52/XD2, 52/XC2, 52/XS2
Mixing, Routing and I/O System

Series 52

www.dhd-audio.com

DHD.audio

Digital Broadcast Technology

Made in Germany

XC2 Core and XD2 Core System

The **52/XC2 Core** is DHD's central processing unit for small or medium-sized mixing consoles with processing of up to 44 faders. Just as well, it works for small and medium-sized routers with a matrix size of 3716 x 3076. The 52/XC2 Core occupies only half the width of a 19" 1 U rack slot.

rear view of 52/XC2 Core (52-7420)

The **52/XD2 Core** is our high-performance device for all routing and mixing tasks, fitting in only 1 U.
With the support of up to four DSP modules, the 52/XD2 Core is powerful enough to master the most demanding applications.
The system can be used to process up to 64 faders or to set up an audio routing system with a matrix size of 8704 x 7424.

rear view of 52/XD2 Core (52-7440/52-7456)

The specialised and rock-solid hardware of the 52/XC2 and 52/XD2 Cores consumes very little power. The combination with highly efficient external power supplies considerably reduces the operating costs of a DHD system compared to products of other manufacturers.

To ensure that your audio network keeps running at all times, the 52/XC2 and 52/XD2 Cores provide extensive redundancy features.

Designed to Create Distributed Systems

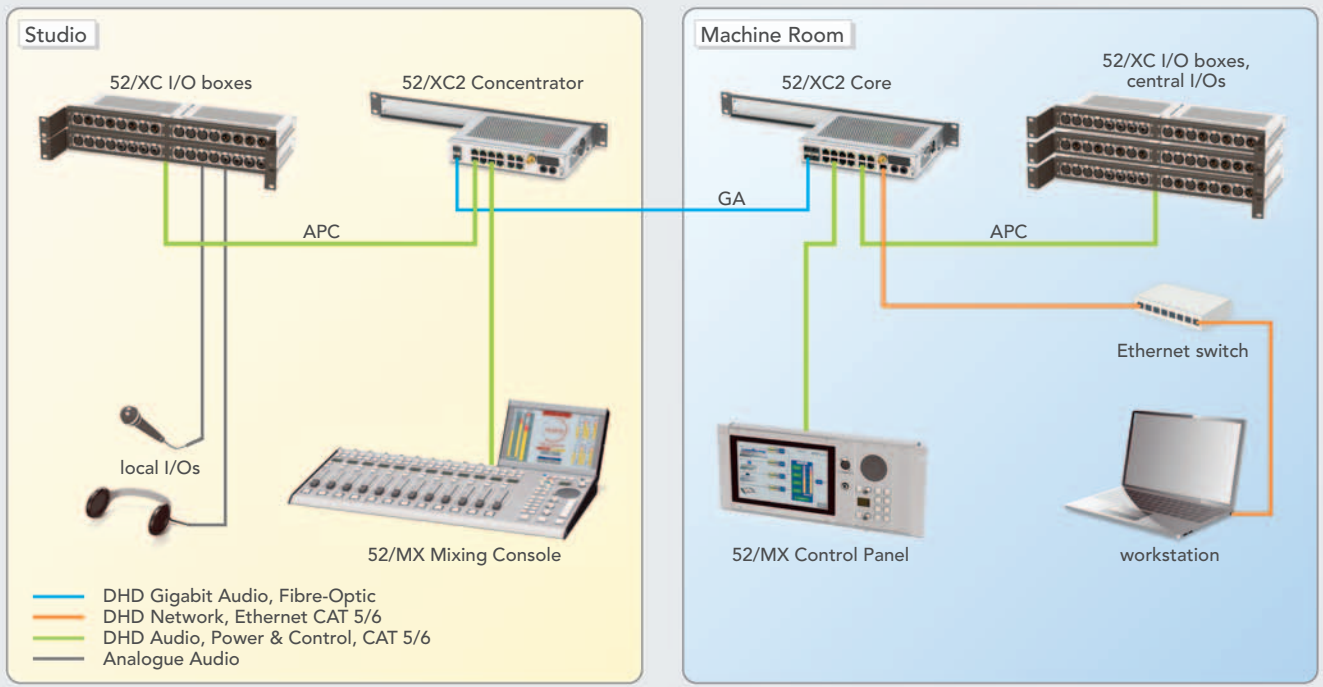
The 52/XC2 and 52/XD2 Cores and the 52/XC2 Concentrator provide common RJ45 ports for the connection of control modules and I/O boxes. Here, standard CAT cables are used, carrying **A**udio, **P**ower and **C**ontrol signals in the same cable – DHD's **APC** technology.

Thus, your setup benefits from the advantages of common CAT cabling infrastructure which allows you to place I/O boxes and control modules anywhere you need them.

All **G**igabit **A**udio and data connections between cores and concentrators are based on standard fibre-optic cables for Gigabit Ethernet – DHD's **GA** technology.

The 52/XC2 Concentrator is always dedicated to one core and acts as APC port extension unit.

This design principle allows you to create true distributed installations – every part of the system is right where it should be. The use of standard data cables and structured cabling for the interconnection of DHD modules can dramatically reduce the overall system installation costs.



example of a distributed installation with studio and machine room

The Processing Engine

The 52/XC2 and 52/XD2 Cores are the basis for all mixing console surfaces of the Series 52 product line. They can for example, a small 4-fader 52/TX touch mixer, a compact 10-fader SX2 console, a medium-sized 18-fader RX2 system or a large 32-fader 52/MX console with layers.

