The audio system was recently overhauled with ceiling mounted cluster speakers, new wireless equipment and a completely revamped audio backbone. This highlights the key changes for the team's awareness.

Architecture Changes

There are three key architectural changes made:

       1) added a mixer core

       2) implemented Dante network audio

       3) added a Digital Signal Processor

Settings & References:

- S:\Media {Working}\avteam\Audio Configs
  - \M32 CBC Settings.xlsx
  - \Audio Architect\CBC Auditorium.audioarchitect
  - \M32 Settings\
    - Snippets, Scenes
  - Dante Presets (i.e. CBC Service, Reaper Recored, etc)
  - Shure Presets – configuration file of our wireless quad recievers.

Audio Architect
Dante Presets
M32 Core Settings
M32 Settings
Shure Presets
M32 CBC Settings.xlsx

1) New Mixer Core

A Midas M32C is a 1U rackmount mixer core. Basically, it's the brain of our main Midas M32 mixer minus the control surface and I/O interfaces. We control it using the M32 Edit software. This mixer core off loads anything

No	Model	IP	Name
1	M32C	10.9.5.71	CBC's M32 Core
2	M32	10.9.5.70	CBC's M32

not required for house sound, thereby, freeing up inputs, buses and matrices for other uses. Currently, we offload live stream and any specialized mixes such as mono outputs and the listening system. This allowed us to dedicate the 2nd layer of the main mixer to unique monitor mixes. We added Stage L, Stage R, Piano, Orchestra monitor mixes & outputs to the existing Choir, Stage Center and Organ monitors. We also added a Monitor DCA which as the master monitor volume control. Increases in monitor volume using bus faders individually rather than the DCA.

Lastly, we switched from snippets to cues for stereo/mono source changes. Cues enable both a local snippet and a Midi command to trigger a companion snippet on the M32 Core, keeping the configuration of both mixers in sync. The audio operator will not need to worry about the M32 Core at all; however, the live stream mix still builds on the M32 mix.

Index	Cue List	Skip	Scenes	Snippets
1	WMP Stereo			00: WMP Stereo
2	WMP Mono			01: WMP Mono
3	Media Stereo			02: Media Stereo
4	Media Mono			03: Media Mono
5	RCA Stereo			04: RCA Stereo
6	RCA Mono			05: RCA Mono
7	CD Stereo			06: CD Stereo
8	CD Mono			07: CD Mono

The live stream operator will essentially see no difference in how they manage audio. The only difference is that the vMix audio input is via Dante now and shows up as its own input. You will no longer see audio on the Center camera.

2) Network Audio *Dante®*

Dante is a professional network audio transport standard. Every audio device on the network presents to the Dante Controller as a Source-to- Receiver matrix. To reroute audio, you simple click on the desired source channel for each receiver channel. The routing can be saved as presets and recalled at any time much like mixer scenes/snippets. You can also name each source/receiver. Once routing is set in the controller, the devices remember their setting; therefore, the Controller is only required to view the current routing or make changes. It does not need to be running for operation. Below is an example of the current routing in the Dante Controller for illustration.

    Note: This information is being provided as situational awareness as there is no reason to view or change the Dante routing during a service. Dante should remain static.
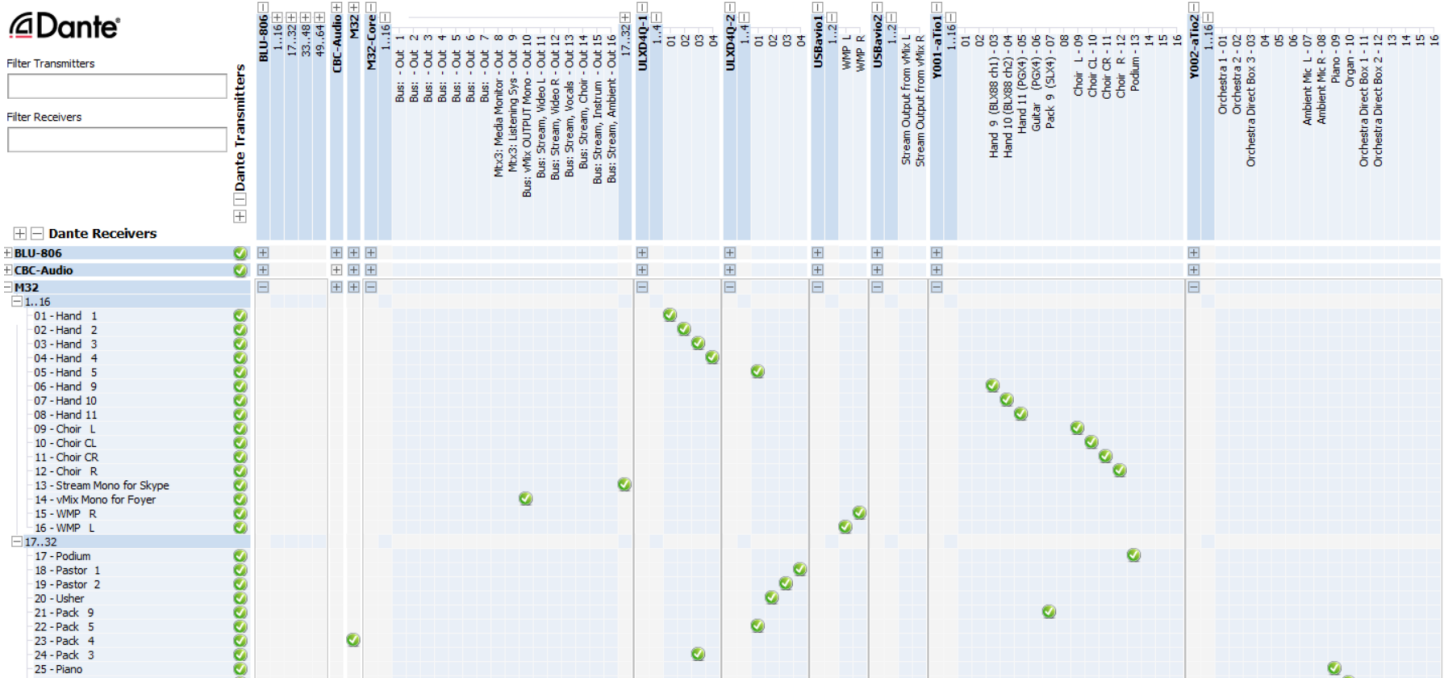
3) Digital Signal Processor

