

# Leaving Las Vegas

Usher ends his Sin City residency with  
a stunning Super Bowl performance

By: David Barbour



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ow's this for a headline? "Usher's Halftime Show is a Guest-Packed Frenzy of Sexy Shirtless Jams, Roller Skating, and Breathless Dance Moves." That pretty much sums up this year's Apple Music's Super Bowl Halftime Show, which took Las Vegas' Allegiant Stadium by storm. Executive-produced by ROC NATION,

to work their magic once again, all skilled at creating a spectacle that unfolds in 15 minutes or less, with minutes to get on the field and even less time to get off. Production designer Bruce Rodgers was joined by producer/designer Baz Halpin, of Silent House, and Aakomon Jones, Usher's creative director, with lighting designer Al Gurdon once again at the helm, and Kirk Powell, of ATK Audiotek (a Clair Global brand), overseeing the audio aspect.

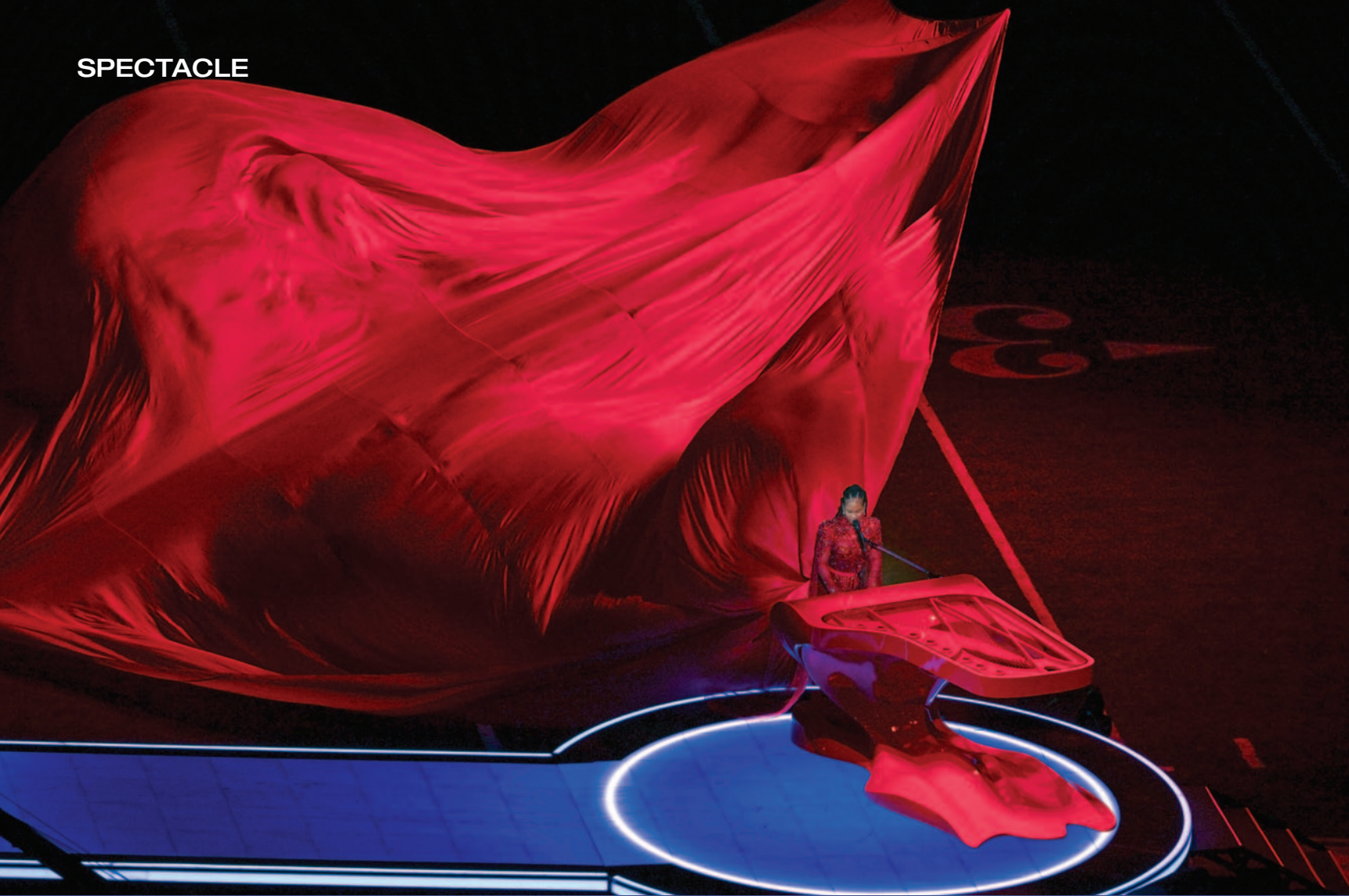


Opposite: Alicia Keys' piano was built by ShowFX. Above: The full company takes to the field.

Jesse Collins, and Diversified Production Services and directed by Hamish Hamilton and Shawn Carter, the show dispensed with the high-concept hijinks of the last few years (no city blocks on the field, no flying singers) for a red-hot hit parade showcasing the ever-popular hip-hop star and his songs. Joined by dancers, acrobats, a marching band, and an army of guest stars, including Alicia Keys, H.E.R., Ludacris, Jermaine Dupri, Lil John, and will.i.am, the show ran on sheer star power.

