STADIUM
TECH REPORT

Stadium Connectivity White Paper

Results & Analysis

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Presented by Stadium Tech Report & **verizon✓**

Using technology as a business lever: Venues are adding more technology to help improve the fan experience and to improve business efficiency
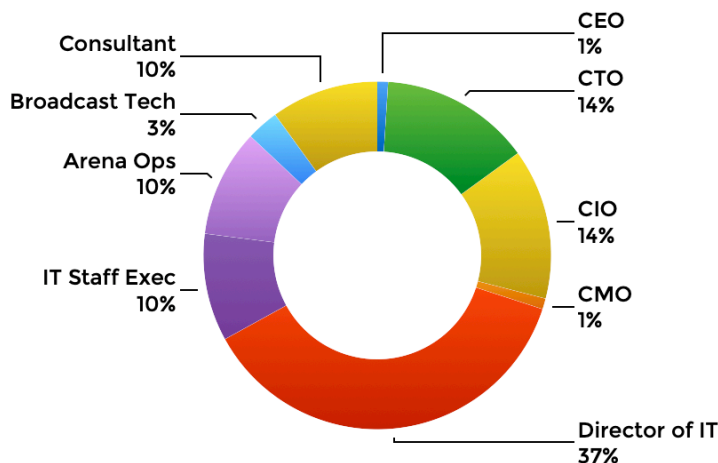
As fans flock to events and games in ever-increasing numbers, large public venues are accelerating the pace of technology deployments to ensure that their guests have a positive experience, and also to make their own business procedures more efficient and more profitable.

In our fourth annual Stadium Connectivity Outlook Survey, respondents pinpointed fan wireless connectivity as their top initiative for the next 12 months. In our analysis, that focus is a clear sign venues are looking to a solid, future-proof wireless infrastructure as a necessary foundation upon which they can build both fan-facing and back-of-house features using new technologies to help them streamline operations while simultaneously adding more revenue streams.

Once again, in August and September of this year we reached out to the Stadium Tech Report community and asked them to participate in our fourth annual Stadium Connectivity Outlook Survey, which included a wide range of questions about the current state of a venue's connectivity, and where

KEY TAKEAWAYS

1. Improved wireless connectivity for fans and venue operations is the top initiative for venues in 2025.

2. Cashierless concessions, biometric solutions and walk-through security scanners are tops on venues' technology deployment lists, while generative AI is also a growing focus.

3. Lowering operating costs and increasing revenues while paying attention to budgets are the combined top challenges for most venue respondents.

4. Venues continue to explore in-house use cases for private 5G, with venue business solutions and on-field operations top of mind.

5. More venues believe they are right on track when it comes to their overall security and their digital transformation strategy.

RESPONDENT PROFILES

Approximately 37 percent of respondents are directors of IT; 14 percent of respondents are CTOs, and 14 percent of respondents are CIOs.

Consultant 10%
Broadcast Tech 3%
Arena Ops 10%
IT Staff Exec 10%
CEO 1%
CTO 14%
CIO 14%
CMO 1%
Director of IT 37%

the respondents would prioritize investments and strategies in new technology as well as with operational functions.

We also asked very specific questions about some of the buzziest stadium technologies that have been emerging in the past few years, including walk-through security screening systems and cashierless concessions, and added some newer venue technologies to our question mix, asking respondents how they might be using biometric verification solutions as well as generative AI.