A BSS BLU-806 audio processor was added in the amp rack to provide processed Dante inputs to the amplifiers. This DSP performs EQ, compression and inserts delays on every send to the amplifiers. For the analog amplifiers, a gain stage was also added to enable fine tuning of the input gains without having to adjust the amplifier gains. A delay was added to one of the cluster speakers to eliminate comb filtering due to their non-coplanar orientation. Similarly, the Main L and Main R speakers were delayed to match with the cluster in the middle row. Additionally, the DSP has the ability to receive (64) Dante channels, produce mixes and then send the custom mixes back out through Dante. The audio operator will not need to access or modify the DSP configuration.

> **Note:** the M32 will apply EQ, dynamics, effects, etc to individual channels but NOT to the outputs. Rather the BSS will provide the processing of the mix sent to the amplifiers.
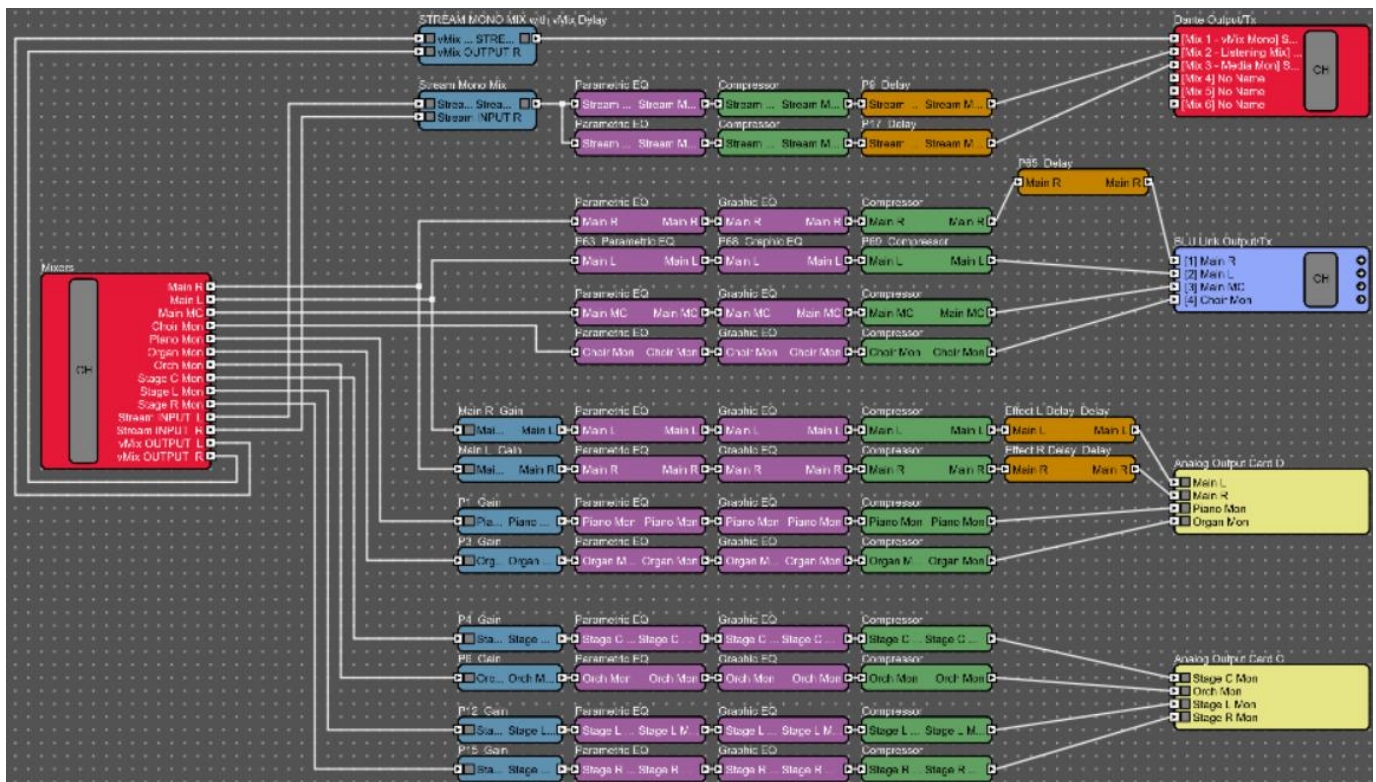
New Equipment