The production brought together many Super Bowl pros

During the early site surveys, Rodgers says, "We assessed the stadium site plan and access tunnels, finding that this was the smallest stadium site with the smallest tunnels in recent memory. This led us to imagine a sideline-located stage akin to what we did with Bruno Mars [in 2014]. It involved crossing over the east-side team bench, which was unpopular with the NFL and our producers." Rodgers consulted with Populous Architects, which works with the NFL, asking "if it was possible to increase the southeast tunnel's width by modifying the bleacher struc-



Jones says, "Vincent Richards, master puppeteer Michael Curry, Baz [Halpin], field team coordinator KP Terry, and our costume designer Tanja Caldwell worked to pull off what we called 'a fabric of love.' The piano design was made to feel as though it flowed almost seamlessly into the dress. The cape detached at the right moment to reveal a sexier look underneath." Opposite: "The goal was to create a roller rink type of environment without it feeling like a nostalgic '70s roller boogie, to introduce skaters as they are now and how he sees them in the future," Jones notes.

ture." Indeed, it was, and he adds, "We were provided a 12' tunnel width similar to past years."

The Super Bowl process, honed over many years, involves an army of field team professionals who take part in the biggest annual entertainment event on the calendar. As soon as the game's first half ends, they roll onto the field a series of carts that connect to make the stage. It's a clockwork operation, handled in a matter of minutes.

However, another wrinkle, first seen last year at State Farm Stadium in Glendale, Arizona, made a repeat appearance. "Allegiant Stadium has real grass turf," Rodgers says, "which is extremely sensitive." To protect the grass as per the NFL and NFL Players Association's requirements, "We were on the field at Allegiant Stadium even fewer times than in Glendale. We were required to halve the number of carts as in previous years, too. We were granted three rehearsals on the actual field but only with the vinyl field cover protection in place. The limitations were worrisome given our infamous eight-minute install

and six-minute strike. The cart count limitations meant finding a spectacular show with less staging." Another worry was the afternoon starting time. "We were hoping for a long second quarter, so the show would take place in the evening, as conceived."

Usher's participation was announced in August, just as his residency at the Park MGM Las Vegas was winding down. Rodgers says, "We quickly learned that his entire team was a well-oiled machine, with familiar names like creative director Aakomon Jones, production manager [Robert] Hydro Mullin, and tour manager [Michael] Huggy Carter. We were also pleased to hear that designer Baz Halpin, who was part of the Katy Perry halftime show [in 2015] was joining Usher's team, too."

Rodgers notes the stimulating quality of the creative team's meetings, a feeling that is echoed by Jones: "It's fun starting from scratch like that. I essentially wanted the artist to traverse across multiple worlds, almost as if he were taking us on a 12-and-a-half-minute journey." Halpin

adds, “We really wanted to showcase the breadth of Usher’s career. As somebody said to me, he’s the Michael Jackson of our generation, a consummate entertainer. We also wanted to reference the incredible run he just had in Vegas. Like Britney Spears, when he came in, he changed what it meant to be a resident performer in the city.”

These ideas coalesced into the concept of a classically theatrical stage for a supercharged performer, framing him with touches of typical Vegas flamboyance: showgirls in feathery costumes, acrobats, artists from Cirque du Soleil. Halpin says, “We wanted to make the design in service of the performer and his catalog of music, not getting bogged down by flying people or holograms or any other technology that would dictate how we craft the performance.”

Also, Halpin says, “As we mapped it out, we saw it really needed to be a traveling performance, starting in one place, moving to another, and moving to yet another. This meant thinking about the crafting of each shot, protecting areas of the stage where people were being repurposed, scenery was being changed, or a piano was being brought on and off.” This led to the creation of a circular main stage with runways leading to two smaller stages.

As the lineup was confirmed, other elements came into play: If you’re going to have Alicia Keys, you will need a piano. And, in what must be a halftime show first, an extensive roller-skating sequence was featured. “Usher loooves roller-skating,” Jones says. “We knew from day one that’d be an element we’d have to have. The goal was

to create a roller rink type of environment without it feeling like a nostalgic ‘70s roller boogie, to introduce skaters as they are now and how he sees them in the future.”

What with the Vegas performers, a marching band, and a gaggle of fans crowding around the stage, the field was more heavily populated than usual. To allay NFL concerns, Jones says, there were “no hiking boots, no treads that were too rigid on the bottoms of sneakers, no high-heeled shoes, no hard bottom dress shoes for the guys, and definitely no roller-skates.” If any questionable footwear were to be worn during the stage performance, he adds, performers “had to run out with their shoes in their hands, sit onstage, put them on, and hike up their legs so their footwear never touched the field.”

Halpin notes that Usher is a ferociously hard worker, putting himself through an intensive rehearsal process and doing something like 150 takes of the show’s music tracks before feeling satisfied. In many ways, Jones adds, the biggest challenge, given the star’s three-decade track record of hits plus his runs in Vegas, Broadway, and elsewhere, was: “How do you do everything in you want in twelve-and-a-half minutes?”

### The video stage

The set design consisted of a main stage with an immersive video floor, amplified by an array of effects, including lasers, hazers, flashing lights, and fog. Wrapped in LED, the main center stage, along with the band area and ramps

Photo: Tom Donoghue



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leading to the two wing stages, spanned more than 118 linear feet on 20 custom carts. All Access Staging and Productions, the event's scenic fabricator, used its Versa field stage system, developed for halftime shows. This system uses the company's Versa deck and field stage support structure with pneumatic tires, designed to roll over sensitive areas without harming grass or turf fields. "The stage was fairly confined," says Erik Eastland, All Access president and founder. "The B stage in the center was about 48' in diameter, with two ramps that were about 24' by 8', leading to the A and C satellite stages." An additional cart, used for the throne stage, utilized the stair system, developed for last year's show, in which the stairs flip up onto the cart. It allowed for maximum use of space while creating the illusion of sitting directly on the grass.

