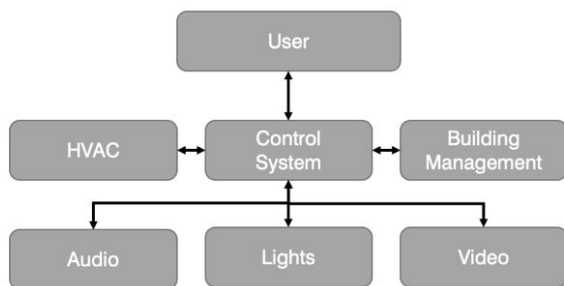


ALLEN & HEATH EXTERNAL CONTROL

INTEGRATING A&H SYSTEMS IN TCP/IP ENVIRONMENTS

With the shift from analogue to digital AV technology and the integration of AV with building infrastructure, AV solutions are starting to look more and more like IT networks. At the same time, feature-rich AV systems and their networking nature have created a strong demand for simplified user control.

Control systems must be flexible in their capacity to handle all aspects of an installation (audio, lights, video, HVAC). They also must be simple to install, configure, deploy and use, regardless of the complexity or power of the underlying infrastructure.



A control system is the main interface between end user and the space around them

This white paper will summarise different approaches to AV control through the years and how Allen & Heath has responded to the modern challenges of user control.

Control technologies, in 400 words

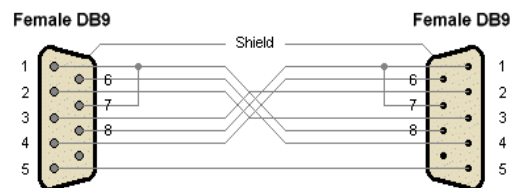
Several decades ago, before the days of Ethernet and TCP/IP, GPIO ports (General Purpose Input / Output) were already in use as a simple way to interface equipment from different

brands. Open collectors or relays on the outputs would drive an LED or external relay, while contact closures would typically be driven by a switch.

This simple technology still works well today where basic on/off logic applies. GPIO use is widespread in integration with fire alarm systems, school bells, movable walls, on-air lights, video projectors, music players, curtain rails and much more.

More complex communication was the realm of popular protocols like RS-232 (point to point) and RS485 (master + multiple receivers).

Both protocols are bidirectional and dictate limits on cable type and length (15 metres / 50 feet for RS232, 12 metres / 40 feet @10Mbps or 1.2km / 4000 feet @100kbps for RS485). Due to their serial nature, the bandwidth is also limited and the reliability often problematic over long cable runs.



TIA-232-F (1997) updates the original 1960 Recommended Standard 232

As AV systems increased in complexity and features, so did the control requirements in terms of bandwidth and networkability. The obvious answer, and one which is now widely adopted, is TCP/IP over Ethernet. It is beyond the scope of this document to list all advantages of an Ethernet platform for AV control, suffice to say that control traffic can now happily coexist

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with other traffic in converged networks, and make use of standard Ethernet infrastructure and topologies.

An ever-increasing number of audio and video devices is designed to be networkable and offer some degree of external control. Although standards and protocols such as AES70 are emerging, more often than not the set of control messages is proprietary and vendor specific. It is therefore the job of the control system to make use of such messages and interface such devices in a meaningful way.

Ethernet control can take different forms, from dedicated control systems with a hardware component and touch panels by the likes of AMX, Crestron and Extron, to iPad kiosks or modern BYOD (Bring Your Own Devices) approaches - tablet and smartphone adoption means users can be given the ability to control the AV system, lights or HVAC with their own mobile devices. BYOD solutions can minimise the cost for hardware and the touch screen interface should be instantly familiar to most users. So much for RS232.

Control of Allen & Heath systems over a network

All Allen & Heath digital mixing systems are controllable over an Ethernet network. A TCP protocol spec document is available for each product line at www.allen-heath.com and details the string format, set of messages and TCP port to be used.

AHM-64 matrix processors offer control of input, zone and control group levels, mutes, crosspoint levels and mutes, preset recall, track playback and source selector. Mute and level values can be broadcast via a Get command.

dLive DM/CDM audio engines and Avantis mixers offer control of channel levels, mutes, send

/ crosspoint levels, routing assignments, pre-amp gain, pad and 48V, channel name and colour, and scene recall.

Qu series mixers offer control of all of the above plus input source selection, insert in/out, channel processing, pan, remote shut-down and more.

SQ series mixers offer control of levels and mutes, send levels and mutes, routing assignments and scene recalls. Get commands enable the broadcast of these parameter values.

Third-party control systems

① Works with: AHM-64, CDM / DM engines, SQ, Qu

The Allen & Heath TCP protocol is often utilised by integrators when programming third-party control systems.