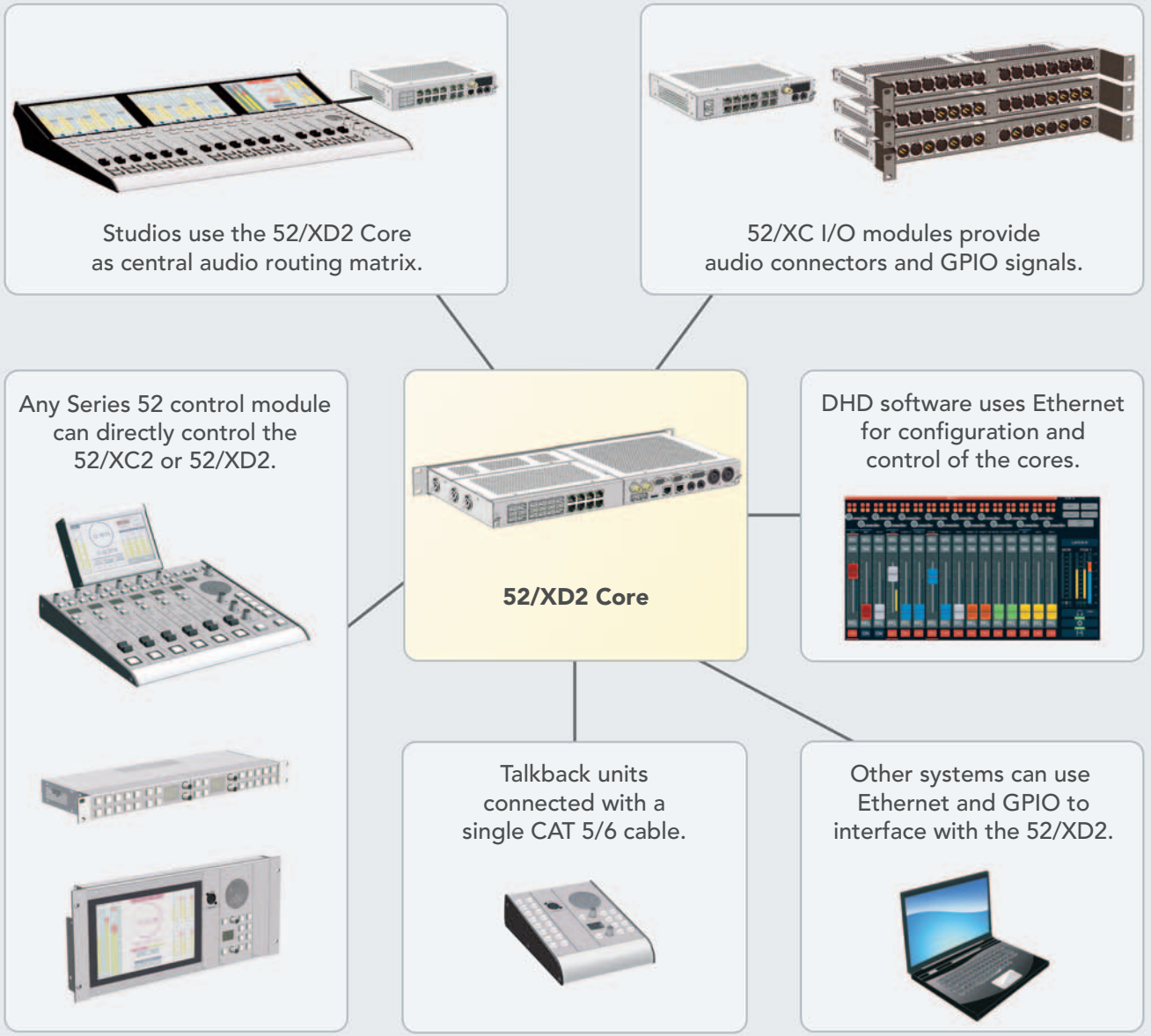
All 52/XC input and output modules and 52/XC2 Concentrators are compatible with the 52/XC2 and 52/XD2 Cores. You may also use I/O modules and cores of our 52/XS2 series.

Used as routing matrix, the cores are not only able to switch audio signals, but can also fade those in and out and even apply DSP processing (gain, EQ or dynamics) to the signals. You may also create complex on-air switching systems as well as talkback systems.

For direct control, combine the 52/XC2 or 52/XD2 Cores with a great variety of DHD control modules, including faders, router control panels and TFT touch displays. All control modules and TFT touch displays use standard CAT cables for communication with the cores.

DHD provides special PC software for remote control, routing, scheduling and monitoring. Third-party systems, too, can interface via Ethernet by using Ember+ or the open DHD External Control Protocol. Or just connect via GPIO or to a serial port.

The flexibility of the 52/XC2 and 52/XD2 Cores is mainly based on the Toolbox9 configuration software. All your ideas and requirements for certain functions will be defined during a configuration process typically done by DHD or by your system integrator. This configuration is what makes your system work. However, if you need to change it later, just use the Toolbox9 software again.



Audio Networking

DHD Audio Networking

DHD cores provide high-quality digital audio networking using a unique ultra-low latency technology which needs only one audio sample for the synchronous data transmission of your digital audio signal. An IP-based transfer of control data packets takes place simultaneously to the "MADI-like" audio data transmission.

This technology comes in two different versions:
DHD GA and DHD APC.