One unusual feature was the curved shape of the band area. "We integrated the downstage section of the band area into the main stage carts to ensure a seamless match in curvature," says Joey Brennan, technical design and development manager at All Access.

The stage was lined in LED tape, providing extra color accents. "We had three runs of tape on the top and two runs on the side in RBGW and it looked fantastic," Eastland says. "We tried something new this year, really building it out and not just having a 1.5" line; we wanted something much bolder and my guys in the shop did a beautiful job with it."

An array of surfaces was incorporated into the set pieces. The main stage, wing stages, and ramps were outfitted with Yes Tech video tiles featuring a 3.9mm pixel pitch. The band area used custom grated decks to accommodate fog machines and lighting effects.

Yes Tech tiles were chosen, says Michael Spencer, of Fuse TG, the video gear supplier, because, "In the early design stages, they wanted to get the width of the carts maxed out, and we needed a 500mm tile for that." Also, he notes, the Yes Tech tile is designed to hold up well even under the pressure of roller skates.

"Ensuring all surfaces were roller skate-friendly presented numerous opportunities for creative problem-solving," says Tommy Rose lead project coordinator, All Access. "From Plexiglas to Lexan, grating to carpet, aluminum to wood, and even dance floors, we had it all. Each surface varied in thickness, requiring meticulous calibration and rigorous testing prior to installation." (Eastland notes that the stage "had to be constantly cleaned because the skates scuffed it up so much.") Also, dancer poles were integrated into the ramps, a feature that required careful engineering to accommodate their slope. All Access also supplied the lighting carts that were positioned around the field perimeter; the total cart count was 29. Jason Rudolph, the screens tech, says that the images, which were produced by Tom Colbourne and his team at Blink Inc., were delivered using ten disguise vx 4+ servers, two



"We really wanted to showcase the breadth of Usher's career," Halpin says. "We also wanted to reference the incredible run he just had in Vegas." Hence the addition of showgirls, acrobats, and performers from Cirque du Soleil.

Photo: Tom Donoghue



Lil John performs surrounded by an army of fans. Gurdon's lighting included the deployment of saturated reds and blues that added much to the show's atmosphere.

Analog Way Aquilon C+ processors, and a Ross Video Ultrix advanced routing system, controlled by two grandMA3 light consoles. ("This year," he says, "we were in a mixed format setup; part of the processing we had to deal with was HDR and some was SDR. We also had to incorporate SDR and HDR sources to go to those mixed destinations. This is where the Aquilon was a really robust solution for us.")

To transport the carts through the stadium and onto the elevated field, All Access added an extension to the stadium's ramp to accommodate the width of the carts and crew. The ramp's abrupt transition was addressed by modifying the slope into the stadium.

"All Access and I worked closely to get the stage built," Spencer says. "I went out to the shop a few times, looking at what they were doing, making sure it got integrated correctly. It was the Super Bowl: We didn't have a lot of time for troubleshooting. We needed access to the tile and we needed to have the cable in a certain way. We are friends with a lot of the All Access guys and we worked closely on getting this thing executed."

### Scenic effects

ShowFX provided many of the key scenic effects. First came Usher's throne, located at the north end of the stadium. The unit's sharply pointed outline, says David Mendoza, ShowFX president, "was mainly made of EPS foam, which was CNC-milled on our five-axis Kuka robotic router from the 3D file provided to us by [designer] Vincent Richards. The foam shape was fitted over a steel frame for structural integrity and the faceted surfaces were laminated with black acrylic and mirrored aluminum. Lastly, LED tape was mounted in aluminum channels and covered with meticulously mitered plastic diffusion strips. All the wiring was routed to the back side, where the decoders and power supplies were tucked away." The throne required 500' of Environmental Lights RGB Precision Pixel tape, with 45 universes of control.

Although one might imagine that getting the throne's unusual shape would be tough to achieve, Mendoza says, "It was less of a challenge to create than the hours and hours of soldering required to integrate the LED lighting."

Regarding the eye-catching red piano for Alicia Keys, Mendoza says, "The pedestal was also CNC-milled from

solid blocks of foam and then fitted with an internal aluminum frame, with an air caster system that enabled the unit to lift, maneuvering on and offstage; it then dropped down for the performance. The piano's upper body was a carpenter-built plywood box made to house an 88-key Yamaha electronic keyboard. The piano came with weighted keys, a requirement of the artist. The interior was detailed with a foamcore-replicated harp, complete with 88 strings to complete the realistic look. The wood and foam pieces were assembled onto the aluminum frame, hard-coated, and then blended and body-worked prior to the automotive paint finish application."