Wireless

Most of our old wireless equipment was illegal due to FCC auctions and/or was well past End-of-Life. We purchased two 1U Quad Wireless receivers providing (8) simultaneous wireless transmitters of any combination of the new (8) handheld or (8) body pack transmitters. The receiver tunes to a transmitter based on its Group # and Channel #. We use the Group # to determine if the receiver will listen to the handheld or body pack for a given channel. We use channels 1-8 to correspond to a receiver channel (see examples below). You can easily tune the receivers on the unit itself of through its control software. Each handheld has a unique color band that matches the scribble strips for easy identification. Also, the LCD screen will display the name of the wireless device at the time it was sync'ed (i.e. Hand 1) as well as the remaining battery life in minutes. We retained (3) of the old handhelds and (2) of the old Body Packs that were will usable as Hand 9,10,11 and Pack 9, Orchestra LAV. For services, we placed (5) of the new handhelds in the choir area for routine use. The remaining handhelds are kept in the audio area for surge needs.

		Source Device	Devcies
Shure ULXD4Q 1	1	Quad 1 Gxx:ch1	Hand 1 ≡ Pack 1
	2	Quad 1 Gxx:ch2	Hand 2 ≡ Pack 2
	3	Quad 1 Gxx:ch3	Hand 3 ≡ Pack 3
	4	Quad 1 Gxx:ch4	Hand 4 ≡ Pack 4
Shure ULXD4Q 2	1	Quad 2 Gxx:ch5	Hand 5 ≡ Pack 5
	2	Quad 2 Gxx:ch6	Hand 6 ≡ Pack 6
	3	Quad 2 Gxx:ch7	Hand 7 ≡ Pack 7
	4	Quad 2 Gxx:ch8	Hand 8 ≡ Pack 8

Hand = Group 24   Pack = Group 25

Lastly, these new microphones all use special rechargeable batteries. We have an 8-battery charger and must periodically rotate batteries to prevent them from going bad.

> **Example 1:** Group 24: ch 5 refers to Handheld 5   **Example 2:** Group 25: ch 8 refers to Body Pack 8
> **Note:** Pack 8 = Pastor 1, Pack 7 = Pastor 2, Pack 6 = Usher

Dante Sources/Receivers

In order to expand the number of devices we can utilize and to fully leverage the capabilities that Dante affords, we added several Dante devices. We upgraded the M32 and M32C cards to Dante from USB which provides 32x32 card inputs/outputs each. The BSS DSP and two wireless Quad receivers are also native Dante devices. We purchased (2) USB Dante devices for the Audio PC and Stream PC providing 2x2 audio. The Audio PC also supports 32x32 audio for Reaper 32 channel record/playback through a dual-ethernet NIC. Lastly, we placed a Yamaha (16) channel input / (8) channel output interface unit on the stage by the orchestra and one in the Audio Rack. The Tios utilize the existing XLR snakes to put all these devices on the Dante network.

