



Sound Developments at the 57th Grammy Awards

By: Mel Lambert

“Music’s Biggest Night” poses RF challenges while fiber-optic links come of age

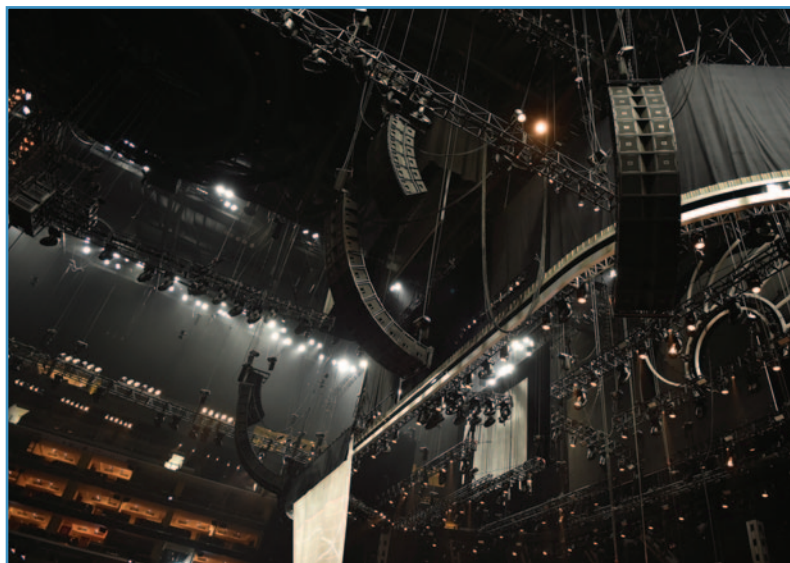
Producing audio for the 57th annual Grammy Awards Ceremony—for both the live audience within the cavernous Staples Center in downtown Los Angeles and the millions watching around the world in 5.1-channel surround—is an increasingly complex process, and one that requires a great deal of careful planning and attention to detail. Hosted for the fourth time by LL Cool J, “Music’s Biggest Night” was telecast live by CBS Television on February 8, drawing an estimated 25.3 million US viewers who saw British soul singer Sam Smith grab four Grammy awards, including Record of the Year for his hit “Stay with Me;” he also secured Song of the Year, Best New Artist, and Best Pop Vocal Album.

According to Michael Abbott, the Grammy broadcast’s

audio director/coordinator, “This was probably the most ambitious show we have ever attempted. We had a total of 23 live acts—last year, there were 20—with a running time that started on paper at three hours and 40 minutes,” but on the night ran closer to four. “We have several choirs and string sections—plus lots of scenic designs and lighting elements—along with six performances on the central ‘satellite dish.’ Usually, the dish performers are solo artists, but this year we had several bands that required extra



Common performing “Glory.”



JBL Professional VerTec PA supplied by ATK Audiotek.

connectivity to that area. As a result, this element also created cross-patching of audio paths that needed to be highly coordinated; it was a very dynamic environment backstage that changed hour-to-hour.” Patching was provided to five destinations: the front-of-house mix position, two monitor mixers for the A and B Stages, broadcast truck, and a pair of music-mixing mobile trucks.

“There were a total of 56 mixer/technicians on the audio staff—up by four or five people compared with last year—plus another 24 from IATSE Local 33,” Abbott continues. “We had a meeting with the entire team to address the flow of performances. We used RF transmitters for our choir mics to quickly deploy them during set changes, using eight ATK Audiotek hybrid power units that supplied phantom power to the AKG C414 mics. Soundtronics Wireless provided its Phoenix phased-array antenna system and coordinated all on- and off-site RF use.”

Wireless coordination within a crowded RF spectrum

Once again, the highly experienced Dave Bellamy, from Soundtronics Wireless, handled wireless-frequency planning and oversaw coordination, working with RF assistant Grant Greene. “Accommodating an increased number of wireless mics, guitar/bass belt packs, and IEMs for the 23 Grammy acts was very demanding,” Bellamy states. “We now have a

narrower RF spectrum that needs to be carefully managed. Starting with a spectrum analysis and computer-based frequency coordination, we worked out how much room we had to work with in each frequency band. Then we budgeted that space, as necessary. Using IAS [Intermodulation Analysis System] software, we found what room we had for

use our frequencies. They just came walking in!”

