor areas
- Increase network performance for spectators
- Deploy during limited available times without disrupting service during events

Solutions

- 684 indoor access points (APs) (R650 and R750)
- 89 outdoor APs (T750)
- 46 ICX® switches (7150, 7550 and 7850)
- RUCKUS AI™
- Cloudpath® Enrollment System
- RUCKUS SmartZone™ controllers
- LPV Professional Services (PS) and Extended LPV Care PS

Benefits

- Food and beverages can be ordered from seats
- Fan experience apps now stream without stalling
- Security from Wi-Fi upgrade protects visitor and network data
- Simple single-pane-of-glass management and enhanced analytics

Background

The United Center's Wi-Fi network was on its last leg. As fans returned from COVID-19 en masse with their new apps and devices, the existing network struggled to keep up with the crowds. To make matters worse, the existing design couldn't properly provide the robust coverage needed to accommodate the density.

"The top-down approach that the old system was built on was really challenging—with access points covering a couple hundred seats from over 100 feet away in the catwalks," said Bob Gorman, the United Center's senior director, technical operations. "As the events and attendance increased, it was really difficult to maintain good throughput. With that structure in that environment and outdated hardware, it was time for an upgrade."

In the same way that Chicago's sports teams eventually transitioned from the

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old Chicago Stadium into the newly-built United Center, the arena's antiquated Wi-Fi network also needed to migrate to an enhanced infrastructure.

To upgrade the United Center network, Gorman engaged American Tower along with RUCKUS Networks and their Professional Services team to reimagine the United Center Wi-Fi and deliver a superior fan experience within the sports industry at the arena. To execute on this vision, the team would have to strategically schedule deployment time within the United Center's very busy event schedule.
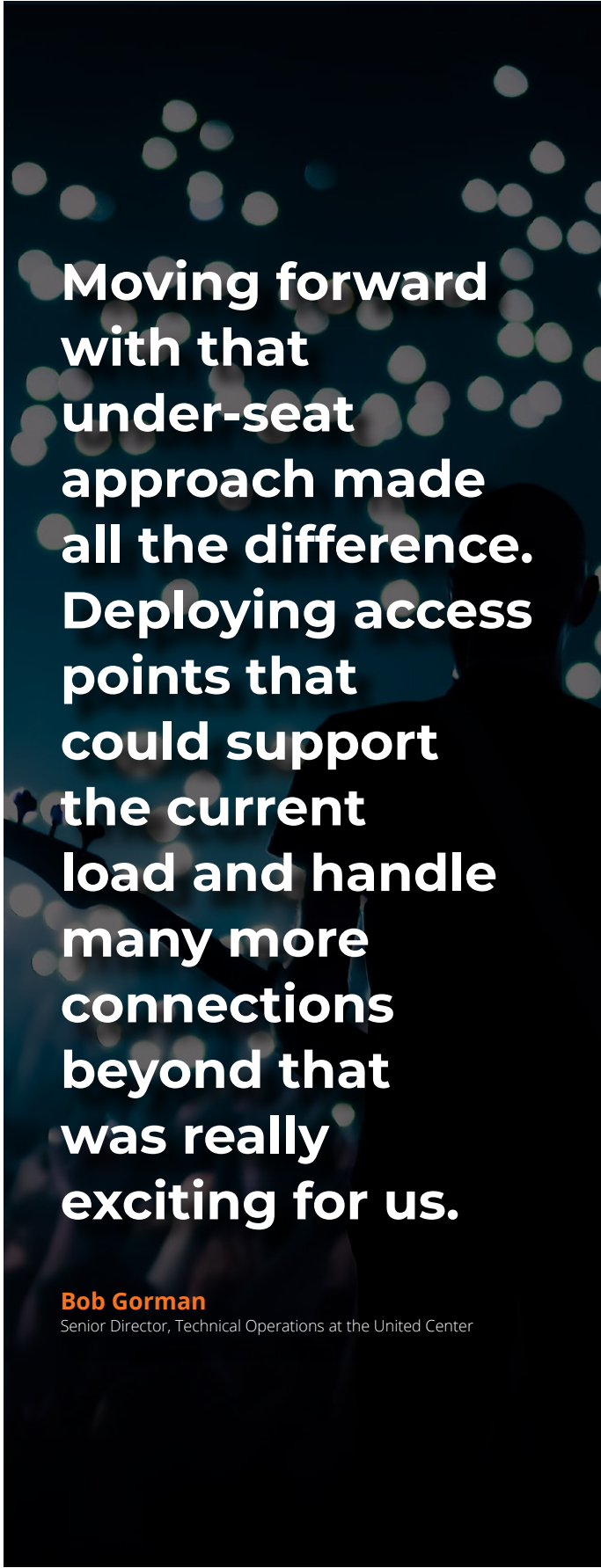
"The United Center hosts nearly 230 public events a year," said Gorman. "Between Bulls and Blackhawks rehearsals and games, entertainment rehearsals and concerts, private sponsorship events and other non-infrastructure projects that are happening in the building—having a true dark day in the venue is almost impossible."