One of the show's most talked-about moments was Keys' enormous, flowing red cape, which seemingly detached by itself, flying off. "Alicia wanted something special and really gravitated to this idea," Rodgers says. "I came up with the cape idea and presented it to ROC NATION, who manages Alicia," Jones adds. "Then, Vincent Richards, master puppeteer Michael Curry, Baz, field team coordinator KP Terry, and our costume designer Tanja Caldwell worked to pull off what we called 'a fabric of love.' The piano design was made to feel as though it flowed almost seamlessly into the dress. The cape detached at the right moment to reveal a sexier look underneath. Silent House helped design the piano and sourced the silk; Tanja brought in Dolce & Gabbana to design Alicia's look." Rodgers adds, "Michael Curry and his studio created the silk effect using puppeteer handlers sourced by KP Terry, who had similar experiences working with Michael at the Salt Lake Winter Olympic Ceremonies [in 2002]."

## Lighting

Lighting designer Al Gurdon says the event comes with certain issues built in. "Every stadium has its challenges, given the need for the halftime show to fit in entirely with the needs of the game," he says. "What this usually means in practice is a restriction on the number and type of lighting structures and fixtures because of the need for very rapid deployment and limited weight. Inevitably, there is a significant trade-off between what I would ideally want and what is possible to deploy, logistically. This tends to push the design into familiar patterns and procedures; the challenge for me is to work within these but bring something new to the show."

Ben Green, one of the production's lighting directors, adds, "There's always a strong desire to have less 'stuff' on the field, whether it's carts, equipment, or people. In some ways, I invite this challenge as the more equipment we can install 'permanently,' the less we have to plug in at halftime. Some of our best opportunities are places where we can custom-build brackets to hold pipes or lights. A major success, with credit to Bruce Rodgers for helping brainstorm the idea, was having the vertical [GLP impres-

sion] X Bars along the audience handrails, for which we built slick black brackets to hold them without obstructing any views in the expensive seats."

Eric Marchwinski, one of the show's lighting programmers, says, "One of the great advantages, which we haven't had for years, was the ability to hang fixtures above the field." Unlike many US stadiums, he adds, "The roof system is a cable-net roof structure that you can rig from. This allowed us to put fixtures in places where we typically haven't been able to. Usually, we're out on the edges of the seating, hanging from the building's structure, but here we had multiple trusses overhead. This provided the opportunity to light dancers and other performers from more appropriate angles. This became quite evident in the way the cast was lit, particularly in the north end zone, where the show started. This also allowed us to hang the PixMob moving head fixtures in the most ideal place in the stadium for audience-based effects; directly over the center of the field."

Alen Sisul, the production's gaffer, says, "We used a custom bracket, which the rigger designed with 4Wall. The brackets hung off of the knee wall between the glass panels on suite level two. A double run of schedule 40 pipe was attached to these brackets, the lights hung on the inner (to the stadium bowl) pipe, and then cables rested on safeties that were slung from pipe to pipe, which created a cradle for the cable looms. All the fixtures were hung off ladders from the suite level below this." He adds, "On a north field level bar/suite area, we reused some brackets that were made for State Farm Stadium at last year's show, similar to the suite level two setup."

In terms of networking the system, Sisul says, "Van Wagner, who runs most of our show's fiber as well as broadcast for the game, actually ran all fiber through media panels, using the stadium's dry lines to get from location to location. This was a first for us on this show. I prefer to run hardline fiber without breaks whenever possible; however, there were not any good cable paths in the stadium and the cost to core-drill new holes everywhere was going to be rather prohibitive."

Gurdon responded to the music and staging with highly kinetic cueing, striking laser effects, and pools of saturated color, some of which spread across the entire field. The lighting rig, supplied by PRG, included 161 Vari-Lite VL3600 Profiles, 84 GLP Impression X4 Bar 20s, 44 Robe ROBIN 1200 LEDWash units, 80 PRG Icon Edges, 49 PixMob Wash fixtures, 32 Acme Pixel Lines IPs, 18 PRG Best Boy Ground Control Long Throws, 15 Robe Spikies, six PixMob Moving Heads, eight Ayrton Diablo 6 units, and one TMB Solaris Flare. Effects gear included six MDG theONEs, six Reel-EFX Df-50 Diffusion hazers, and six Reel-EFX fans.

Breaking down the rig, Green describes the VL3600s as the workhorse units. "They're bright, stadium-sized fixtures



"Usher used a Crown CM311 headset with a Shure AXT100 belt pack, before switching to a Shure ADX2FD transmitter with a new, patented Shure microphone technology capsule, and then back again to the Crown CM311," Stuckey says.

that can do it all. This year, our trim heights were 130'-plus, which, in many cases, pushed our throw distances over 200'. We needed something that could light the dancers, talent, and grass, and these were up for the task." The Diablo, he says, "is a favorite for being a profile unit in the size and weight that it is, which was the decision-maker; they lived in the stage on those cute pop-up shelves, a clever idea thanks to Tommy Rose at All Access. Given their location around the main stage, these lights wore a lot of hats, including dancer cross-light and background flare." The ROBIN 1200s "were great for color base around the stadium and on the field. Being LED and having the ability to strobe added some dynamic candy."

The Icon Edges, Green says, "were our primary beam workhorses on the field, and, frankly, quite a bit more. Thanks to their feature set, they can light up the haze nicely with templates, or not, and provide some nice background accent." The Pixel Lines "helped pretty heavily at lighting the band cart. The great thing about them is their

wide beam spread, which helps in two ways: one, having a wide spread at such a short throw distance helped cover everyone on the cart, and two, the wide spread made a nice camera flare that could be caught from more than one angle." The Impression X4 Bar 20s "were a versatile option in a position where we had to keep a very low profile. The pixel, zoom, and tilt variability on these gave a lot of background options and cross-light for the opening segment."