For AMX, Extron and Crestron systems, drivers are available for download at www.allen-heath.com/thirdpartycontrol/ to ease the programming and facilitate integration. Control elements include levels and mutes for input and output channels, send / crosspoint levels, and scene / preset recall. An example programme is provided with each driver and can be used as a starting point by more advanced programmers.

MIDI over TCP

① Works with: AHM-64, CDM / DM engines, Avantis¹, SQ, Qu

The message format in the Allen & Heath TCP protocol is essentially based on hexadecimal MIDI strings. A driver for Windows and Mac OS is available to expose such strings on a virtual MIDI port, enabling communication with any MIDI enabled software. Typical applications include show control software such as Qlab triggering scenes / mutes / fader moves in the mixing system, or automation of Waves Multitrack presets.

¹ Requires Avantis firmware V1.1 or higher

The MIDI Program Change, SysEx and NRPN strings can be mapped directly to compatible software. In addition, blocks of faders can be dedicated to MIDI CC control and optionally translated to popular HUI or Mackie Control protocols for DAW applications.

For direct connection to legacy devices over 5-pin MIDI, a TCP to MIDI converter such as the Bome [BomeBox](#) can be used.

Hardware controllers and GPIO

① Works with: AHM-64, CDM / DM engines, Avantis

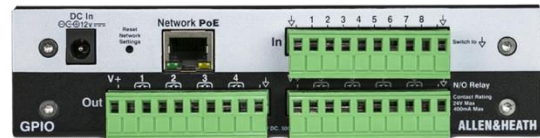
When the control requirement doesn't extend beyond audio, the Allen & Heath ecosystem can provide dedicated, tactile hardware controllers. These are TCP/IP based and PoE enabled devices that can interface directly with the audio engine.

The IP1 is a single gang 1-knob wall-plate for simple level control or scene / source selection, while the IP6 (6 rotaries, 12 programmable keys, 6 displays) and IP8 (8 motorised faders, 16 programmable keys and 8 displays) can be used on a desktop or wall mounted with a custom frame.



The IP1 wall-plate controller, available in US or EU standard, black or white.

Also in the range is a GPIO interface which takes simple GPIO functionality to the present day of IT networking. Fully networkable and PoE enabled, it can be deployed wherever required in a building, with up to 8 units in a single system, eliminating the need for long analogue cable runs.



The Allen & Heath networkable, PoE enabled GPIO interface

The unit provides 8 opto-isolated inputs, 8 normally open (N/O) relay outputs and two 10V lines, all on phoenix connectors. One of the outputs can be configured to normally closed (N/C) for failsafe applications. An optional rackmount kit is available.

Additionally, the AHM-64 matrix processor includes integrated 2x2 GPIO on the rear panel for local connection to third party hardware.

The AHM-64 GPIO offers 2 inputs switching to ground and 2 relay outputs in addition to a +10V DC output. Output 1 can be wired as normally closed (N/C) or normally open (N/O) whilst output 2 is normally open (N/O).



The AHM-64 includes integrated 2x2 GPIO

Qu-Control

① Works with: Qu series

Qu-Control is a customizable iOS app for iPod Touch, iPhone and iPad. It provides an end user interface for wireless mobile control of the Qu digital mixers. Qu-Control offers simple configuration of up to five screens with up to 15 control widgets each, for applications including background music source selection, master zone level, scene recall, or microphone paging. Password protection prevents unauthorized access to controls, making it the ideal solution for mobile wireless control of venues, conference rooms, hotel lobbies and any other installed sound environment where the operator may not have experience with audio mixing.

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Custom Control app and editor

① Works with: AHM-64, CDM / DM engines, Avantis²

Similar to Qu-Control in concept, the Custom Control app for AHM-64, dLive DM/CDM audio engines and Avantis mixers also offers customisable user interfaces, but with an expanded feature set and cross-platform compatibility.

Integrators can design multiple user interfaces for the system, tailored to different user levels and/or device types. For example, the bartender is presented with a simple phone interface, while the AV operator has access to uncluttered levels and routing on a tablet, but more comprehensive control on a laptop.

The design of the user interface is via the Custom Control editor for Windows and Mac OS. Access to all levels, mutes, sends as well as preset recall, source selection, metering are provided, and tabs can be configured for access to multiple control pages or zones. Once complete, the configuration is uploaded to the audio engine, ready for deployment.

Any device running the Custom Control app can log into the system with a given user, at which point the correct user interface is instantly downloaded and displayed. This allows for both kiosk applications and BYOD use, since the configuration is deployed on demand. Users can be password protected for added security.



The Custom Control app is available for free on iOS, Android, Windows and Mac operating systems.

Conclusion

As we have seen, seamless integration of control and AV systems is now expected and a standard feature of new installations. Allen & Heath tackles this challenge from multiple angles, providing integrators with an array of options, from dedicated hardware controllers to innovative BYOD solutions or simplified integration with industry leading third-party systems.

² Requires Avantis firmware V1.1 or higher

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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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