Because of this year’s complex set designs, Bellamy had fewer RF antennas in the high steel, and more below the deck. “There was no space above the stages to mount our normal Widowmakers,” he says. “Instead, we had eight Sennheiser A5000 antennas at different locations under the



Ed Sheeran.



The front-of-house production mixer, Mikael Stewart.

all our wireless systems. Because the FCC would not allow us to renew our temporary license since this year, we lost 12MHz of available bandwidth; all told, we had 56 channels in the UHF spectrum.

“We wanted to avoid the situation where we had to take a mic from one artist and give it to another artist, but didn’t have enough time to accomplish that changeover efficiently—hence my ‘war board,’ so that everybody involved could see the show flow. Sometimes we had to change microphone capsules; sometimes we had to change the companding DSP—all of which takes time. Ideally, everybody would have their own microphone and be the only person to use that frequency. But in the *real* world that’s impossible. Sometimes the same mic might get used up to six times! RF transmitters with a wider frequency tuning range offer a lot of extra flexibility—we had 20 choir mics on wireless this year. While AC/DC used our RF mics, Madonna bought her own system, including a monitor console with integral special effects; she also needed five wireless-mic frequencies and seven IEM frequencies.

“During rehearsals, [we encountered] the occasional rogue microphone—we just shut them off! Only people directly involved with the show were allowed to use RF devices. Several ENG [electronic news gathering] crews turned up with RF mics and we turned them off because they were causing interference and weren’t authorized to

stage platform, plus our normal 12 Dominators and six Sidewinders at several high-steel locations out in the house, some 115’ off the ground. We also added antennas beneath the camera platform for the IEM used by performers on the central satellite stage.”

Bellamy started experimenting with different under-stage configurations for mid-April’s Academy of Country Music Awards at the AT&T Stadium in Arlington, Texas. “There was no other way to make it work,” he recalls. “Because of restricted space under most stages, we needed a smaller design that we could tuck up under the decking—hence our decision to go with the compact A5000 antennas. We also redesigned the filters so that each antenna could cover a wider frequency range. We lost some gain when we did that, but we got it back because of the closer proximity.”

“Because there was so much steel up in the air making it difficult to find sight lines for his antennas,” Abbott concludes, “what Dave Bellamy did this year with his systems arrayed below the stage was a novel approach, but made perfect sense.”

Flown line-array system with augmented subwoofers

For the event’s live audience of nearly 20,000 within the Staples Center, ATK Audiotek once again supplied the familiar four identical hangs of 12 JBL VerTec VT4889 line-array



Members of the 2015 Grammy Awards' audio team. From left/top row: Andrew "Fletch" Fletcher, FOH system engineer; Mikael Stewart, FOH production mixer; Maureen Droney, Producer & Engineers Wing managing director; Ron Reaves, FOH music mixer. Bottom row: Mark Linnet, M3 offline remix truck engineer-in-charge; Eric Schilling, co-broadcast music mixer; and Glenn Lorbecki, Grammy Award telecast supervisor of broadcast audio.

cabinets plus a delay ring, and 16 VerTec VT4880A subwoofer arrays flown above the stage. "This year, because of the rigging Madonna required for her aerial system used at the conclusion of her performance, we split the normal central cluster of JBL subwoofers," explains Andrew "Fletch" Fletcher, PA system technician. "They were divided into two 8-box arrays hung either side of the inner pairs of line-array cabinets." The delay system comprised two 8-box clusters of JBL VerTec 4889 cabinets and Powersoft amps supplied by ATK, which augmented the Staples Center's single center delay cluster of VerTec VT4889DP-DA cabinets. A total of 12 ATK C6 cabinets covered the side seating areas.

"We also added a second pair of custom cabinets based on Powersoft Audio's M-Force 30" subwoofer technology," states Jeff Peterson, ATK system-design engineer. "We had planned to use four last year, mounted beneath the center of the A and B Stages, but reduced that count when the staging

started to rattle! This year, we solved that problem and used a total of four of the short transmission-line cabinets, which measure 4' deep by 4' by 3' wide; they extend the PA rig's overall frequency response by an octave." Each cabinet was powered by a single channel of Powersoft's proprietary K10 switch-mode amplification, delivering 9kW into a 1.5-ohm impedance. Powersoft's Armonia software handled all signal processing, system EQ, and delay for the LF array, which is reported to extend down to 17Hz. Armonia also offered remote control and monitoring of the Powersoft amplifiers driving the JBL flown arrays.

