

Fiserv Forum

State-of-the-art venue for world-class sports and entertainment



PHOTO CREDIT: MILWAUKEE BUCKS

Technology innovations drive engagement and operational efficiencies at world-class arena

Milwaukee Bucks President Peter Feigin was on a mission.

"We want to build the best sports and entertainment complex in the world."

The bar has been set very high. Venues today are forced to compete with what's become the nemesis of live events: The couch. Fans no longer need to leave the house to become fully immersed in a game or a concert, now that 55" televisions, virtual reality headsets and home theaters are commonplace. So as Feigin managed development of the Bucks' new basketball arena, he knew that a state-of-the-art digital experience would be key to drawing fans in and keeping them engaged with everything from on-demand video streaming of instant replays to apps that let fans order food or locate the shortest restroom lines.

In addition to delivering fast and reliable connectivity to event-based apps and the internet, the network infrastructure within the new Fiserv Forum must also support the building systems and business applications that combine to create an environment that is safe, comfortable and operates efficiently. Pulling it all together into a "best-in-class" event venue is a tall order. One organization was selected to assist with the design, execute and manage to that mission – Johnson Controls.

The holistic approach: Johnson Controls takes on role as technology contractor

Johnson Controls was assigned as the single point of responsibility to bring an enterprise-wide perspective to managing the planning, design assist, installation, integration, commissioning and service of technology systems, business applications and supporting infrastructure.

"I can go one-stop shopping as a buyer, which is really the advantage."

Bucks President Peter Feigin

Because the Bucks' owners recognized the benefit of taking a holistic approach, Johnson Controls was named the technology contractor early in the construction process, an approach designed to:

- **Ensure the owners' objectives were being met** by having early conversations about the best approach to address their desired outcomes for the venue, and by making data-driven decisions about connectivity and interoperability.
- **Facilitate collaboration** among Johnson Controls' experts, the venue's owner, and the design and construction teams.
- **Minimize cost and risk** by leveraging Johnson Controls' vast ecosystem of partners to bring proven, repeatable, best-in-class technologies to the project.

The Technology Contracting approach proved effective throughout the planning and construction phases of the project – all vendors worked with clear direction and coordination, resulting in less duplication of effort, fewer change orders and faster commissioning.

Bottom line? The technology systems and secured network infrastructure are ready for the venue's planned opening *and* equipped to meet future enhancements as technology needs evolve and the area surrounding the arena takes shape.

Future-ready: A network built for today and tomorrow

A lot can happen over the lifespan of a sports and entertainment venue. When the Bucks' previous arena was completed in 1988, just 15 percent of U.S. households had a personal computer.¹ Cell phones were a foot long, weighed two pounds and did one thing – make calls.²

Regardless of the direction technology takes over the next few decades, the new Fiserv Forum network infrastructure has been designed to be future-ready, with ample:

- **Bandwidth:** The team installed 258 miles of fiber and copper cable to support the various technology systems within the arena. That's enough cable to stretch from Milwaukee's Fiserv Forum to Chicago three times.
- **Connectivity:** To avoid overwhelming nearby cell towers, Wi-Fi and high-capacity DAS networks have been installed and will support simultaneous connectivity for 17,500 fans for basketball, and 18,000 fans for concerts and other events.
- **Speed:** Fans will have exceptional internet speed – 20GB/second – which is enough to send 10,500 video texts per second.³
- **Capacity:** Fans will enjoy an optimal experience for viewing and sharing content in real time. During a single basketball game, the system can transfer 72TB of data per event. That's 72 trillion

bytes – enough to stream and binge watch your favorite show every hour of every day for nearly five years.⁴

- **Extensibility:** The network is adaptable to accommodate future technologies to further maximize the fan experience and building performance.

Beyond basketball: Handrail antennas designed for always-connected experiences and fast, flexible seating configurations

While Fiserv Forum is – first and foremost – home to the Milwaukee Bucks, the facility must also accommodate concerts and other revenue-generating events that require a reconfiguration of the seating. Because these changeovers may need to take place multiple times a week (the arena is expected to have as many as 175 events booked each year), Bucks President Peter Feigin presented Johnson Controls with a challenge: Find a way to incorporate handrail antennas that offer ubiquitous Wi-Fi coverage, have no impact on sight lines and deliver maximum configuration flexibility.

Over the past few years, handrail-mounted antennas have emerged as one method for delivering rock-solid, fast, reliable network connectivity that can't always be achieved through overhead or beneath-the-seat antennas. So it's not surprising that they would be an integral part of Fiserv Forum's network infrastructure design; there are 76 handrail-mounted antennas within the arena. But this implementation features one distinct innovation: Johnson Controls and its ecosystem partners, Abaxent and AccelTex, implemented a unique form factor among the 28 handrail antennas in the lower bowl – where most seating reconfiguration takes place – that allows for increased flexibility, is ADA compliant and doesn't compromise fan sight lines.

The lower bowl handrail solution utilizes a "dart connector" method of disassembling/reassembling the rails to which the small antenna enclosure is attached. By eliminating threaded connections, arena maintenance crews can quickly remove a handrail with just two clicks, accommodate the seating arrangement necessary for the event, and pop it back into place for the next game. The antenna and assembly configuration required the Johnson Controls team to develop an innovative method of extending the antenna leads down the handrail underneath the stadia where the access points are located.

Now, regardless of the event or seating arrangement, fans are certain to have robust, uninterrupted Wi-Fi coverage, live data streaming on demand and an unforgettable event experience.