"The logistics of managing an installation at that tempo meant that we were popping seats in the mornings, scanning the concrete to draw cores and putting those same seats back together for an event in the same day. Later that night after the shows, games or rehearsals were over, the crew would work on a third shift to make those cores happen. Both RUCKUS and American Tower's willingness to operate under those circumstances at that tempo was critical to the success of the deployment."

Designing it right the first time

To identify what it would take to update the United Center Wi-Fi network, the RUCKUS® LPV Professional Services team began by evaluating the existing network's configuration. Because the seating layouts varied widely by event, installing all APs in the ceiling rafters—as was typically done—seemed like an ideal solution. Yet the overhead approach could not provide the proper coverage without overlapping interference.

To design a plan that would provide complete coverage and deliver strong throughput that would meet or exceed key performance indices (KPIs), LPV Professional Services built a 3D computer model of the facility that would offer accurate signal numbers based on the components used and where they would be deployed. With a goal to create a resilient and reliable network, Professional Services also made sure to include redundancy, which would also add to the network stability.

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Senior Director, Technical Operations at the United Center

After exploring all options, Professional Services selected the under-seat AP method, as they had deployed in many large venues like the United Center. The under-seat method can deliver capacity density superior to over-head deployments at such high distances. "Moving forward with that under-seat approach made all the difference," said Gorman. "Deploying access points that could support the current load and handle many more connections beyond that was really exciting for us."

Unfortunately, because seating arrangements differed greatly based on the event, installing APs under seats wasn't possible for all occasions. "That's where some of the additional creativity comes in," said Duane Buddrius, global director of Professional Services. "It's not just what it takes from an RF point of view, but also what can they manage for each situation. Each event's seating is not configured exactly the same, and that's always the most challenging part."

To create a network that delivers robust performance without interfering with the arena's architecture, the LPV Professional Services team recommended imbedding APs into the existing arena floorplan structures. For example, APs were hidden in the dasher boards surrounding the ice rink to cover the arena's floor area. For basketball games, custom enclosures were created to accompany the scorers' tables on the court.

"We already knew that it was going to be a drastic improvement in comparison to the previous installation," said Gorman.

"I knew that it was going to be a stellar thought process and product installation." But when he was presented with expected results, Gorman was truly impressed. "We just didn't have those kinds of numbers before," he said. "Being able to give guests more access as well as an exceptional experience was really incredible."

Putting it all together

Once the design was approved, American Tower deployed more than 700 strategically-placed APs throughout the United Center, including high-performance RUCKUS R750s—the first-ever AP to be granted Wi-Fi CERTIFIED 6® status by the Wi-Fi Alliance. These APs, along with R650s and T750s, created the ideal Wi-Fi network for high-density, high-capacity crowds by utilizing the patented BeamFlex+® smart antenna system, which mitigates interference and optimizes throughput by choosing from thousands of unique antenna patterns to lock in on a signal.