To be clear, these are not our views but the insights of our audience - honest feedback that once again provides an industry-wide perspective on the common issues facing venues of all shapes and sizes, from large NFL and college football stadiums to Major League Baseball stadiums, to NBA and NHL arenas, as well as more intimate concert halls.
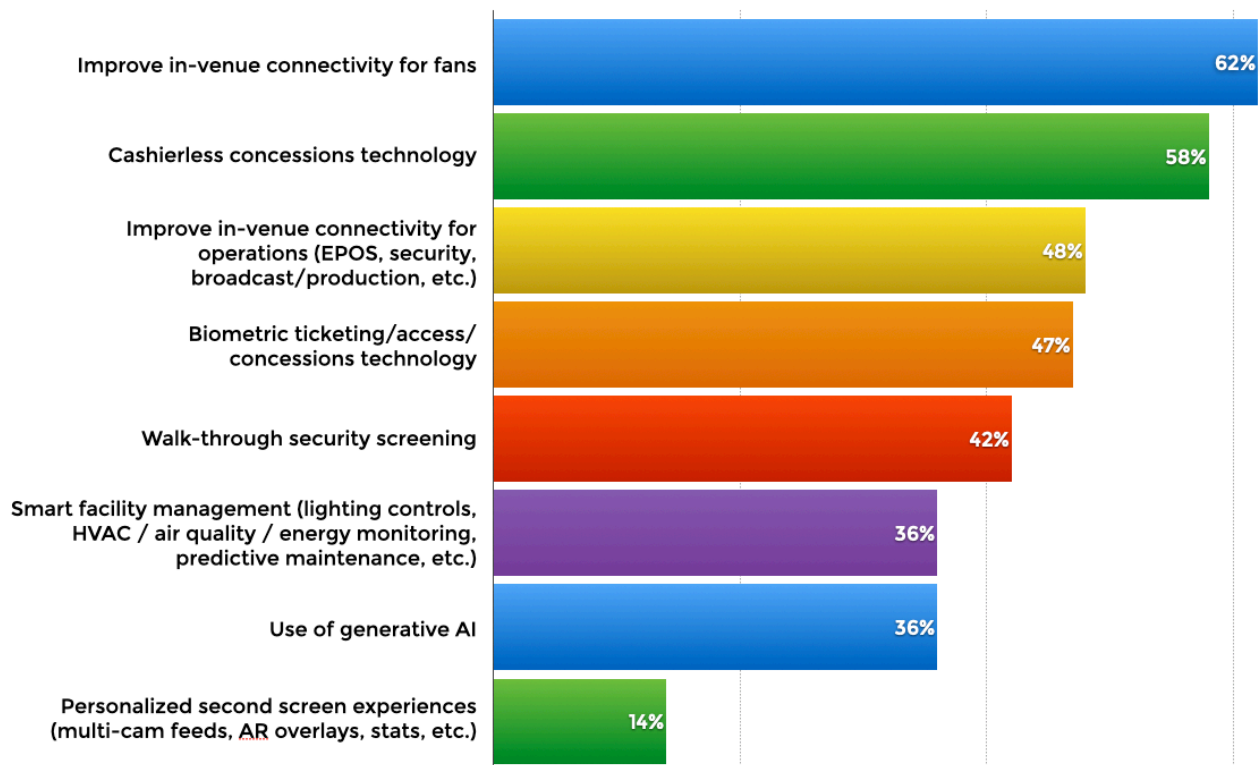
Venues look to add wireless upgrades in 2025

In our fourth annual Stadium Connectivity Outlook Survey, respondents pinpointed upgrades to fan-facing wireless networks as their top roadmap initiative for 2025. With almost 62 percent of respondents citing the desire to "improve in-venue connectivity for fans," that choice edged out "cashierless concessions technology," last year's top initiative. This year, just over 57 percent of respondents included cashierless concessions as an initiative on their 2025 roadmap.

In third place on the initiative list was "improve in-venue connectivity for operations" (48 percent), showing that while new technologies are gaining attention (biometric technology and walk-through security scanning were the next two vote-getters in the list), venues as a whole are realizing the need for robust wireless networks for both fans and back of house uses as they seek to modernize facilities and operations from entry gates to the playing surface and everywhere in between.

Here at Stadium Tech Report we could see this renewed interest in wireless upgrades coming. Our headlines over the past few months have been filled with stories of new Wi-Fi deployments, cellular network upgrades, and even some full replacements of Wi-Fi networks that were just a few years old.

Survey question: *Which initiatives are on your roadmap for 2024? (Check all that apply)*

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Initiative	Percent
Improve in-venue connectivity for fans	62%
Cashierless concessions technology	58%
Improve in-venue connectivity for operations (EPOS, security, broadcast/production, etc.)	48%
Biometric ticketing/access/concessions technology	47%
Walk-through security screening	42%
Smart facility management (lighting controls, HVAC / air quality / energy monitoring, predictive maintenance, etc.)	36%
Use of generative AI	36%
Personalized second screen experiences (multi-cam feeds, AR overlays, stats, etc.)	14%

Our analysis reveals several reasons why teams and venues are spending the money to upgrade these networks now. Included in that list is the fact that new technologies like Wi-Fi 6, Wi-Fi 6E and cellular 5G are maturing in the market, with good product and service support from the vendor and carrier community; there is also the ability to tap into big chunks of new wireless spectrum, specifically the 1,200 MHz available in the 6 GHz band for unlicensed Wi-Fi 6E here in the United States, and the C-band and CBRS spectrum for cellular.