Sisul notes, "A first for us was using PRG Best Boy Long Throw followspots, sitting on their bases in the audience, in place of Gladiators. AI wanted the ability to color-change and use gobos via control from the front of house. The operators were stationed right next to the fixtures using PRG's base stations." Harry Forster, who called followspots, says that, with the straightforward stage deck setup, "It was a little easier to pick the positions, although the sheer number of people and guests made it challenging. The way that Hamish shoots means we're looking northeast in one shot and next we're looking southeast,



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The photo above shows the relationship between the throne, where the show began, and stage, where most of it played out.

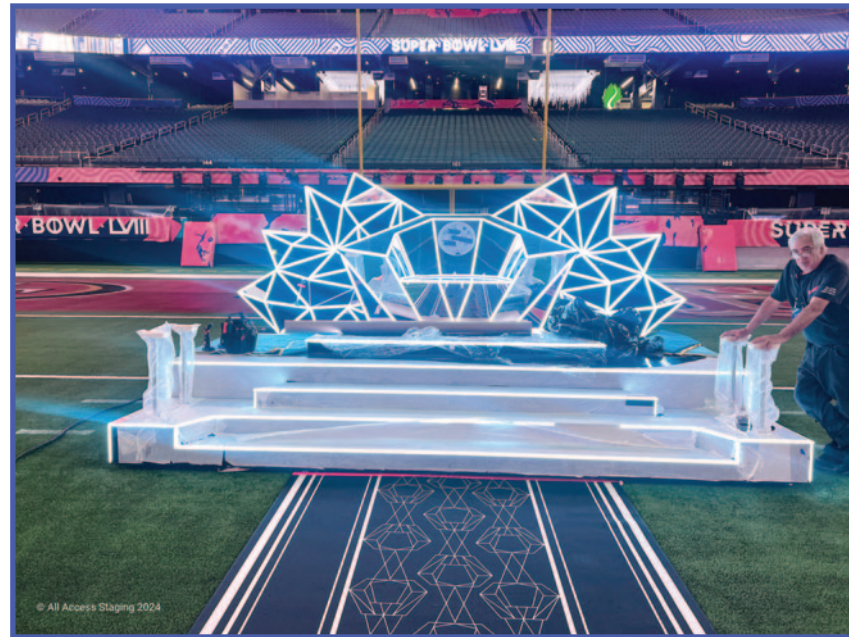
and it all needs to be perfectly choreographed, with steadies going in and out to avoid shadows and stuff like that.”

In addition to the PixMob units mentioned above, the company deployed 3,000 of its X4 wristbands on the performers and 60,000 LED badges on the spectators. According to Jean-Olivier Dalphond, PixMob CCO and partner, the LED Badge is “an RGB LED that is brighter than a person’s smartphone.” The ultra-bright product was chosen “because the show could have happened at sunset.” He adds, “The crowd at the Super Bowl loved it; it looks like a credential.” Control of the badges and wristbands, he adds, involves “infrared lights, just like your remote control. So, instead of changing the channel from two to three, it changes the color from red to green. It’s a very robust, simple technology that creates very advanced effects. It also has the advantage of using no radio frequency,” thus staying out of an already-crowded RF environment.

Control of lighting, lasers, atmosphere, and some special effects was handled by a complete grandMA3 system, consisting of three MA lighting grandMA3 full-size, four grandMA3 NPUs, and one grandMA3 light, all running grandMA3 software. Marchwinski and his design support services firm Earlybird have been early adopters of the grandMA3 platform. “We have been using the software on every show for two-and-a-half years now, since the fall of 2021. The software has been continually improving with every release, and we are diligently working to help contribute to its improvement while helping other colleagues make the transition from grandMA2,” he says. “We whole-

heartedly believe it is a huge improvement and a progressive step forward from grandMA2. There are some very brilliant concepts that MA Lighting has come up with, allowing for many things that were simply not possible on grandMA2. It’s an innovative way of thinking, and certainly the future of lighting control in many facets of the entertainment industry.

“We used a few of these new features on this year’s halftime show that we hadn’t used last year,” he continues. “One of the most interesting features was the native support of NDI video on grandMA3. During the three camera rehearsal nights, Mark Humphrey [who programmed alongside Marchwinski] remained up at the front of house, which is very high up and offstage right in the stadium, looking down at the field. I was set up at a remote programming position in the 100 level on the 50-yard line. These two positions gave us two unique vantage points, which helped us quickly deal with focusing, notes, and updates, although were very physically far apart. After a



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rehearsal pass, I could open the video from the last take on my laptop and play back the show inclusive of time code from this video. NDI allowed the output of my laptop to appear on Mark’s external monitor up at his front-of-house position and thus allowed us to collaborate on the notes quickly, with a shared playback image we could analyze together. We found this to be an incredibly helpful feature to bridge the large physical gap we had between us while working. Who would ever think a lighting console would need video input?!”

Also, Marchwinski says, given the unique amount of LED tape on the throne mentioned above, “grandMA3 groups understand the physical arrangement of the pixels to each other, allowing the user to think about running effects or timings on X, Y, or Z axes. The throne that Usher was revealed on had pixel tape arranged in all three axes, allowing us to utilize the selection grid in three dimensions. Alex Fasciolo, a previz technician from Earlybird, wrote a plug-in that took in all the physical locations of the pixels and put them into the selection grid. It’s a tedious process because there are about 8,000 pixels you’re selecting. The script that Alex wrote arranges these pixels in the selection grid according to their physical arrangement on the throne. With this, I could take a 3D grid group and apply timings vertically, horizontally, or front to back, using the depth of the actual set piece.”