"One area that we saw great improvement by design was on the arena floor," said Gorman. Since the original network was configured for mainly sporting events, there was little connectivity on the actual basketball court or inside the hockey rink. So, when concertgoers are seated in the bowl of the arena, connectivity issues arose. The new design took this into consideration. "By adding lower APs, we were able to really improve connectivity on the floor seating area for concerts," said Gorman.

Since the arena was already utilizing ICX switches, adding new RUCKUS Ethernet switches was a breeze. These fixed-form-factor switches with a low-latency, non-blocking architecture were ideal for delivering the needed throughput for the arena's most demanding applications.

To manage the arena's Wi-Fi, United Center chose RUCKUS SmartZone network controllers, which offered seamless integration with the RUCKUS APs and switches. Scalable and easy to use, these controllers offered converged wired and wireless network management from a single unified network console. "That whole RUCKUS ecosystem has been amazing for our networking team to stay ahead of challenges," said Gorman.

With RUCKUS Smartzone controllers, the United Center can now automate many routine administrative tasks and leverage:

- Zero-touch provisioning
- Automatic firmware updates
- One-click access to any AP or controller across all clusters
- Easy, secure access to the network for employees and guests

In addition to SmartZone controllers, the United Center selected RUCKUS AI to provide service assurance and business intelligence to the line-of-business stakeholders. Powered by artificial intelligence (AI) and machine learning (ML) algorithms, RUCKUS AI delivers easy-to-understand graphics with an overview tab that provides a high-level summary view. This cloud service also offers a customizable dashboard to allow them to view metrics like AP service uptime, time to connect, connection success rate, client throughput and more, and to generate reports to make more informed business decisions.

"With our old Wi-Fi system, we didn't have the ability to visually represent what was happening," said Gorman. "And the data could only go back maybe seven days. If I missed that seven-day window, then the data was gone. Even then it was raw data that had to be exported and then managed."

With RUCKUS AI, the United Center can also proactively manage network health and identify possible issues before

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they become a problem. It accelerates troubleshooting and helps IT teams meet their network service-level agreements (SLAs). Gorman offered the following as an illustration.

"We had a glass conference room where we kept getting complaints about wireless signals," said Gorman. "We were able to use analytics to identify where the problems were and make some adjustments to the access points from a power perspective to resolve the issue. RUCKUS AI has been an amazing tool for understanding what's going on with the network. We could have never done that with the old system because it would have never been able to ascertain what was going on."

RUCKUS AI was also instrumental in assisting Professional Services with the commissioning, testing and optimization of the network. "We use it when we're tuning the RF and performing specific tests, like checking: Are all the switches online?" said Buddrius. "It has the versatility to be able to be customized with the data studio and the special charts that Professional Services

needs to look at. But it also has all the capabilities and flexibility to be able to do things from an operations point of view."

Safeguarding easy access for guests and staff

To make gaining access to the network as easy as possible for fans and staff alike, the United Center selected the Cloudpath Enrollment System. This onboarding cloud service employs a number of powerful safeguards to make sure every connection is secure no matter who the user is or what device is used, while making onboarding easy for the technical operations team.

To squeeze the most from their new network, the United Center divided their network into a private side for enterprise operations and a guest side for fans and visitors—to which the CloudPath system assured that the right users got the right level of security access. This partitioning provided a higher level of security and isolation from guest traffic for mission-critical applications. It also allows them to manage the guest side as needed.

"We can have open Wi-Fi access at the United Center," said Gorman. "Even though it's the same infrastructure, we can have a landing page that will provide sponsorship value, collect names and email addresses."

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On the guest and visitor side, Cloudpath system also allowed the United Center to capture fan data while onboarding the user through a custom login portal. For this work, Gorman tapped the Cloudpath Enrollment System White

Glove Service provided by the RUCKUS Professional Services team, who guided United Center IT through the deployment process.

Once up and running, Gorman and his IT team have seen significant amelioration in network performance as well as usage. "A lot of our infrastructure like the Ticketmaster handhelds and in-seat server services have been greatly improved," said Gorman. "[Connectivity] in the seating area for fans and our concessions environment has exceeded my expectations."