Video Control Room

PHOTO CREDIT: MILWAUKEE BUCKS

See it. Hear it. Feel it. In-house video production solution immerses visitors in sight and sound

While fans follow the action on the court and post selfies from inside the arena, their experience is enhanced by sights and sounds delivered through an in-house video production studio supported by the audio/video infrastructure and broadcast cabling plant designed and implemented by Johnson Controls.

Cameras positioned throughout the space stream video to the video production studio where it can be pushed out to the major networks or displayed with cutting-edge clarity throughout the venue and on the new center-hung, full HD scoreboard – one of the top scoreboards in size in the NBA.⁵ The scoreboard and ribbon board ride on the converged enterprise-grade network, along with speakers surrounding the scoreboard, suspended from the rafters inside the seating bowl, ensuring seamless content management and delivery.

Cisco Vision gives operators at Fiserv Forum the ability to customize the color scheme, content and branding of information that is displayed on 840+ hi-definition IPTVs throughout Fiserv Forum. The displays deliver live feeds, analytics, promotions, advertisements, entertainment and communications – extending the experience for fans and creating revenue-generating opportunities for event sponsors.

Creating a safe, secure, comfortable fan experience – efficiently

Fiserv Forum can house 17,500 people at any given time. Keeping them safe and comfortable is an important part of what it takes to create a memorable fan experience; a primary objective for the Johnson Controls team.

Safety and security

A number of cybersecurity measures have been taken to protect the people, network infrastructure and technology systems within Fiserv Forum against vulnerabilities. In addition, access control is well-defined. The overall system contains more than 420 monitored or controlled doors to ensure safety to all who set foot in the facility. Varying levels of restricted access are imposed for players, storage, medical and public areas. For NBA players and certain members of the Milwaukee Bucks staff, for example, biometric iris and fingerprint scanners grant access to defined locations.

Once inside the venue, the safety of players, performers and visitors is monitored from the Arena Operations Center, where security personnel can view, in real time, more than 365 hi-definition IP surveillance cameras positioned throughout the stadium, as well as extra-dense 20 megapixel cameras focused on the bowl area where patrons sit and player benches are located.

“We want to be the pioneers. The innovators in the NBA. So we look for people who have entrepreneurial spirit, people who are willing to take risks to get things done.”

Bucks President Peter Feigin



PHOTO CREDIT: MILWAUKEE BUCKS

Operators also have immediate insight into and detailed information about critical alarms and game-day systems to ensure an optimal and safe fan experience. Throughout the venue, fire alarms are integrated with the arena's audio visual systems so that in the event of an emergency, the fire alarm signals the ribbon board to display an emergency message and pre-recorded evacuation messages are played over the loud speakers.

The system is also designed to ensure a coordinated response with first responders in the event of an emergency. The Arena Operations Center uses the DAS public safety frequency, which ensures communication devices continue to transmit in hard-to-reach areas such as stairwells, elevators, basements, and thick-walled or shielded areas.

Comfortable and sustainable

Nobody wants to sit through a game or a concert in an environment that's uncomfortably warm, cold or noisy. Johnson Controls HVAC equipment and technologies ensure the comfort of fans, players and performers at the new arena – and do so efficiently.

For example, three magnetic-drive YORK® YMC² chillers regulate the temperature of the environment, as well as reduce energy consumption and increase efficiency. The highly efficient electronically commutated motor (ECM) fans in the air handling units in the arena bowl move as much air as approximately 400 residential furnaces, reduce power consumption and carbon footprint, and ensure quiet operation so the equipment doesn't compete with the event.

Connecting it all is the *Metasys*® building automation system, which controls and monitors equipment and system performance, and can make real-time adjustments based on variables such as the actual attendance at each event. With its predictive analysis, *Metasys* can also identify issues that might otherwise reveal themselves at critical points during an event.

The Water Cooled Scroll model YCWL chiller technology is used to make ice for the arena's ice rink which will be the site of family ice shows hosted at the new arena or possibly a NHL exhibition game.

Beyond one building: a catalyst for community growth

The arena, entertainment plaza, Bucks' training facility and parking structure are seamlessly converged to create an enterprise facility management solution that enhances the fan experience, improves the building's performance, reduces energy usage, and lessens the entertainment district's environmental footprint.

As a "smart" building, Fiserv Forum is the centerpiece of an ambitious effort, spearheaded by the Bucks, to revitalize 30 acres of mostly vacant property surrounding the arena. Construction has already been completed on a new parking structure and team training facility, both of which are supported by the same network infrastructure built by Johnson Controls for the arena.

And this is just the beginning. Over the coming years, the area surrounding the arena will be transformed into an entertainment district – the largest development project ever undertaken in downtown Milwaukee, combining entertainment, residential, retail and commercial spaces. The technology foundation being laid now will be leveraged to enable future businesses and partners to become part of the district.

"Our ownership group committed to building an arena that is the gold standard for a sports and entertainment facility while also driving additional development and community growth throughout the region," said Feigin. "We wouldn't be able to accomplish those goals without the partnership and support of Johnson Controls. Together we've built an incredible arena and an incredible future for our home city."

Notes:

¹ <https://www.pcworld.com/article/142550/article.html>

² https://www.pcworld.com/article/131450/in_pictures_a_history_of_cell_phones.html#slide1

³ <http://www.ibtimes.com/heres-crazy-amount-cellular-data-snapchat-consumes-how-stop-it-1938313>

⁴ <https://corporate.comcast.com/comcast-voices/you-can-do-a-lot-with-1-terabyte-of-data>

⁵ <http://fox6now.com/2018/01/16/9-4m-leds-new-daktronics-scoreboard-hoisted-into-place-in-new-bucks-arena/>

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