Turning to the PixMob elements, Marchwinski says, “We love the PixMob team and their products. We’ve been programming their products for seven years and have been very fortunate to have been able to program some of their most innovative solutions. The MH1 Moving Head product allows for some beautifully organic effects that are locationally based, without needing complex pre-programming or distribution of pixels. It is a truly ‘active’ system, where you can ‘paint with light that you can’t see’ (infrared). PixMob this year was more visible than ever before, and crucial to filling camera backgrounds with musicality and energy no matter where the camera was pointing.”

In response to a comment that his style adapted well to Usher’s music, Gurdon says, “I am a strong believer that lighting does not exist in a vacuum, and there is no single ‘correct’ way of doing things. Of course, I have an opinion and, I hope, a bit of taste, but I place a lot more importance on something looking visually coherent and cohesive, rather than it being in red, blue, green, or whatever. So, the lighting, the screens, and the costumes all need to feel like they are coming from the same idea, and not fighting each other. Or they are all subservient to a controlling idea. For example, ‘Yeah!’, the final song, was heavily influenced by the look of the original promo video, in its color palette and its use of lasers.”

### Special effects

The special effects firm Pyrotecnico contributed to the production on several fronts. For starters, Kvant BeamBrush lasers were deployed in high and low positions. “They were looking to create what I called the yellow brick road, a kind of electric carpet,” says COO Bob Ross, about the units placed close to the feet. The kinetic laser effects provided a burst of energy and highlighted the star’s intricate dance moves. Ross adds, “We also had lasers projecting down on the main stage from the song, ‘Yeah!’” The lasers were run using Pyrotecnico’s software, with a link to the lighting board provided by time code.

Ross notes that his team worked closely with Marchwinski during programming to ensure all elements worked harmoniously.

Also featured was an impressive bank of fog provided by Master FX Atlas units. “We had them lined up across a 40’ span for H.E.R.’s entrance,” Ross says. “The nice thing about those products is they don’t have heavy tanks to weigh down the field carts.” Rocco Vitale, creative director, at Pyrotecnico, adds, “We also know that, even though we were in the stadium, humidity would be a factor.” Ross says, “They required testing, to ensure the fog would dissipate quickly enough, which it did. There was a nice full plume when she came running through.”

And then there were the Usher Bucks, imitation dollar bills emblazoned with the star’s image, which were shot out of confetti cannons at the finale. “We had 24 [MagicFX] STADIUMSHOTs up on the catwalks, 360° around the stadium,” Ross says. “We had to do testing for the NFL, to make sure the Usher Bucks wouldn’t land on the field. We had to ensure that our pressures were accurate to the amount of product we were shooting, so we didn’t push it too far.” Vitale, noting the Pyrotecnico had the Usher Bucks manufactured to the design team’s specifications, says, laughing, “Everyone has piles of them on their desk. I have about four grand here.”

### Sound

Last year, at State Farm Stadium, the NFL ruled out the use of audio carts on the field, the standard Super Bowl method going back many years. As a result, the entire loudspeaker rig had to be hung. This was the case again this year. Going with what worked well in 2023, Kirk Powell opted again to use an L-Acoustics system. The rig included 212 K2 three-way active 12” boxes flown from the stadium’s roof plus 16 K1 long-throw boxes and 48 KS28 subs, which were also flown. An additional 16 Cohesion CP218 subs were placed on the field. Hanging the rig, Powell says, “didn’t create too many challenges. But the cable runs are so long and there’s lots of truss and all that.”

The production had the benefit of an all-digital audio signal path with an extensive Dante-networked audio infrastructure featuring components from Focusrite’s RedNet range of Dante-networked audio converters and interfaces.

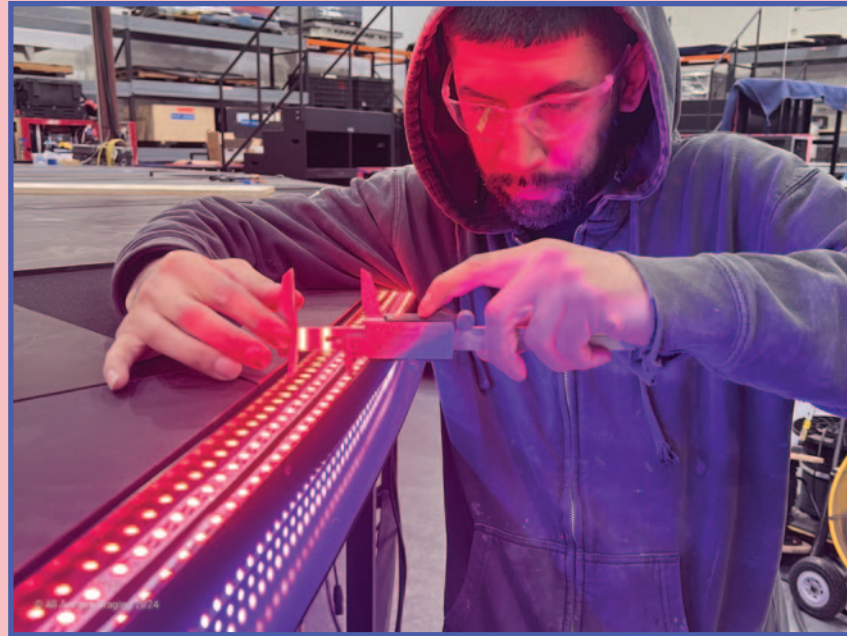
“This is our ninth year using Focusrite RedNet with our Dante Audio-over IP network at the Super Bowl,” Powell says. “This year, we are employing over 100 RedNet units, which is the largest Focusrite setup used on a Super Bowl to date.” (It’s important to note that ATK was responsible for all the audio in the stadium, including the pre-game performances by Reba McEntire, who performed the national anthem; Post Malone; and Andra Day, as well as the half-time show and announcements throughout the game).