DiGiCo SD Series digital consoles once again handled front-of-house mixing chores. ATK VP of special events Mikael Stewart helmed an SD10 for production sound, while Grammy regular Ron Reaves handled music on an SD7 fitted with a redundant DSP engine. Tom Pesa and Michael Parker returned to mix monitors on the A and B Stages, respectively, also using SD7 consoles with

redundant engines. "Last year, I used an SD5 for production sound, but the SD10 is just as useful," Stewart states. "The SD7 is a perfect choice for this type of assignment," adds Reaves, "because of its full parameter recall for each act. I *don't* need another layer of complexity in what is already a complex gig. And the SD7 sounds great!" A DiGiCo Optocore fiber-optic ring connected all of the console control surfaces to their backstage processing and I/O racks. Academy P&E Wing member Leslie Ann Jones once again supervised the house audio.

While handling the A Stage monitor mix, Pesa recalls that his greatest challenge was accommodating the extra acts within the same rehearsal time. "This meant that the amount of work before each artist showed up was much more detailed," he says. "Based on relationships with guest engineers—including Paul Oakenfold, who handled Madonna's monitor mixes on a DiGiCo SD7 console [with an EX-007 expander]—and conversations in advance, I did more 'pre-dialing' of mixes. Paul was pretty much stand-alone, other than shipping a few mixes through my console.

"I started with general in-ear mixes based on who the performer was, and then added or subtracted items after conversations with their engineers. That way, when the band showed up there was much less work to do before my first pass at the song; we fine-tuned the mixes as the artist continued with multiple takes during camera rehearsals.

"My usual game plan was to program for each act, but not get too far ahead, since the Grammys is an ever-changing show; doing too much in advance can actually create more work when an act or performance changes. I have a good relationship with engineers such as James Berry with Beyoncé and Steve McCale with Beck, and set things up in advance. Beck performed with Future Sonics Atrio ear monitors; he doesn't use in-

ears very often, but the Atrios sounded great for him. The show demands a quiet stage environment, so the use of in-ears is preferred. I'm a big fan of Future Sonics and mixed the entire show on their mg6pro IEMs.

"For the Grammys, the SD7 was a perfect fit. The amount of dynamics available for each specific performance let me create very personal in-ear monitor mixes for each artist. The speed with which you can grab EQ, compression, effects, etc., made short work of the basic mix creation, and allowed more time to be spent on the fine details."

On the B Stage, Parker recalls that "we had to manage and build our rehearsal and live-show snapshots in a way that certain acts would start their performance with a 10-second intro into the next performance, which was *not* rehearsed in show order! For example, Ed Sheeran's solo performance was mixed from Stage B IEMs. At the end of his performance, he walked to the A Stage to perform with ELO, so Tom Pesa generated a stereo mix that I busbed to Ed's ears with no time to change anything but mute his band inputs. This was fairly easy to configure on my DiGiCo SD7 console, because of the Optocore network—all consoles could send and/or receive up to eight channels. At the end of ELO's performance, I muted Ed Sheeran's IEMs and opened Adam Levine and Gwen Stefani's IEMs—all within a single SD7 console snapshot."

Microphone choices from three primary vendors

Once again, Audio-Technica, Shure, and Sennheiser supplied a range of wired and RF microphones, plus IEM systems. Gwen Stefani used an Audio-Technica Artist Elite 5000 Series wireless with an AEW-T6100a hypercardioid handheld transmitter. The newly upgraded 5000 Series features dual-compressor circuitry that separately processes high and low frequencies. A proprietary IntelliScan offers a 996-

channel frequency scan, true diversity operation, and soft-touch controls.