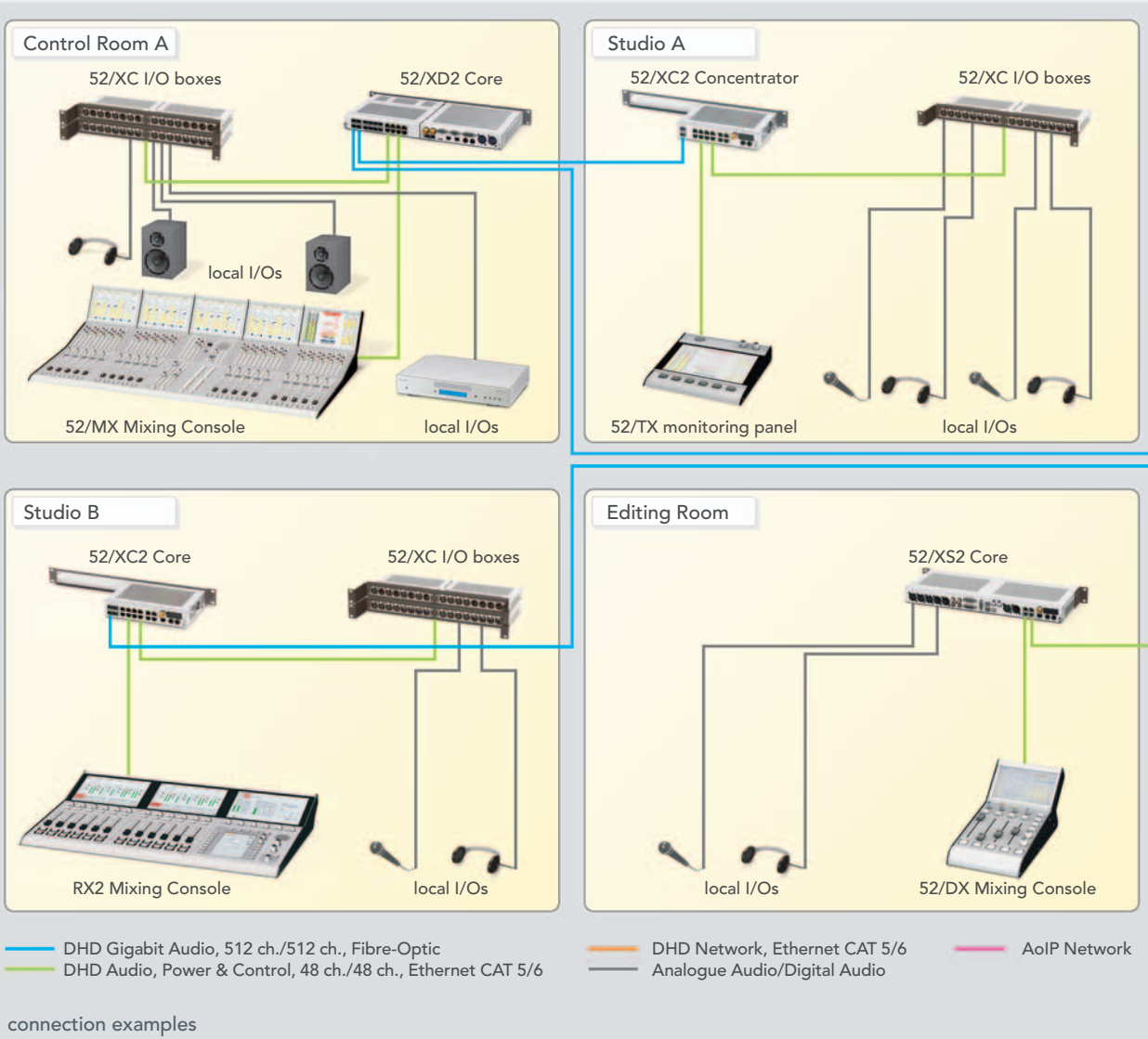
DHD GA "Gigabit Audio" uses standard Gigabit Ethernet data transmission based on fibre-optic cables. This allows simultaneous transfer of 512 input channels and 512 output channels per port plus IP-based 100 MBit/s control data packets.

Use DHD GA for powerful core-to-core interlinks or for the connection of I/O boxes and control modules to the core via concentrators. DHD GA supports link lengths of up to 500 m using multi-mode fibre-optic cables or of up to 40 km using single-mode fibre-optic cables.

DHD APC "Audio, Power & Control" uses standard Ethernet data transmission based on CAT cables. This allows the simultaneous transfer of 48 input channels and 48 output channels per port plus IP-based 10 MBit/s control data packets.