So if venues had been without internal wireless networks, or had deferred upgrading their older distributed antenna system (DAS) networks, there has rarely been a better time than now to install wireless networks with lots of future capacity.

That sort of perfect-storm market condition is probably why respondents to our survey this year also had "wireless and in-building connectivity" as their top choice (nearly 58 percent of respondents) to our question asking "Which areas will you be making changes in your IT infrastructure to support growth or reduce operating costs over the next 12-18 months?"

"High-performance wireless networks are essential for all venues going forward. You simply can't operate in this hyper-connected era without them."

Jonathan Nikols - Senior Vice President, Global Enterprise Americas, Verizon

For many venues, robust wireless connectivity is becoming table stakes in the business of hosting high-profile entertainment acts and "jewel events" like major championship games, since the people who own or run those events simply won't book them in a venue that can't support the kind of bandwidth demands seen at the biggest events. Other venues that perhaps hadn't had robust wireless before are now seeing the need to build such infrastructure so they can do other things -- both internal and fan-facing -- to support the twin goals of reducing operating costs while adding more revenue, which we will address later in this paper.

Venue technology deployment experience says it's hard to move forward with new ideas if you haven't got a solid wireless network base in place. For our respondents, 2025 seems to be a year when wireless infrastructure needs get addressed again.

Technologies finding a place in stadiums: Cashierless concessions, biometric verification systems and walk-through security scanners

Cashierless concessions is a topic that has dominated Stadium Tech Report's coverage for the past two years. The deployment of nearly 100 new checkout-free concession stands last year was followed up by another 100 new stores launched in venues since October 2023, with our reporting showing about 250 such stores active in stadiums and arenas worldwide. So it's no surprise that nearly 60 percent of respondents said it was a planned initiative for their 2025 roadmap.

(Editor's note: By our definition, "checkout-free" stores are the types of stores with gates at the entrances where customers scan or swipe payment information to gain access. Once inside, customers select the items they want, which are identified by cameras and/or sensors, and just leave, with billing taking place later online.)

There have also been numerous more deployments of other frictionless retail solutions, including optical scanning checkout terminals, self-checkout kiosks with bar-code readers, and even systems of both these types using facial authentication for purchase and age verification. Self-serve cocktail

machines are also starting to show up in stadium club areas, just another way for "cashierless" technology to help improve operations and increase revenues.

Missing key moments in a game or performance while waiting to grab a snack or purchase merchandise negatively impacts the live event experience. Our reporting on cashierless concession technology has shown a high rate of fan acceptance and use, since many of the venues employing these innovative solutions are able to reduce average transaction times to less than a minute. One interesting fact from the survey results is that the number of respondents claiming "more than five" cashierless stands in their venue rose to 53 percent this year, up from 39 percent last year.

Survey question: *If yes, how many cashierless checkout concession stands does your venue have?*