Yet the network's stability and resiliency wasn't really understood until a recent event occurred. In a recent impromptu event, the United Center hosted 15,000 fans, of which nearly half used the RUCKUS Wi-Fi to connect to apps such as Snapchat, Instagram, TikTok, Facebook and X (formerly known as Twitter) without a single hiccup. Gorman was surprised to learn that, during the hour-long show, the network supported more than 1.7 terabytes of information.

Despite this impressive performance, Gorman is especially excited about how the new network accommodates staff and team needs. "I think we're seeing more benefits on the corporate side," said Gorman. "We're getting really close to certificate-based authentication. So, from a cybersecurity perspective, that's amazing. People getting on those networks without a username and password isn't a problem anymore. They will need to have a device with a certificate on it in order to get on the business networks."

Providing excellence in Chicago's always-on entertainment venue

For additional peace of mind that the arena's network will remain fully

optimized, Gorman opted for RUCKUS Extended LPV Care Professional Services, which delivers ongoing support to ensure optimal performance throughout the year. "I think that's an important piece," said Gorman. "From a value-added reseller or an installer, you might get that kind of support. But actually getting manufacturer support like that is really unheard of."

By utilizing the experience and knowledge gained from deploying networks on such projects as Brazil's 2014 World Cup, Wimbledon's annual Grand Slam Tournament, and many

other LPVs, Professional Services provides the United Center with year-round expertise to keep the network fine-tuned, delivering best-in-class Wi-Fi.

"Venues like [the United Center] are like Formula One race cars," said Buddrius. "You've got to make sure they're always tuned up and perfect or you're not going to win that race—because every one of these big events is a race. It's [like] keeping the factory mechanics involved. We come in on a quarterly basis and we'll review the analytics and other [factors], ensuring that it's [fully] tuned up."

Since the deployment of the new United
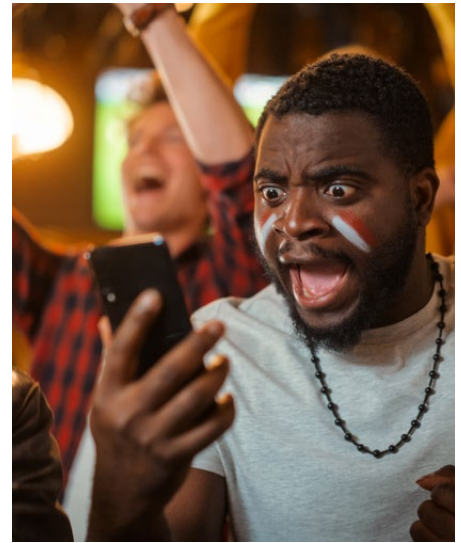
Center Wi-Fi network, fans and concertgoers have never been more pleased. The arena enjoys complete coverage. Speeds have improved. Fans can now order food and drinks from their seats. And despite the United Center being nearly one million square feet of entertainment, crowd capacity has yet to overload the network.

Today, the United Center campus—which includes the Atrium, the Madhouse Team Store, and Queenies' Supper Club—all benefit from the new fast, flexible and reliable Wi-Fi network as well as a 5G upgrade to the wireless network performed by CommScope, the parent company of RUCKUS Networks. As the United Center expands by adding more public recreational outlets and entertainment venues, the wireless networks are ready to provide flexible, premium connectivity.

Even as technology changes, this agile RUCKUS network has created a solid foundation built to last for years into the future. "The good news is we've built an infrastructure that will support it," said Gorman. "I feel very confident that all we need to do is change out the antenna and access points [for future accommodations]. I mean, we have the bandwidth to facilitate more speed and more connectivity."

About RUCKUS Networks

RUCKUS Networks builds and delivers purpose-driven networks that perform in the demanding environments of the industries we serve. Together with our network of trusted go-to-market partners, we empower our customers to deliver exceptional experiences to the guests, students, residents, citizens and employees who count on them.

www.ruckusnetworks.com

Visit our website or contact your local RUCKUS representative for more information.

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