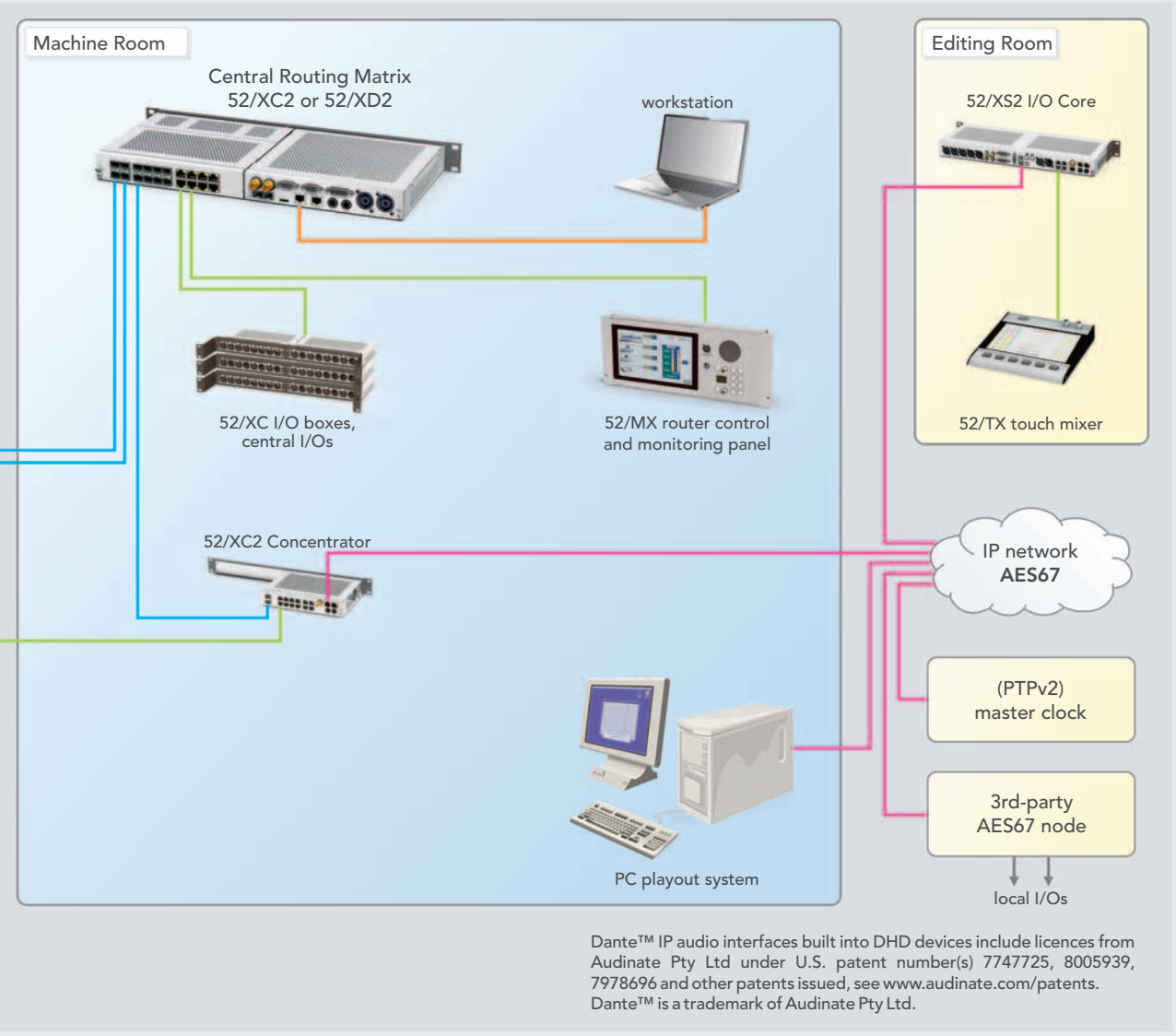
Use DHD APC for core-to-core interlinks or for the connection of I/O boxes and control modules. DHD APC supports link lengths of up to 100 m using standard CAT cables.

DHD APC will also provide the 48 V power required by end devices like I/O boxes or control modules.



connection examples

Audio-Over-IP Networking



For advanced flexibility in connecting third-party devices, each DHD Series 52 core can be equipped with an XC2 AES67 RAVENNA Interface (52-7067A). A Dante™ Audio-over-IP interface (52-7080A) is also available. With those modules you can use up to 64 channels of uncompressed bidirectional audio to connect to almost any other Audio-over-IP device like codecs or signal processors via a standard Ethernet network.

The DHD Audio-over-IP interfaces distribute the audio signals from the console to any other AES67-enabled DHD device, third-party device, PC or Mac. This allows monitoring, talkback and connection of remote facilities to the studio via the network.

The realtime AoIP network might consist of:

- DHD consoles with built-in AES67 RAVENNA interface
- DHD router with built-in AES67 RAVENNA interface
- PC or MAC with virtual soundcards compliant with RAVENNA or AES67
- AES67-enabled audio devices from other manufacturers
- Dante™ devices with enabled AES67 mode
- ST2110-enabled video devices from other manufacturers

And by the way: All 52/XC2 and 52/XS2 Cores already include a 4-channel in and 4-channel out Dante™ interface. This is very handy for smaller networking applications to easily connect to a recording PC, a codec or any other Dante™-enabled device.

I/O Options

52/XC Digital I/O Module

front view 52-7112

- 4 AES3/EBU/SPDIF inputs, 24 bit, input sample rate converters
- 4 AES3/EBU/SPDIF outputs, 24 bit, output sample rate converters
- 4 general-purpose inputs, isolated
- 4 general-purpose outputs, isolated

52/XC Mic/Headphone Module

front view 52-7235

- 4 mic/line inputs with remote preamp 0...63 dB, 18 dBu maximum
- 48 V phantom power, switchable
- 4 stereo headphone amp outputs
- 4 general-purpose inputs, isolated
- 4 general-purpose outputs, isolated
- 4 analogue control inputs

52/XC 8-Mic/Line Module

front view 52-7238

- 8 mic/line inputs with remote preamp 0...63 dB, 18 dBu maximum
- 48 V phantom power, switchable
- 8 general-purpose inputs, isolated
- 8 general-purpose outputs, isolated

52/XC Embedder/De-Embedder

front view 52-7172

- 2x 3G/HD/SD SDI de-embedders and 2x 3G/HD/SD SDI embedders, each:
  - in, 2x loop through, out (BNC connectors)
  - for 2 audio groups, 8 ch., SRCs
  - selectable audio groups 1/2 or 3/4
- 4 general-purpose inputs, isolated
- 4 general-purpose outputs, isolated

52/XC Analogue I/O Module

front view 52-7224

- 4 analogue line inputs, 18 dBu/24 dBu maximum, electronically balanced, 24 bit
- 4 analogue line outputs, 18 dBu/24 dBu maximum, electronically balanced, 24 bit
- 4 general-purpose inputs, isolated
- 4 general-purpose outputs, isolated

52/XC Analogue 8-Out Module

front view 52-7228

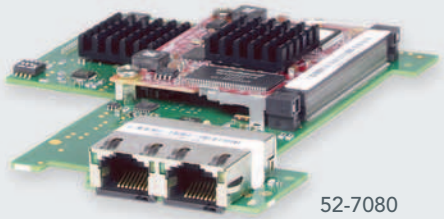
- 8 analogue line outputs, 18 dBu/24 dBu maximum, electronically balanced, 24 bit
- 4 general-purpose inputs, isolated
- 4 general-purpose outputs, isolated