2023 Results

One
13%

More than 5
39%

2–5
48%

### 2024 Results

One
8%

More than 5
53%

2–5
39%
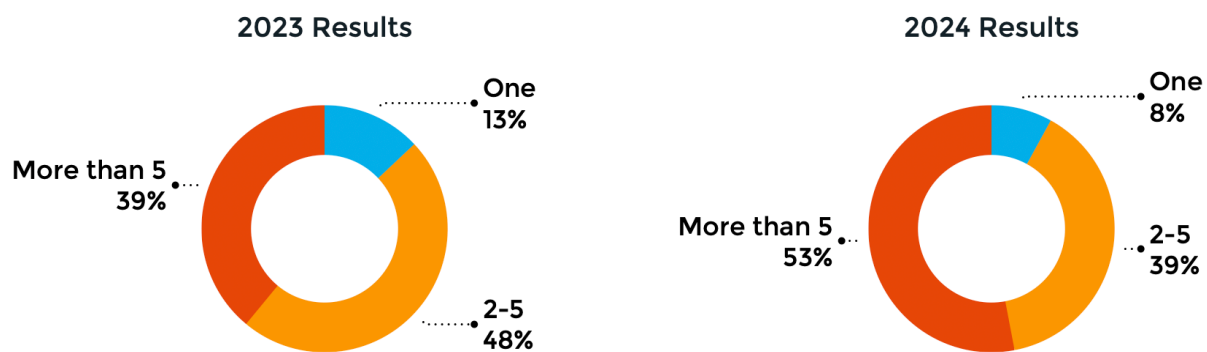
Autonomous checkout is an attractive solution. Many teams and venues have reported that they've been able to grow revenue by increasing transaction volume and basket size, while also improving the fan experience by significantly reducing queuing time. Further, when replacing traditional belly-up stands with new frictionless solutions, they've gained operational efficiencies by having the ability to allocate their staff more effectively, which is perhaps one of the reasons why staffing was again less of a concern in this year's survey compared to 2022, when respondents said it was the biggest challenge they faced.

Facial authentication tech used for ticketing, concessions

Just behind cashierless concessions on the respondents' initiatives list are biometric technology and walk-through security scanning. Biometric technology, a new category for this year's survey, was cited as a top initiative for 2025 by nearly 47 percent of respondents, good for fourth place on that list. While most stadium deployments of biometric technology involve facial authentication systems, there are also other forms of biometric verification being deployed, like the Amazon One system which uses a human palm for verifying transactions.

A facial authentication software company called Wicket has been the leader in this space, with customers like the Cleveland Browns, the Atlanta Falcons, the New York Mets and the Tennessee Titans among those using Wicket-based systems for ticket verification. According to end users, the facial-authentication ticketing systems can be noticeably faster than traditional hand-held or kiosk-based ticket scanning of bar codes or NFC transactions. Major League Baseball also rolled out its own facial-authentication ticketing systems in 2024, with six teams installing the devices.

Survey question: *Does your venue use facial or other biometric authentication technology for any of the following functions? Check all that apply.*
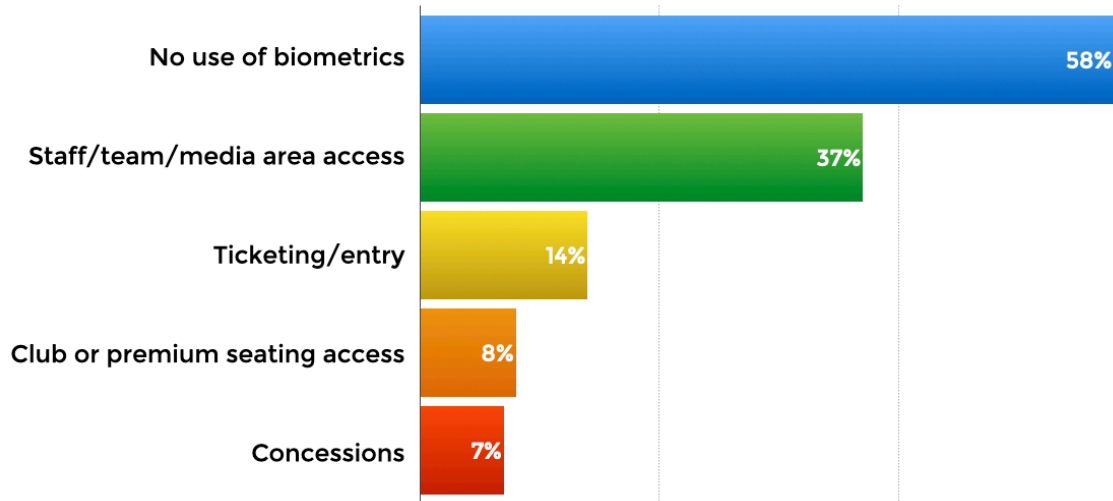
This past year, several vendors and caterers have partnered with teams to develop systems where facial authentication can be used for both payment and age verification to support "buy a beer with your face" type applications meant to speed up concession transactions. And the National Football League gave facial authentication technology another boost this season by requiring all 32 teams to use a Wicket-based system for media and staff access to on-field and other sensitive areas.

Walk through security screening serves dual purpose of protecting fans and improving the game-day experience.