The Focusrite gear setup included 25 RedNet D16R

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MkII 16-channel AES3 I/Os; 35 RedNet A16R MkII 16-channel analog I/O interfaces; 25 RedNet D64R 64-channel MADI bridges; 12 RedNet MP8R eight-channel remote-controlled mic pres with dual PSUs; and eight RedNet AM2 stereo audio monitoring units, for a total of 105 RedNet units.

The A16R units facilitated connectivity across various interfaces managed by the venue and other parties, while D16R units were linked with amplifiers. RedNet D64R MADI bridges were utilized to connect with consoles and broadcast trucks. For clock management, the RedNet D64R offered a generous channel capacity with the ability to convert sample rates across different audio systems at a multitrack level, ensuring seamless inter-system audio transfer and sharing without relying on a common master reference clock. “The production truck operates on a separate clock since they’re not in use all day,” Powell says. “The D64R enabled me to separate the clock between my system and the production truck, especially as they



An All Access staffer installing LED tape along the stage's perimeter.



One of the satellite stages was lined with Robe Spikies.

wrapped up after halftime. As they began to dismantle, I preferred not to be synchronized to their clock to avoid any premature shutdowns. We also used the D16Rs and A16Rs because we were doing analog backup as the interface for the system's amplifiers.”

Putting on the Super Bowl in Las Vegas' jam-packed RF environment was no easy matter, so, as a matter of course, lead RF engineer Cameron Stuckey went with the Shure Axient Digital Wireless Microphone System. “ATK Audiotek and Professional Wireless Systems (PWS) handled all wire-

less microphones and IEM systems for the pre-game entertainment, halftime entertainment, and referees,” he notes.

“This show had six guest vocals, a guitar, and Usher using both a headset and handheld microphone,” Stuckey says. “That’s the largest number of wireless mics I’ve ever had on a halftime show. But we can’t call that unusual anymore because we’ve been building to this point for a few years: Coldplay in Santa Clara, JLo and Shakira in Miami, and Dre in Los Angeles. They all added a little more RF. In terms of RF resources, the halftime shows keep adding more and more, and I find that exciting.”

The stadium posed additional complications, Stuckey notes: “Like SoFi Stadium in Los Angeles, Allegiant’s street level is the concourse level at the top of the lower seating section. This puts the field and halftime stage below grade, and there aren’t many RF blockers better than two stories of dirt. The shadow created by the landscaping around the stadium is a treat. Frequencies that are unusable just outside the stadium in the parking lot are excellent frequencies to use on the field. The demand for spectrum at the Super Bowl is so high that often a single frequency will be assigned to multiple users relying on time-sharing or spatial differences to avoid interference.”

The mic lineup was as follows, Stuckey says: “Usher used a Crown CM311 headset with a Shure AXT100 belt pack, before switching to a Shure ADX2FD transmitter with a new, patented Shure microphone technology capsule, and then back again to the Crown CM311. Alicia Keys used the new Neumann KK 105 U capsule on an ADX2 transmitter. H.E.R. used a new Shure headset with Shure AXT100 transmitter, with another AXT100 on the guitar.

Jermaine Dupri, will.i.am, Lil John, and Ludacris all used the same new, patented Shure microphone technology capsule as Usher, with Shure ADX2 transmitters.”

### The Quadversity factor

The RF team depended on ten AD4Q four-channel digital wireless receivers, an AD600 Axient digital spectrum manager, and two AXT400 Axient dual-channel receivers. The key feature of the Axient Digital AD4Q is Quadversity, a patented Shure technology, leveraging four simultaneous RF inputs to feed a single RF channel.

Regarding Quadversity, Stuckey says, “Every other professional wireless microphone on the market today utilizes antenna diversity; two independent antennas receive the transmitter’s signal. This applies to both analog and digital mics with true diversity. Analog wireless mics with true diversity have two independent antennas, two independent receiver circuits, and two independent audio demodulators. Inside a typical two-channel rack-mount receiver are four receiver circuits, two for channel one and two for channel two. The rack-mount receiver compares the audio signal from Circuit A and the audio signal from Circuit B to choose the best audio signal to send out the audio output. Some analog systems will even blend together the two audio signals rather than choose one outright.

“Digital RF works in a similar way but, instead of an analog audio demodulator, there is a digital conversion and data streams are created rather than audio signals in the rack-mount receiver. Axient Digital, in diversity mode, has two independent antenna circuits per RF channel and the rack-mount receiver creates a data stream from the two circuits to send to the output (Dante, AES3, or analog XLR).

“True diversity is crucial for wireless mics because signal loss from multipath inference is unavoidable. The destructive interference from multiple signals arriving at the receiver with different phases is what leads to dropouts. And the odds of having multipath interference at two properly deployed antennas simultaneously is low, but they’re not zero.