		Source Device	Label
Yamaha Tio 1 Inputs [Audio Rack]	1		
	2	HDMI Extractor	Mono from Stream
	3	BLX88 (ch1)	Hand 09
	4	BLX88 (ch2)	Hand 10
	5	PGX4 (1)	Hand 11
	6	PGX4 (2)	Orchestra LAV
	7	SLX4	Pack 9
	8		
	9	XLR - snake	Choir L
	10	XLR - snake	Choir CL
	11	XLR - snake	Choir CR
	12	XLR - snake	Choir R
	13	XLR - snake	Podium
	14		
	15		
	16		

		Source Device	Label
Yamaha Tio 2 Inputs [Stage L]	1	XLR - direct	Orchestra 1
	2	XLR - direct	Orchestra 2
	3	XLR - direct	Orch, Direct Box 3
	4		
	5		
	6		
	7	XLR - direct	Ambient 1
	8	XLR - direct	Ambient 2
	9	XLR - snake ch1	Piano
	10	XLR - snake ch2	Organ (Keyboard)
	11	XLR - snake ch3	Orch, Direct Box 1
	12	XLR - snake ch4	Orch, Direct Box 2
	13	XLR - snake ch5	
	14	XLR - snake ch6	
	15	XLR - snake ch7	
	16	XLR - snake ch8	

Speakers

Lastly, we added (2) Electro-Voice Loudspeakers [EVH 1152-D64] in a ceiling mounted Center Cluster. We still utilize the Main Effects/Fill Speakers for side fill. We moved the larger Galaxy Audio HotSpot 7 to the orchestra and added (4) Galaxy Audio MicroSpot 5 [Piano Mon, Organ, Stage Left, Stage Right] monitors. We also added (3) direct boxes to allow for additional orchestra instruments. The speakers, monitors and DSP-to-amplifier configuration are shown below.
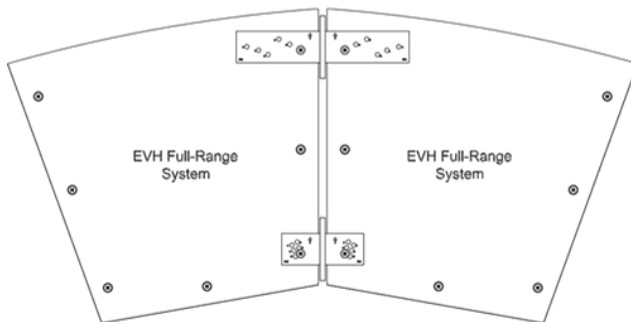
Audio Outputs & Amps

Source Device	Source	Amp	Output	Power	Power | Amp | BSS	Output Device	M32 Mix	Speakers
BSS Audio BLU-806DA	BLU 1	Crown DCi 4|1250N	Ch 1	1250@anyΩ	0 | -15 dB | n/a	Cluster, Stage L	Main L	ElectroVoice [EVH 1152-D64] (12 awg)
	BLU 2		Ch 2	1250@anyΩ	0 | -15 dB | n/a	Cluster, Stage R	Main R	ElectroVoice [EVH 1152-D64] (12 awg)
	BLU 3		Ch 3	1250@anyΩ	0 | 0 dB | n/a	Subwoofer	Main MC	EV Subwoofer (12awg)
	BLU 4		Ch 4	1250@anyΩ	0 | -10 dB | n/a	Choir Mon	Choir Mon	~5Ω Series & Parallel (14 awg)
	D-1	Crown XLS 802	Ch 1	500w@8Ω	-6 | ---- | -10 dB	Stage L (side)	Main L	?Ω Stereo Effects Speaker (14awg)
	D-2		Ch 2	500w@8Ω	-6 | ---- | -10 dB	Stage R (side)	Main R	?Ω Stereo Effects Speaker (14awg)
	D-3	SoundTech PL150	Ch 1	~50w@16Ω	0 | ---- | 0 dB	Piano Mon	Piano Mon	16Ω Galaxy Audio Micro Spot 5 (14awg each)
	D-4		Ch 2	~50w@16Ω	0 | ---- | 0 dB	Organ Mon	Orch Mon	16Ω Galaxy Audio Micro Spot 5 (14awg each)
	C-1	Yamaha P1600 - 1	A	200w@4Ω	-15 | ---- | -10 dB	Stage Center	SC Mon	(2) 8Ω Speakers on Steps (4Ω in ||) (14awg each)
	C-2		B	160w@8Ω	-10 | ---- | -5 dB	Orchestra Mon	Orch Mon	(2) 16Ω Galaxy Audio Hot Spot 7 (8Ω in ||) (14awg each)
	C-3	Yamaha P1600 - 2	A	~120w@16Ω	-10 | ---- | -10 dB	Stage Right Mon	SR Mon	16Ω Galaxy Audio Micro Spot 5 (14awg each)
	C-4		B	~120w@16Ω	-10 | ---- | -10 dB	Stage Left Mon	SL Mon	16Ω Galaxy Audio Micro Spot 5 (14awg each)
	A-1	Crown XLS 1002	Ch 1	110w@16Ω	-3 | ---- | 0 dB	Stage Front R	Front Mon	*16Ω Galaxy Audio Micro Spot 5 (14awg each)
	A-2		Ch 2	110w@16Ω	0 | ---- | 0 dB	Stage Front L	Front Mon	*16Ω Galaxy Audio Micro Spot 5 (16awg each)
	A-3		Ch 1					
	A-4		Ch 2					

* = not a dedicated monitor; others relocated as needed.