Another technology experiencing rapid deployment is the "walk-through" model of security scanner products, which allow fans to pass through security screening without having to stop or divest items from pockets or bags. According to our survey respondents, 70 percent of venues are already using walk-through security scanning systems, with another 19 percent evaluating the systems.

The new systems are replacing traditional magnetometers mainly due to their ability to rapidly process customers, thereby eliminating the long lines that can occur when attendees have to go through traditional metal-detection processes. According to some of the stadiums, the new systems also allow them to save money on security gate deployments since the walk-through systems can process far more people per gate.

"Strategic deployments of connected technology are the best path forward for venues who are looking for streamlined operations and a better fan experience."

Brian Gorney - Managing Director, U.S. Pro Sports, Verizon

Venues are curious about Gen AI

One technology to look at more closely in 2025 is generative AI, which we added to our initiatives list for this year's survey. With almost 36 percent of respondents saying it was on their 2025 roadmap, and another 26 percent of respondents saying they are already using generative AI, look for Stadium Tech Report to add more comprehensive coverage of generative AI systems in the coming year.

Technology deployments are the key to reducing costs while increasing revenue

For the past two years, our question about "What are the biggest challenges you face in the next 12 months?" has highlighted the "big three" topics of stadium finance -- how to cut costs, stay within budgets, while simultaneously increasing revenue.

This year was no different. In fact, the top three answers grew a bit in each category -- lowering operating costs (64 percent of respondents vs. 56 percent the prior year), followed by budgetary constraints (62 percent vs. 53 percent the prior year) and then increasing revenues (59 percent vs. 55 percent the prior year).

Survey question: *What are the biggest challenges you face in the next 12 months? Check all that apply.*
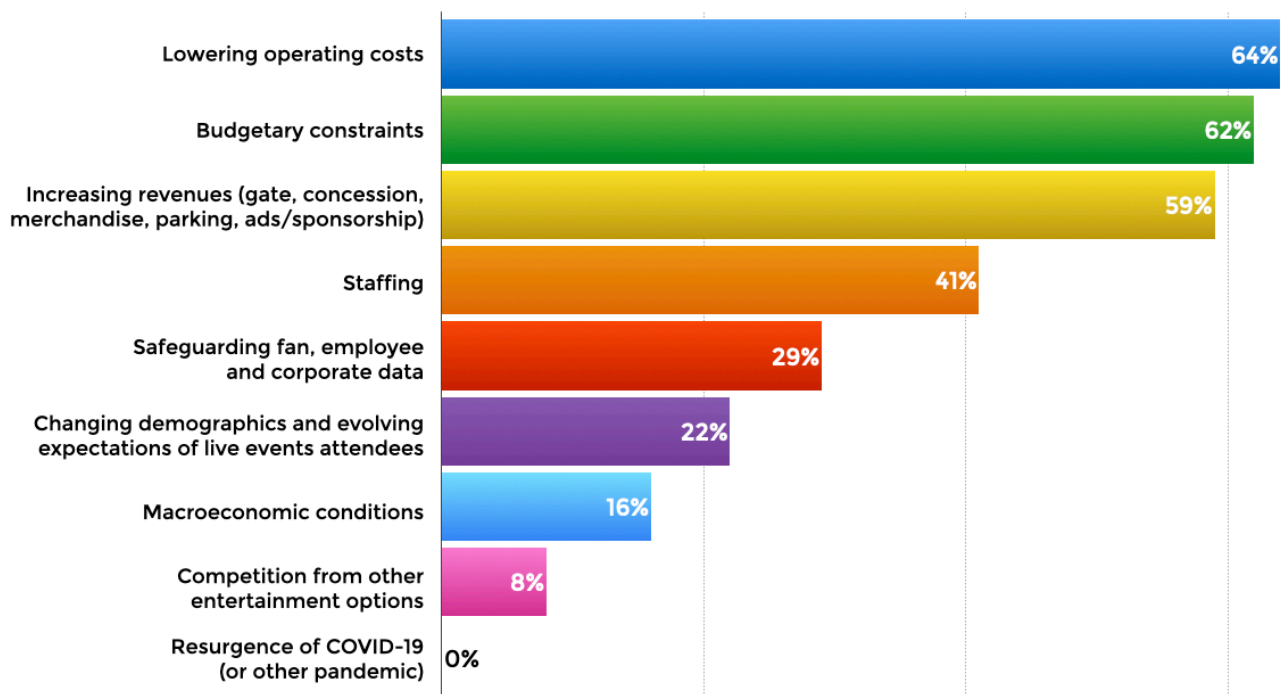
While there are always the old-school ways of lowering operating costs and staying within budgets like "not spending," raising revenues is a harder nut to crack with just operational shifts. Yes, small gains in efficient operations can usually always be found, but to really move the needle on the revenue side, it usually takes something new -- new concessions, new premium seating areas, new events -- to record significant net gains.

