

DISTRIBUTED, INTEGRATED, SCALABLE AND ACCESSIBLE AUDIO AND CONTROL WITH DLIVE PLUS TOP 5 TIPS FOR SELECTING A MIXING SYSTEM

Today's AV system professionals face a unique set of challenges posed by integrated audio, video and lighting systems, combined with an expanding range of networking protocols and rapid advances in both hardware and software. To help designers and installers meet these challenges, we will look at how to design efficient, cost-effective, distributed audio and integrated control systems. This white paper will touch on core concepts that are applicable to a wide range of products and applications, from background music and corporate presentations through to large scale live performances, using Allen & Heath's dLive digital mixing system as an example platform.

Mixing system trends – far from just a 'console'

All readers will instantly recognize the device pictured below as a mixing console.



Mixing systems have come a long way though, and now provide functions far beyond live sound mixing.

This is what a mixing system might also look like, in an installation - a simple wallplate controller:



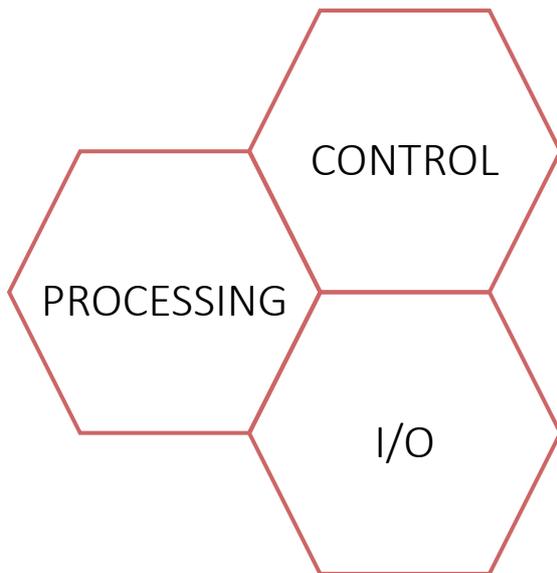
How did we get to this point?

Early digital mixers were designed to replace their analogue counterparts, thus they typically combined all the processing, control and I/O elements in one unit.

Starting with the iLive in 2005 and dLive ten years later, the engineers at Allen & Heath were bold enough to separate the processing and control elements. The control surface became effectively a remote controller for the mixing engine in the rack. Crucially, and uniquely, this mix engine could operate stand-alone, with or without a control surface, opening up a variety of other control options.

Pushing this a step further, in many situations it makes sense to separate the analogue I/O from the processing engine, so that the inputs and outputs can be conveniently located, or deployed only when required.

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Another changing paradigm of the mixing system is that, in the past, live consoles needed a companion sound management system or matrix solution in order to cater for all requirements of distributed sound in a building. Nowadays, however, mixing systems such as dLive can combine the functionality of live sound *and* audio distribution very easily, as we will discuss below.

Top 5 tips for system integrators

So, let's have a look at what the ideal mixing solution for installation should look like.

1. Distributed

A mixing system should be distributed, meaning you can deploy audio wherever it's needed, without constraints. A large installation might require dozens of audio points, and hundreds of system inputs and outputs. The connections must be capable of running on an existing Ethernet infrastructure, or fibre optic where longer cable runs are required.

2. Integrated

A mixing system should be integrated, with ample access to all major industry protocols. Allowing Dante integration, broadcast feeds over MADI, multitrack recording, and providing networkable GPIO interfaces and TCP/IP control for third party integration.

3. Scalable

A mixing system should be scalable and offer solutions ranging from single rooms to the largest and most demanding of spaces. dLive can provide from 0 to over 800 system inputs and outputs, a matrix of over half a million crosspoints, and up to 96 remote controllers in a single system.

4. Accessible

A mixing system should be accessible and make life easier for non-technical operators, particularly in volunteer-driven venues. Key settings such as volume control, music source selection and preset recall should be controllable from simple remote control devices. Tablet apps should give easy access on the move, while multiple levels of user permissions should provide appropriate levels of control to different users. Online/offline software should provide Internet access to the system, meaning a system integrator can sit in an office in Sydney and remotely log into a system in Perth to check status, power supplies, error logs, or to fix routing problems.

5. Versatile

Finally, a mixing system should be versatile, and capable of handling every aspect of a venue's audio life, from background music and boardroom meetings to a full-scale theatre show or live performance. Beyond the hardware, software features such as Automatic Mic Mixing are all important in corporate AV. For example, the AMM in dLive can handle up to 64ch in up to 4 different zones or

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meeting rooms, and offers both the industry classic gain sharing algorithm, and a more sophisticated Number of Open Microphones algorithm.

dLive Installed Solutions – a practical guide

Not only dLive addresses in an exemplary way the requirements outlined above, but it does so with unrivalled sound quality. Built on 96kHz FPGA technology, it also provides guaranteed class-leading system latency of 0.7ms, input to output.

Navigating the growing ecosystem of dLive expanders, apps, software, controllers and audio networking cards can be a challenge, so here's a quick 'dLive for Dummies' guide to help readers confidently build a distributed audio and control system from scratch.