52/XC Mic/Line Module

front view 52-7255

- 8 mic/line inputs with remote preamp 0...65 dB, 26 dBu maximum
- isolated input stages
- 48 V phantom power, switchable
- 4 general-purpose inputs, isolated
- 4 general-purpose outputs, isolated
- recommended for usage in OB-vans

52/XC2 Dante™ IP Audio Interface



52-7080

- internal module for 52/XC2 and 52/XS2 Cores
- compatible with Dante-enabled devices or PCs with Dante Virtual Soundcards
- 64 in and 64 out, sample rate converters
- Gigabit Ethernet for Dante connection
- enabled for AES67

52/XC2 Concentrator

rear view 52-7310

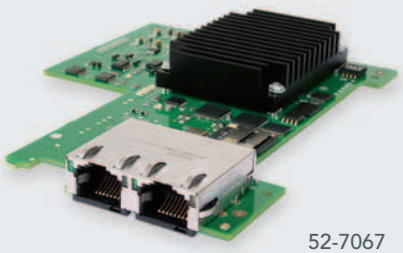
- for connecting I/O and control modules
- 12 DHD APC ports
- 2 DHD Gigabit Audio network ports
- includes 2 SFP modules for connection to XC2/XD2 Cores with LC connector, for multi-mode cables
- extension slot, for AoIP Interface 52-7067/52-7080
- 2 power inputs 48 V

52/XS Multi I/O Module

rear view 52-1335

- 2 mic/line inputs, preamp, 48 V
- 2 stereo headphone outputs
- 8 analogue line inputs, 24 dBu maximum, electronically balanced
- 8 analogue line outputs, 24 dBu maximum, electronically balanced
- 3 AES3/EBU inputs, 1 SPDIF input
- 2 AES3/EBU outputs, 1 SPDIF output
- 2 USB audio IF, 10 GPI, 10 GPO, 2 ACI

XC2 AES67 RAVENNA Interface



52-7067

- internal module for 52/XC2 and 52/XS2 Cores
- compatible with devices or virtual soundcards that are enabled for AES67 and RAVENNA
- 64 channels in/out (32 streams in/out)
- software options for:
  - Seamless Protection Switching (SPS) or channel/ stream extension (128 ch./64 streams) - 52-8541
  - multicast GPIOs - 52-8542
  - NMOS - 52-8543

52/XC Gigabit Audio Port

52-7391
multi-mode

52-7395
single-mode

- bidirectional audio exchange of 512 channels between two XC2/XD2/XS2 Cores
- DHD-licensed SFP module with LC connector

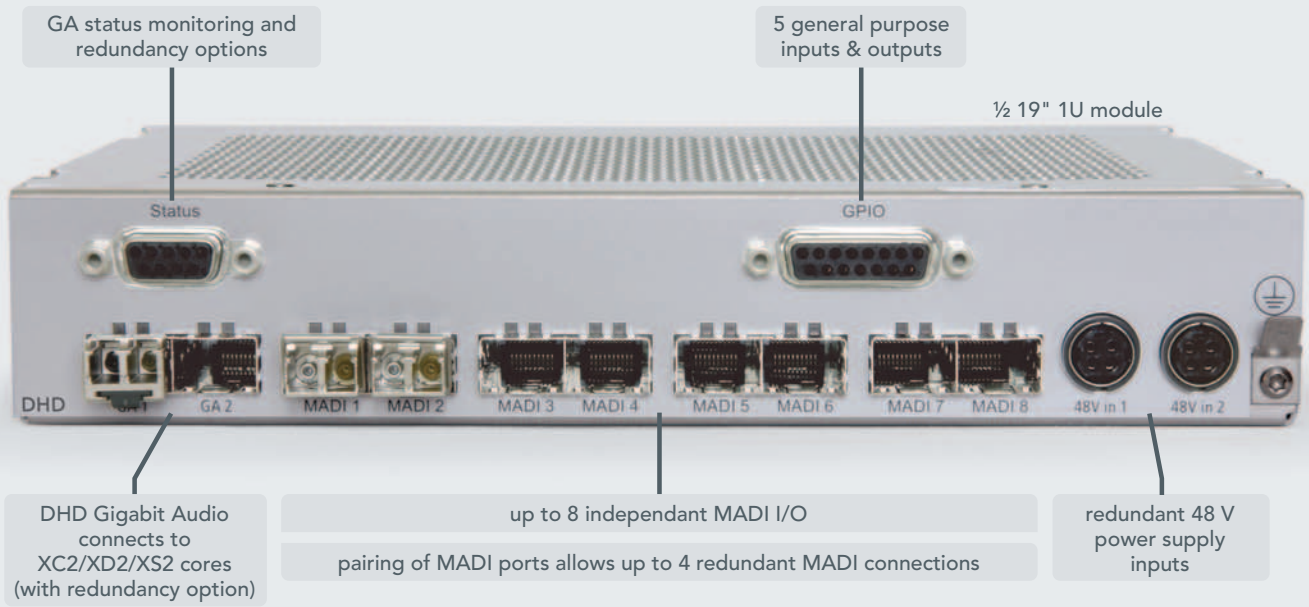
52/XC Core Audio Network License

52-8582 – XC Core Audio Network License

- bidirectional audio exchange of 48 channels between two XC2/XD2/XS2 Cores
- multiple links are possible
- direct connection via standard CAT cables
- hardware-related license code

I/O Options

XC MADI Concentrator 52-7320 and XC MADI Ports



front view of 52-7320 XC MADI Concentrator

The 52/XC MADI Concentrator provides an additional option for multi-channel connections to your broadcast system. It can be used with all XC2/XD2/XS2 Cores and Series 52 mixing consoles.

Up to 8 MADI interfaces can be used on each MADI concentrator to extend your XC2/XD2 Core to be a powerful MADI Router.