New tech can support new revenue-generating activity

It's not reflected in our survey answers directly but if we combine what our respondents tell us in the survey with what we see in our reporting, it's fairly clear that many venues are tackling "the big three" financial challenges by deploying technology -- which can sometimes do all three things at once, cutting operational costs and staying within budgets while adding new forms of revenue.

At one large university that previously avoided installing fan-facing Wi-Fi, a plan to promote order-ahead concessions on a stadium app basically forced the school into finally deploying robust

in-stadium Wi-Fi to support the concessions idea. With that Wi-Fi deployment came the ability to make back of house operations more efficient by using wireless services, while also adding the opportunity for increased concessions sales via the order-ahead app system.

On a somewhat simpler ROI equation, several teams and venues who have added walk-through security scanners and facial-authentication ticketing systems have been able to brand them as "fast" or "express" systems that can be new activations for outside sponsors. Other venues have been able to add sponsor branding to the outside walls of the new checkout-free concession stands, again adding new activation opportunities inside a venue simply by standing up a new technology feature.

Smart facility management technology, which 36 percent of respondents identified as an initiative for 2025, is also finding real-world benefits inside venues. By deploying devices such as IoT sensors, venues can reduce staffing and operational costs while also suppprting LEED initiatives to better control factors like energy usage.

And a new response choice for this year's survey question about challenges, about safeguarding fan, employee and corporate data, was selected by 29 percent of respondents, making it fifth on the list of challenges. As security concerns at venues grow alongside new technology deployments, we expect to see more new solutions arise in this area in the near future.

Interest in Private 5G wireless networks remains strong

On other communications tech fronts, venues are still showing great interest in ways to use private 5G networks internally. Verizon's successful deployment of coach-to-coach on-field networks in every NFL stadium last year may be the reason why respondents continue to show high interest (41 percent of respondents) in using Private 5G for on-field operations.

Survey question: *With private 5G, you can isolate a portion of the bandwidth and dedicate it to a specific workflow. Which workflows would you use it for? Check all that apply.*
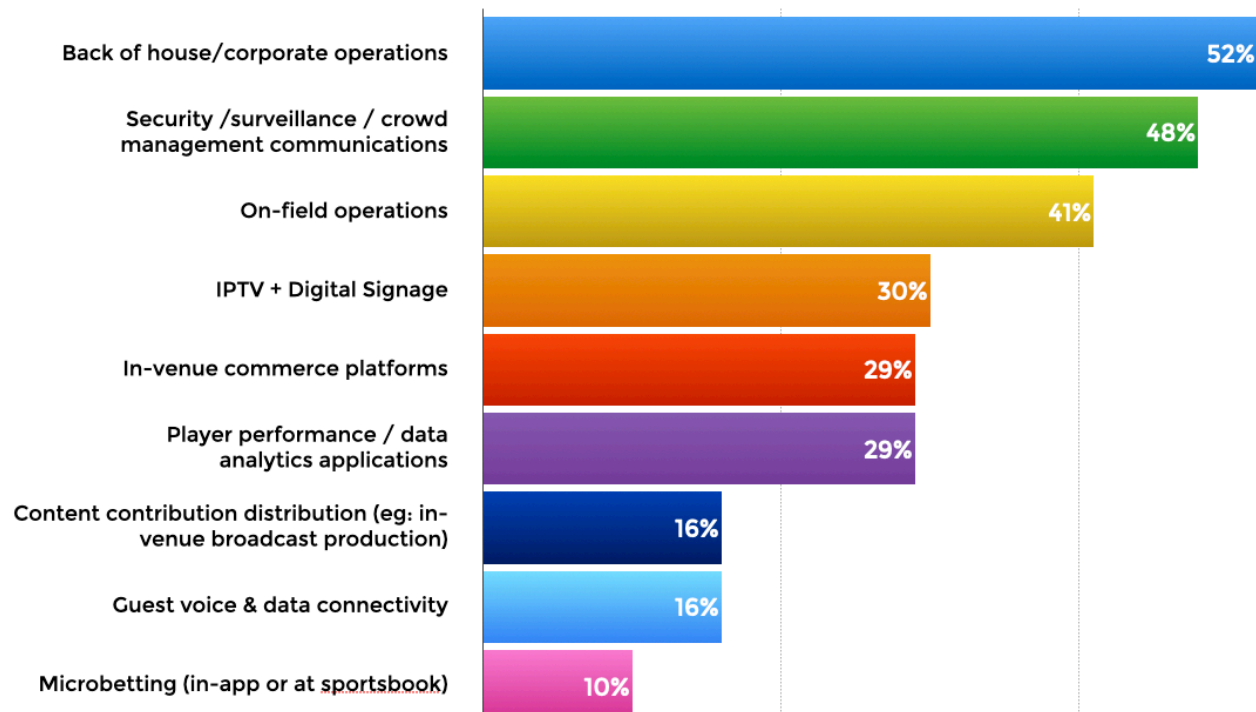
Using private 5G for back-of-house operations was still the top selection for possible Private 5G use cases, with 52 percent of respondents selecting that answer. In second place for the second straight year was using private 5G for security and surveillance communications (48 percent). One category that grew in interest a bit from last year was using Private 5G for IPTV and digital signage, which jumped from 26 percent of respondents in 2023 to 30 percent in 2024. By delivering greater stability, speed and security, dedicated private 5G networks remain a viable option for venues looking to solve bandwidth issues in areas with higher security and lower latency requirements.