Sennheiser systems were used by Ed Sheeran, Sam Smith, Beyoncé, Madonna, Tony Bennett, Annie Lennox, Miranda Lambert, and others. During his blockbuster "Thinking Out Loud," Sheeran opted for a Sennheiser SKM 2000/MD 9235 combination, while Beyoncé used a Sennheiser Digital 9000 wireless system while performing her powerful rendition of Thomas A. Dorsey's gospel hymn, "Take My Hand, Precious Lord." "For this particular performance," recalls Stephen Curtin, Beyoncé's front-of-house engineer, "she wanted to go for an old-school vibe of singing in a church. We had just used the Digital 9000 on Beyoncé and Jay Z's stadium tour, where it was rock-solid. Beyoncé's Grammy performance was in front of a PA system with SPLs reaching 100dB; we ran the vocals on top of all this without any issues."

"The audio was pure and clean, and represented her vocal better than any other microphone out there," says reg-

ular monitor engineer James Berry. "With the Digital 9000, you get out exactly what you put in; this translates to in-ear monitors, front-of-house mix, and the broadcast." Curtin adds, "Distortion is just something we have never experienced with the SKM 9000. With the digital HD transmission, you are not losing anything at all."

When Mary J. Blige joined Smith on-stage for "Stay With Me," the latter used a Sennheiser SKM 2000 handheld transmitter with an MMK 965 capsule, while Blige used her Sennheiser SKM 5200 transmitter with a Neumann KK 105S capsule. "I chose the 965 capsule for its extremely smooth response," states Smith's regular front-of-house mixer, Simon Thomas. "I needed a microphone that was going to be very sensitive in the quiet moments, yet could also take a good old spanking when we pushed it. I have no tolerance for RF interference, since our attention has to be on mixing the show. I've been using Sennheiser transmitters and receivers for over a year and a half now, and I can't



Wireless microphones in bread tins at the RF coordination area.

Fiber-optic connections for music-mixing trucks

In addition to using multi-mode MADI connections as backups from the backstage areas to its pair of mobiles, this year Mobile Music Mobile/M3 opted to use a proprietary single-mode fiber-optic connection for its main feed. “We were using a system from FiberPlex Technologies,” says M3 chief engineer/co-founder Joel Singer, “which comprised four FOI-6010 fiber-to-MADI workboxes in the [NEP Broadcasting’s Denali] Summit Truck [used for the final TV mix], from which two TAC 12 optical cables were deployed to our Horizon and Eclipse Trucks, with two TD-6010 workboxes at each of these positions for MADI-to-optical conversion. All the 6010s were populated with bi-directional MADI SFP breakouts. Everything performed flawlessly during the Grammy Awards.”

All rehearsals and the final 5.1-channel broadcast mixes were handled in M3’s Eclipse Truck, while the identically equipped Horizon Truck was used to refine mix automation from the Avid D-Control control surfaces connected to Pro Tools HDX mixing and DSP engines via Avid HD MADI I/O interfaces. In this way, the music-mix engineers, John Harris and Eric Schilling, could develop their Pro Tools sessions off-line with tracks recorded during rehearsals, and then use the result as a basis for the subsequent live-broadcast music mixes. The project also used remote-controlled Grace Design m802 and Aphex 1788A pre-amps with MADI-compatible A-to-D converters.

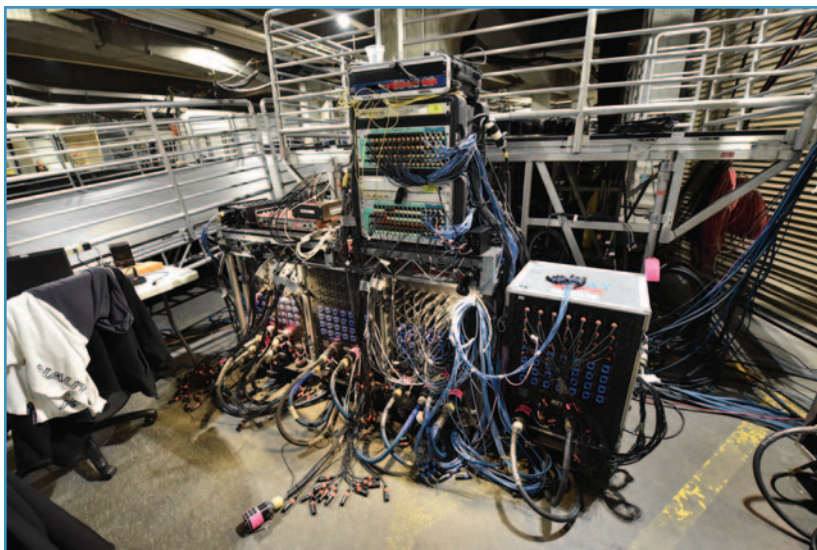
“When Mike Abbott and I first spoke about what methods we were using for MADI-to-MADI on single-mode