The signals of the MADI interfaces are concentrated on one fibre-optical cable (DHD Gigabit Audio) and connected to a DSP core. The ports conform to AES10 and run with 56 or 64 channels. The first MADI port contains an asynchronous sample rate converter.

By linking 12 MADI concentrators to a central 52/XD2 Router, you can build an impressive audio routing system with up to 96 MADI ports – which is a matrix size of 6144 x 6144 channels.

The 52/XC MADI Concentrator features a redundant MADI-port operation mode. A doubled fibre-optic MADI link can be created by pairing two MADI ports.

Another redundancy option is the MADI concentrator redundancy. Using this mode, two MADI concentrators are connected to one XC2/XD2 Core and the paired MADI links connected to both MADI concentrators will act with automatic failover.

52-7321
multi-mode

52-7325
single-mode

- 56 or 64 input channels and 56 or 64 output channels, AES10 MADI, LC connector
- for XC2/XD2/XS2 Cores and XC2 Concentrators

XC2 AES67 RAVENNA Interface 52-7067

Built-in Audio-Over-IP Interoperability

The XC2 AES67 RAVENNA Interface boosts the Audio-over-IP capabilities of all DHD mixing consoles and routers. Developing our own AES67 implementation for this interface allows a maximum of interoperability with RAVENNA/AES67-enabled devices or virtual soundcards.

With this interface you can send and receive up to 32 AES67/RAVENNA-compliant AoIP streams, with a maximum of 64 mono transmit channels and 64 mono receive channels.

The 52-7067 AES67 RAVENNA module can be used on the internal extension slot of all 52/XC2 Cores, 52/XS2 Cores and 52/XC2 Concentrators.

A sample rate converter for inputs and outputs eliminates the need to synchronise the mixer to the AES67 network.

Configuration Options

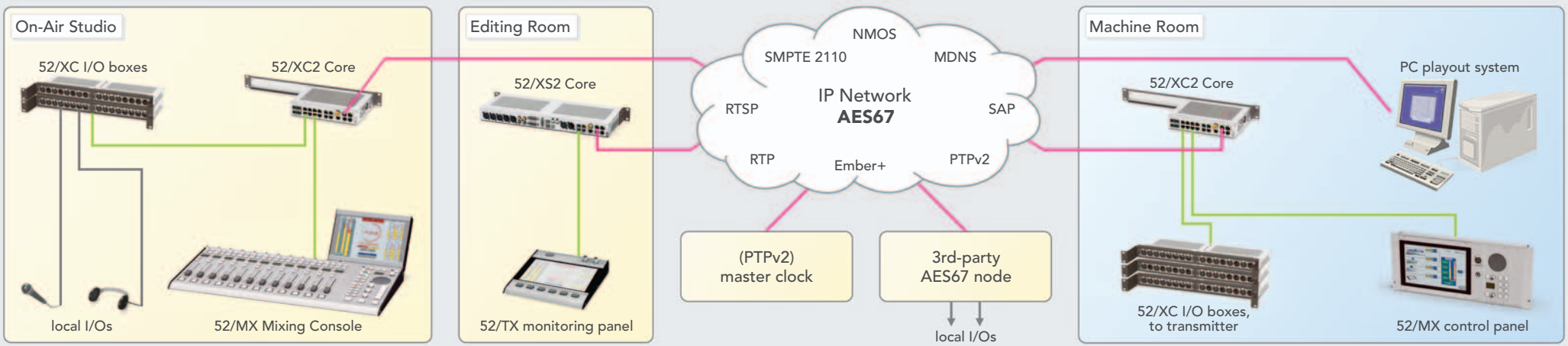
An easy-to-use web interface and powerful discovery mechanisms for the audio streams allow fast integration into your AoIP infrastructure.

The web interface offers a **simple configuration mode** for fast setup using DHD default parameter sets and linked Toolbox9 configuration data.

Also, an **advanced configuration mode** is available, in which network parameters for input and output streams and synchronisation (PTPv2) parameters can be set to SMPTE-based defaults or to user-defined values.

With full Ember+ integration, the configuration and monitoring of the XC2 AES67 RAVENNA interface is also possible via Ember+-compliant software.

web interface for configuration



Core Options

Overview

52/XD2 Core		52/XC2 Core		52/XS2 I/O Core
52-7440 + 52-7456 4 DSPs	52-7420 2 DSPs	52-7420 1 DSP	52-7423 1 DSP	52-1830 1 DSP
64 faders*	**44 faders***	**24 faders***	**16 faders***	**16 faders***
48 summing busses* (PGM, AUX, N-1, PFL)	40 summing busses* (PGM, AUX, N-1, PFL)	32 summing busses* (PGM, AUX, N-1, PFL)	16 summing busses* (PGM, AUX, N-1, PFL)	11 (16**) summing busses* (PGM, AUX, N-1, PFL)
30 mix-minus busses*	24 mix-minus busses*	16 mix-minus busses*	6 mix-minus busses*	6 mix-minus busses*
64x64 talkback matrix included	48 level meters*	4 virtual mixers	automix included	incl. XLR I/O interfaces
large router and console with numerous I/Os	**control-room console and small router**	**medium-sized console and small router**	**standard console**	**price-optimised console**