An interactive configuration tool is also available online here: <https://www.allen-heath.com/dlive-home/dlive-system-builder/>

1. Select a MixRack

The MixRack is the heart of any dLive system. It houses the XCVI processing core, complete with control and audio networking ports. There are several sizes available. All feature the same mix engine and 128 channel / 64 bus count, but differ in the number of analogue I/O sockets. S Class MixRacks offer more audio networking ports, cable redundancy and optional PSU redundancy.

Product focus - The [DMO](#) is the most compact dLive MixRack in the range, with no analogue I/O at all. In a typical installation, it would sit in a machine room somewhere in the building, together with switches and servers. It features redundant power supplies and audio connections, as

well as 3 audio networking ports, each capable of 128 bidirectional channels at 96kHz. Other than distributed audio, DMO is ideally suited to matrix applications, for example as a 384x384 MADI router for broadcast, with 24 separate MADI streams, or as a format converter to bridge different protocols on the network, including seamless 48k to 96k conversion.



2. Select a Surface (optional)

The Surface is effectively a network controller for the MixRack, with the addition of built-in audio I/O and audio networking ports. It connects to the MixRack via a single Gigabit Ethernet link carrying multichannel audio and control. There are several sizes available, offering different numbers of faders and screens. S Class Surfaces offer more audio networking ports, cable redundancy, optional PSU redundancy, as well as more physical controls.

Up to 4 dLive Surfaces can be connected to a single MixRack via additional gigaACE cards.

Product focus - The 19" rack-mountable [C1500](#) is the most compact Surface in the range, perfect for AV racks and portable deployment in meeting rooms.



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Need to know – Surfaces are optional. Surface-less systems are particularly attractive in system integration, where the MixRack can be controlled by a combination of remotes, third party panels via TCP/IP, software and apps.

3. Select Audio Networking options

I/O Ports on the MixRack and Surface allow audio networking, system expansion, integration with third party systems and more. Each provides up to 128x128 channels at 96kHz. Options are available for Dante, MAD1, Waves SoundGrid, AES3 as well as our cost-effective, proprietary transport protocols on Cat5 and fibre, which were discussed in a [previous white paper](#).

Product focus – Our [Dante card](#) supports AES67 streams for easy integration with Q-Sys and other systems, and was one of the first products on the market to support Dante Domain Manager. A new card will be available soon to unleash the full 128x128 channel count and selectable 48/96kHz sample rate.



4. Add I/O Expanders

DX Expanders add flexible I/O to any dLive system. They connect to the dLive MixRack or Surface over standard Ethernet (Layer 2). For more expansion in distributed systems and larger projects, the DX Hub or DX Link I/O card can be used, and up to 48 discrete I/O points deployed in a building. Up to two DX Expanders can be daisy-chained on a single link, or alternatively

redundant connections are possible. Options include the portable, rugged DX-168 stagebox, and the modular DX32 with 4x 8ch slots for analogue or digital (AES) I/O.

Product focus – The [DX164-W](#) is a wall-mount or floor-mount DX Expander for fixed installation. It can be mounted in a standard 12x12" NEMA electrical box (the US standard), or in a floor pocket, and can be powered in three different ways: 12V DC (also for redundancy), IEC mains power, or to satisfy regulations when flush mounted in a wall, with screw terminals for an armoured cable.



Need to know – All you need to know on DX connections and expansions, hubs and hops is contained in the [DX System Guide](#), a must read for system designers.

5. Add control

Allen & Heath has a range of networkable, PoE compatible remote controllers. These can be programmed via the Surface or Director software, and customised to control any aspect of the system. The IP6 and IP8 are desktop units with 6 push-n-turn rotaries and 8 motorised faders respectively. They can be flush mounted in

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a podium or furniture and are ideal to give the untrained operator simple control of levels, mutes or presets.

The PoE compatible, networkable GPIO interface can be used to control 3rd party equipment such as lighting, curtains, projection, or to respond to external switches, for example for an alarm mute or override.

Product focus – The [IP1](#) wall-plate controller has a single rotary and screen, and is ideally suited for music source selection, level control, or preset recall in a room. It gives the non-technical user convenient and easy control, and is available in two form factors, to fit either US (Decora) or European / UK face plates and back boxes. Either can be ordered in black or white colour.



Need to know – In addition to the IP controllers, iOS apps and Director software, a [TCP/IP control protocol](#) is available for third party integration, and template drivers will be available soon for Crestron and AMX systems. More on this in a future white paper!

Total solution

As we have seen, Allen & Heath can offer system integrators a complete solution for distributed, scalable audio systems, with extensive capabilities and yet a simple, elegant architecture.

Thinking of specifying dLive? Allen & Heath is there to advise, train and support you at every step of the way, from tender specification through to commissioning.

For further information, application guides, and recommended products please visit <https://www.allen-heath.com/installation/>

Don't hesitate to contact our Install team at installedsolutions@allen-heath.com if you need assistance on which products to specify or if you have questions about an application.

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