fiber, we decided that FiberPlex was the option,” Singer recalls. The FOI- and TD-6010 fiber-optic I/O units can be used with a variety of optical/electrical modules, depending on the chosen conversion transport medium.

Singer also used FiberPlex WDM-16 units to multiplex and transport signals from MADI-compatible backstage racks onto one single-mode TAC-12 fiber-optic strand to the M3 trucks. Then, to make the return from the music trucks to the Denali Summit truck, he selected FOI-6010 workboxes to pass MADI channels between the two locations. Previously, Singer sent the M3’s 5.1-channel music mixes to the broadcast truck using HD-SDI links. “But 3G-SDI products are specified for different electrical specifications; MADI has a completely different spec. We needed something like the 155Mbps optical and MADI links we ended up using in the FiberPlex units.”

To handle MADI feeds from stage racks, Singer was able to multiplex them through a WDM-16 unit, instead of running independent TAC-4 multimode fibers to each rack, as was the practice in previous years. “We converted signals from five racks into a WDM-16 at the pre-amp position,” Singer recalls, “with de-multiplexing in the music truck feeding a MADI router via our duplex pair of single-mode fiber-optic links.”

Such fiber-optic connections are the wave of the future for performance venues, Singer considers. “We recently covered the NBA All-Star Game’s music segments at Madison Square Garden, which has single-mode fiber connections throughout the venue. We simply ask for two strands of fiber, checked the path, and had all the multi-channel I/O we needed.”



Split world, where all audio from the stages was rerouted to the various destinations, including FOH, broadcast, and music-mixing tracks.

remember ever having a single RF issue.”

Madonna’s performance of “Living For Love” used a Sennheiser SKM 5200 transmitter with an MD 5005 capsule, along with a Sennheiser 2000 IEM wireless system. During “I Put a Spell On You,” Lennox sang through a Neumann KMS 105 wired condenser microphone, while Bennett and Lady Gaga opted for a Sennheiser SKM 5200 transmitter and Neumann KK 105 S capsule during their highlight “Cheek To Cheek” duo. Smokey Robinson, Miley Cyrus, LL Cool J, and others used Sennheiser SKM 5200 handheld transmitters both on and off stage, coupled with Neumann KK 105

S capsules.

Although many artists brought their own custom earphones, all but one of them opted to use Shure PSM 1000 IEMs, with 24 available channels being split across the two stages. The PSM 1000's diversity body-pack receiver is said to offer extra RF protection. A mixture of Shure Axient and UHF-R wireless-mic systems were used by such acts as AC/DC, who selected Axient for lead vocals and Angus Young's guitar, with backing vocals on UHF-R systems fitted with Beta 58A capsules. Paul McCartney also used an Axient handheld system with a Beta 58A, as did Juanes Beta, while Adam Levine opted for an SM58 capsule.

"We tried the Axient systems in

rehearsals and were very happy with the way they sounded on both guitars and vocals," says Paul "Pab" Boothroyd, front-of-house engineer for AC/DC and McCartney. Shure UHF-R systems were used by Tom Jones, John Mayer, Usher, Eric Church, Rihanna, and Common; podium microphones were powered by Shure UR1 body packs, eliminating the need to run cables across the stage. Hozier opted for Beta 58A wired mikes, while SM58s handled Brandy Clark's performance with Dwight Yoakam, plus backing vocals.

New this year were Shure Beta 181 microphones on acoustic pianos, a move suggested by front-of-house music mixer Reaves. "It's the best

piano sound ever," he states. "They were the only piano mics we used on the show." "After Ron tried them out on the Latin Grammy Awards," confirms broadcast music mixer Eric Schilling, "we both agreed to use the Beta 181 in all the pianos on this show. They have such a pleasing top-end and great [off-axis] rejection." 📶

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