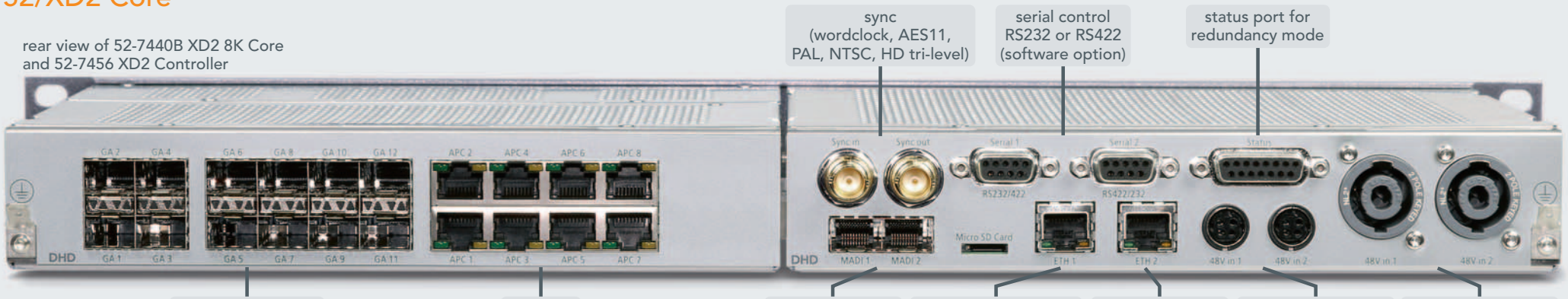
* all stereo

** with 52-1950 Extended Feature Upgrade Licence

All values are maximum values in firmware version 9.0 or higher. Availability depends on number and type of used features.

52/XD2 Core

rear view of 52-7440B XD2 8K Core and 52-7456 XD2 Controller



The 52/XD2 Core is the ideal audio routing matrix for modern broadcast environments. It features full configurability and modularity to tailor a system that fully supports your workflow. Numerous connectivity options for Dante™, AES67, MADI, AES3/EBU, Gigabit Audio, APC or analogue signals are available.

In redundancy mode two identical 52/XD2 Cores work in sync. While the main DSP core controls the broadcast system, the standby DSP core is always ready to take over if necessary. Apart from this DSP and controller redundancy, redundant power supply inputs are built in to provide seamless switching between power sources.

Advanced logic computing for control signals enables you to use the 52/XD2 Core as a true control center for your studio. Transmitting fader starts and red light signals or managing centralised resources like codecs are just a few examples. Third-party systems, too, can interface via Ethernet by using Ember+ or the open DHD External Control Protocol.

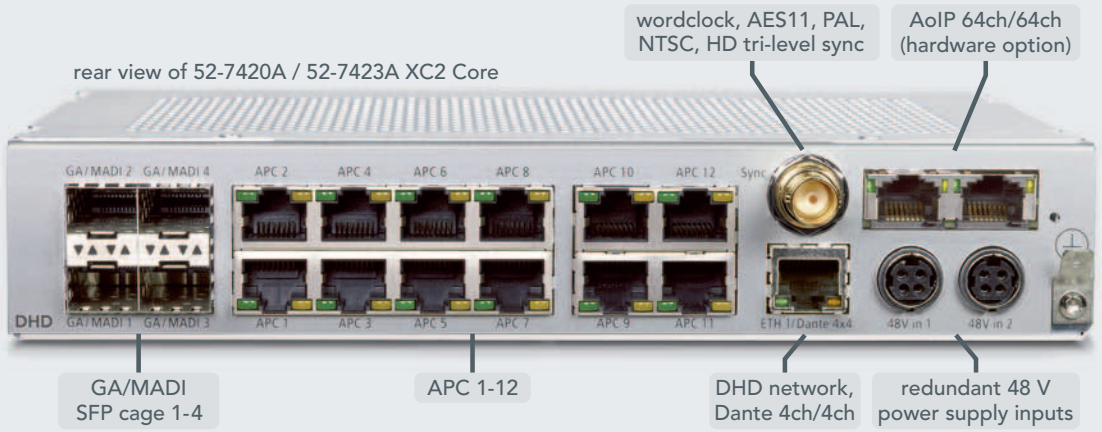
Core Options

52/XC2 Core

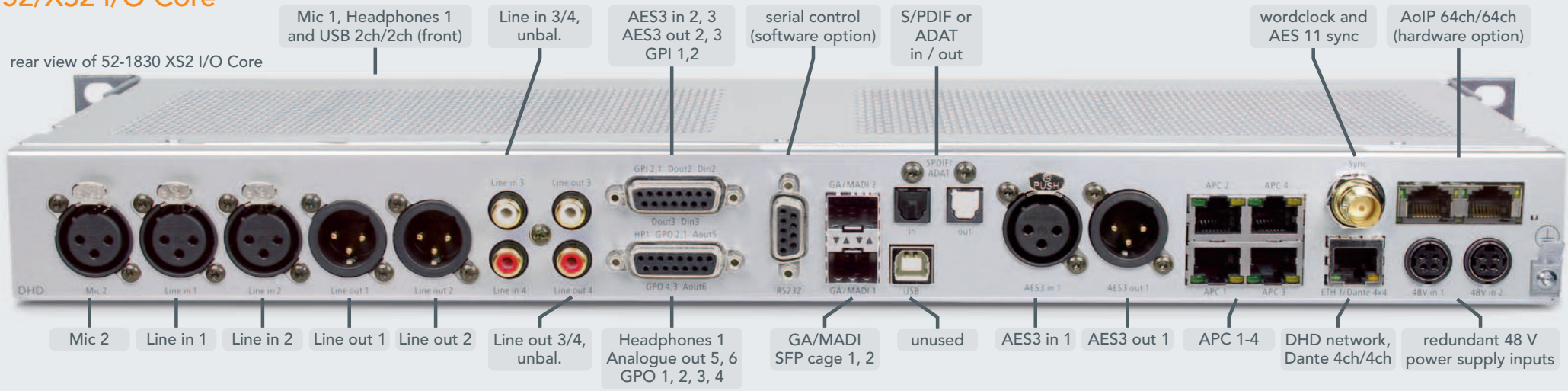
The 52/XC2 Core can manage any task in your broadcast studio, ranging from small DJ-operated studios with 12 faders to large control room desks in a complex studio environment with up to 44 faders.