“Quadversity is a brilliant solution to multipath interference. For each channel of RF, it utilizes four independent antennas for four independent receiver circuits, creating four independent data streams to compare. But the system is even more robust than the doubling in data streams to choose from. In Quadversity, the rack-mount receiver will combine data streams for error correction and synthesize a single ideal data stream. The odds of having four antennas experience multipath interference simultaneously is significantly lower than the already low odds with two antennas, but to add a layer of error detection and correction on top gets a chef’s kiss.

“When using an ADX2FD transmitter like we did for Usher and Reba, two independent RF signals are coming

## Apple Music Super Bowl Halftime Show LVIII

Creative Director/Production Designer: Bruce Rodgers  
Executive Producers: Jesse Collins, Roger Goodell, Desiree Perez  
Co-Executive Producers: Dionne Harmon, Dave Meyers  
Executive Producer/Director: Shawn Carter  
Producer/Director: Hamish Hamilton  
Associate Director: Hayley Collett  
Lead Stage Manager: Gary Natoli  
Supervising Producer: Aaron Cooke  
Field Creative Producer: Kristen Patterson “KP” Terry  
NFL Head of Music: Seth Dudowsky  
Director of Photography: Dylan Sanford  
Art Director: Shelley Rodgers  
Assistant Art Directors: Lindsey Breslauer, Maria Garcia, Lily Rodgers  
Art Department Assistant: Regan Eastland  
Staging Fab Design: Erik Eastland, Tommy Rose  
Lighting Designer: Al Gurdon  
Lighting Directors: Ben Green, Harry Forster  
Lighting Directors/Programmers: Mark Humphrey, Eric Marchwinski  
Lighting System Tech: Jonathan Martin  
Previz Tech: Alex Fasciolo  
Gaffer: Alen Sisul  
Staging Supervisors: Tony Hauser, Cap Spence, Doug Cook  
Field Team Managers: Bryan Ransom, Holly Silber  
FTM Coordinator: Roma Ramchandani  
Creative Director: Aakomon Jones  
Show Designer/Producer: Baz Halpin  
Designer: Vincent Richards  
Costume Designer/Artist: Tanja Caldwell  
Costume Supervisor/Artist: Shay’La Jackson-Banks  
Management: Ronald Lafitte, Larry Tull  
Business Partner/Consultant: Johnta Austin  
Tour/Logistics Manager: Michael “Huggy” Carter  
Engineer-in-Charge: Kirk Powell  
Broadcast Mixer: Tom Holmes  
Front-or-House Mixer: Alex Guessard  
Entertainment Front-of-House Music Mixer: Dave Natale  
Monitor Mixer: Tom Pesa  
Lead RF Engineer: Cameron Stuckey  
RF Techs: Gary Trenda, Kasey Gchachu  
RF Team Lead: Loren Sherman  
Production Manager: Robert “Hydro” Mullin  
Production Coordinator: Christine Mullin  
Choreographers: Cornithea “Rio” Henderson, Mukhtar O Mukhtar  
Assistant Choreographer: Amy Allen  
Screens Content Creation: Tom Colbourne  
Screens Producers: Richard Cullen, Drew Findley, Jason Rudolph

### Vendors

Diversified Production Services  
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All Access Staging  
C2W Rigging  
Fuse TG  
PixMob  
Pyrotecnico  
PRG  
Michael Curry Design  
Icon Imaging  
ATK Audio  
Blink Video Content

# SPECTACLE

from the transmitter. Those two RF signals each hit four antennas and four independent receiver circuits to create a total of eight data streams that the rack-mount receiver has to select from and synthesize a single data stream.

“So for the most important moments, of the largest show of the year, the best tool to use is obvious to me. A lot of very unlikely events have to go wrong for a drop-out to occur when operating in Quadiversity. [RF Techs] Gary Trendera, Kasey Gchachu, and I have spent years ironing out the failure points. It feels like everyone on Earth watches the halftime show and although we are a small team within a gigantic production, every vocal mic comes through us. We don’t take anything for granted.”

## Monitors

On the in-ear front, Tom Pesa, monitor mixer, says, “The standard is Shure’s PSM 1000 for ears and, from a sound standpoint, nobody argues about how good they sound and how widely used they are. That acceptance allows our audio team to not worry about trying to make some other products work. The programming capability allows for quick preparation for some of the first rehearsals on the field as almost 80 in-ear receiver packs are used among principal performers, the band, and large core dance groups. Also, as always, cue mode saves the day when quickly bringing a

mix to a pack for a choreographer, guest engineer, or producer to hear what any particular artist is hearing.

“Topping it all off in monitor world was the utilization of Wireless Workbench to constantly monitor wireless in-ears as well as all of the Shure microphones to gauge metering, RF status, and an array of other details since the actual RF equipment lives and is managed by the RF team away from monitor mix.”

For consoles, Powell says, “We had two DiGiCo Quantum 338 consoles at the front of house, with two DiGiCo SD5 Quantums on monitors, and, for our front-of-house stadium mix, a [Yamaha Rivage] PM3.”

## Conclusion

When all is said and done, the entire team delivered another knockout show, nimbly turning challenges into opportunities and providing Usher with a stunning showcase. As Rodgers notes, “It was another 13-minute show where we were on the field in 07:14.86 and off in 06:15.68 on my clock and the unharmed grass survived the second half of the big game, which made the NFL happy. This halftime show played to an audience of over 200 million worldwide—a record for all the Super Bowl games!” Next year, the Super Bowl moves to New Orleans for a fresh set of challenges. 📶