The continued successful embrace of stadium technology is making venues feel better about their digital transformation path

As technology is deployed to solve more of the pain points of both attending events as well as running in-stadium businesses, our respondents told us in no uncertain terms this year that the need for faster, more secure methods of connectivity remains at a premium.

Survey question: *My existing security posture / strategy is:*
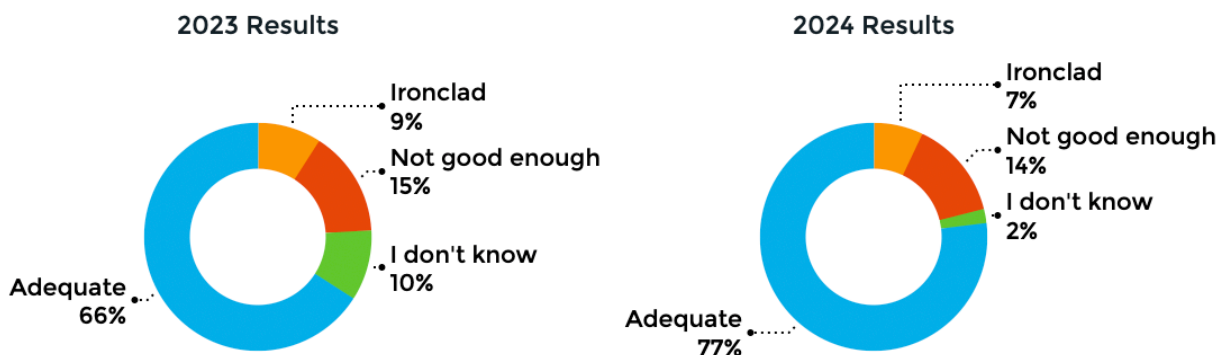
The responses highlighting the challenges of lowering costs while increasing income also seem to go hand in hand with our respondents' interest in turning to technology to help them find new ways to raise revenues, especially with concessions operations.

Far from being frustrated by these processes, our survey respondents seem to be making steady progress on two important factors we have been tracking since we started this survey, mainly how venues feel about their security stance and where they see themselves on their digital transformation journey. This year, venues who think their security stance is "adequate" jumped to 77 percent of respondents, a 10-point gain from 2023. On the digital transformation front, the number of respondents who felt they were "slightly ahead of similar size organizations" reached 42 percent this year, up from 35 percent in 2023.

From what our respondents are telling us, advanced new technologies paired with expanded wireless spectrum resources are giving experienced partners even more ways to help venues find the best path along their digital transformation journey.