By adding software licenses, you can, for example, increase the number of logic functions and peak meters or add channel delay. With an additional DSP card you can get more power for fader processings or additional loudness meters.

Its small size of only 1 rack unit and its low power consumption of only 15 W also makes it perfect for use in OB vans and SNGs.



52/XS2 I/O Core



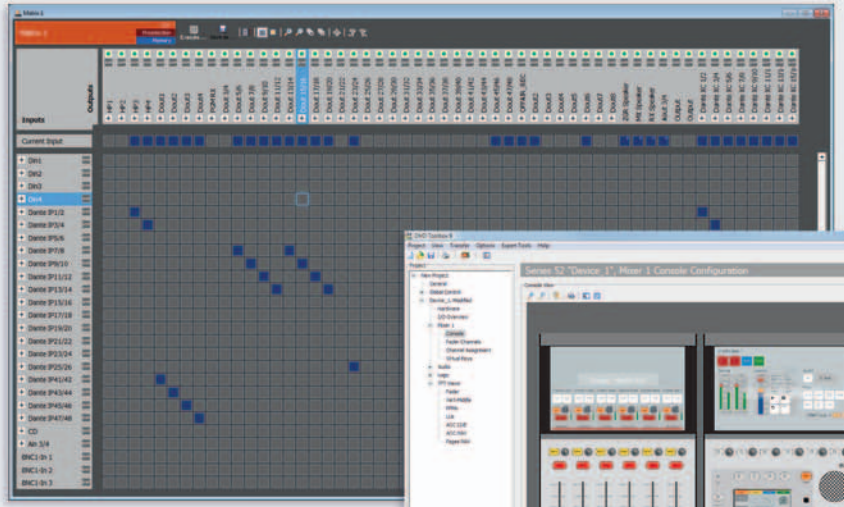
The 52/XS2 I/O Core (52-1830) combines I/O interfaces and DSP processing for up to 16 faders in one housing. It has all the audio interfaces that are required for journalist desks or edit booths. You can mount it underneath your desk or into a rack, using only 1 rack unit.

Easy connectivity is the strong point of the 52/XS2 I/O Core. Microphones, headphones, line and AES3 signals can be connected to XLR ports. Also USB audio, Toslink connectors for ADAT or S/PDIF and a 4ch/4ch Dante™ interface are included. Multi-channel options for MADI, Gigabit Audio and AES67 are available.

Our smallest SX2 Bundle (52-1988) is a budget-friendly package and includes this versatile I/O core and the SX2 central module with 4 faders (52-5614). It is perfect as a compact mixer for a radio production studio or as a starting point to add more modules from our product range for a bigger, more customised system.

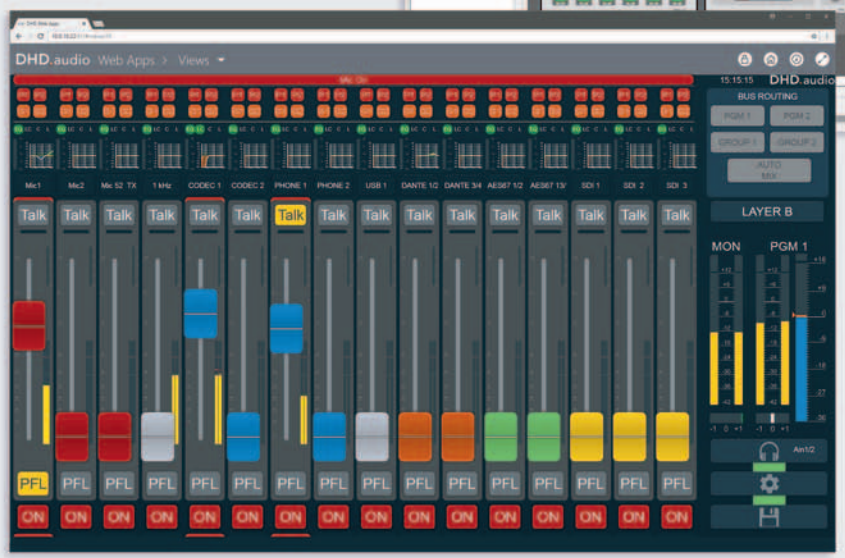
Software

version 2019-08-05



routing software

Toolbox9 configuration software



Views App - TV mixer example

More DHD software for:

- monitoring
- DSP control
- snapshot management
- MIDI support
- SNMP support
- user management

DHD's software products are perfect partners for your DHD hardware. They allow you to configure, monitor and control your complete broadcast system.

With the **Toolbox9** configuration software, the system structure and all main functions will be defined. You can assign functions to buttons, potentiometers and TFT touch displays. Even complex logic systems can be realised. Usually a DHD expert will do the configuration. If you need to change it later, just use the Toolbox9 software yourself.

The **Routing & Scheduling Software** gives you full control over your routing matrices. You can switch cross points live or in preselection mode, change signal labels and create, manage and monitor complex switching schedules.

The **Views App** shows complete audio mixer controls in web browsers like Chrome, Firefox or Safari. This approach allows device-independent monitoring and control of an audio mixer for any kind of touch-screen-based broadcast application.

With studio environments becoming more and more automated and centrally controlled by software, the Views app provides an intuitive and very comfortable user interface. You can build your virtual console with touch-based faders, buttons and meters in whatever size and colour scheme you choose.

Apart from creating a mixer copy in the browser, you can also design specialised views to be shown on large studio information screens. This supports your daily studio work flow, giving you an instant overview of incoming calls, audio levels and other useful functions like a studio clock. The screen design can be individually configured, for instance to sport your station colours and logo. As the Views App is HTML5-based, you can arrange it together with other web-based content, like news pages or traffic information, in just one browser window.

DHD audio GmbH · Haferkornstr. 5 · 04129 Leipzig · Germany · sales@dhd-audio.de · www.dhd-audio.com