THE NEW STANDARD IN ADVANCED AUDIO PROCESSING

NEWTON

PATENT PENDING

Outline

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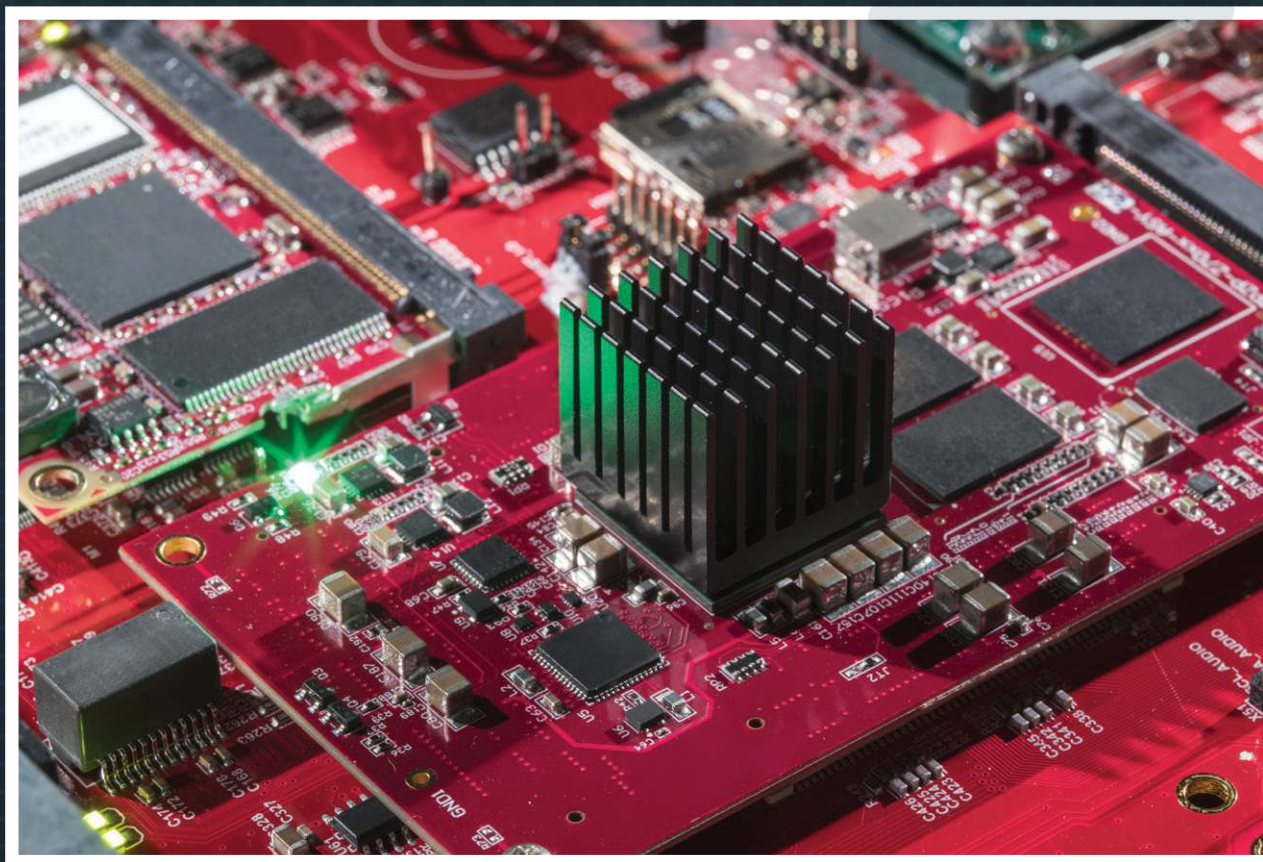
Outline is proud to introduce Newton, the next generation in audio system control and networking. Newton advances the management of sophisticated audio systems by combining new filter technology, multi-format audio signal routing, multi-format standards conversion and digital signal synchronisation in a single 1RU networkable chassis.

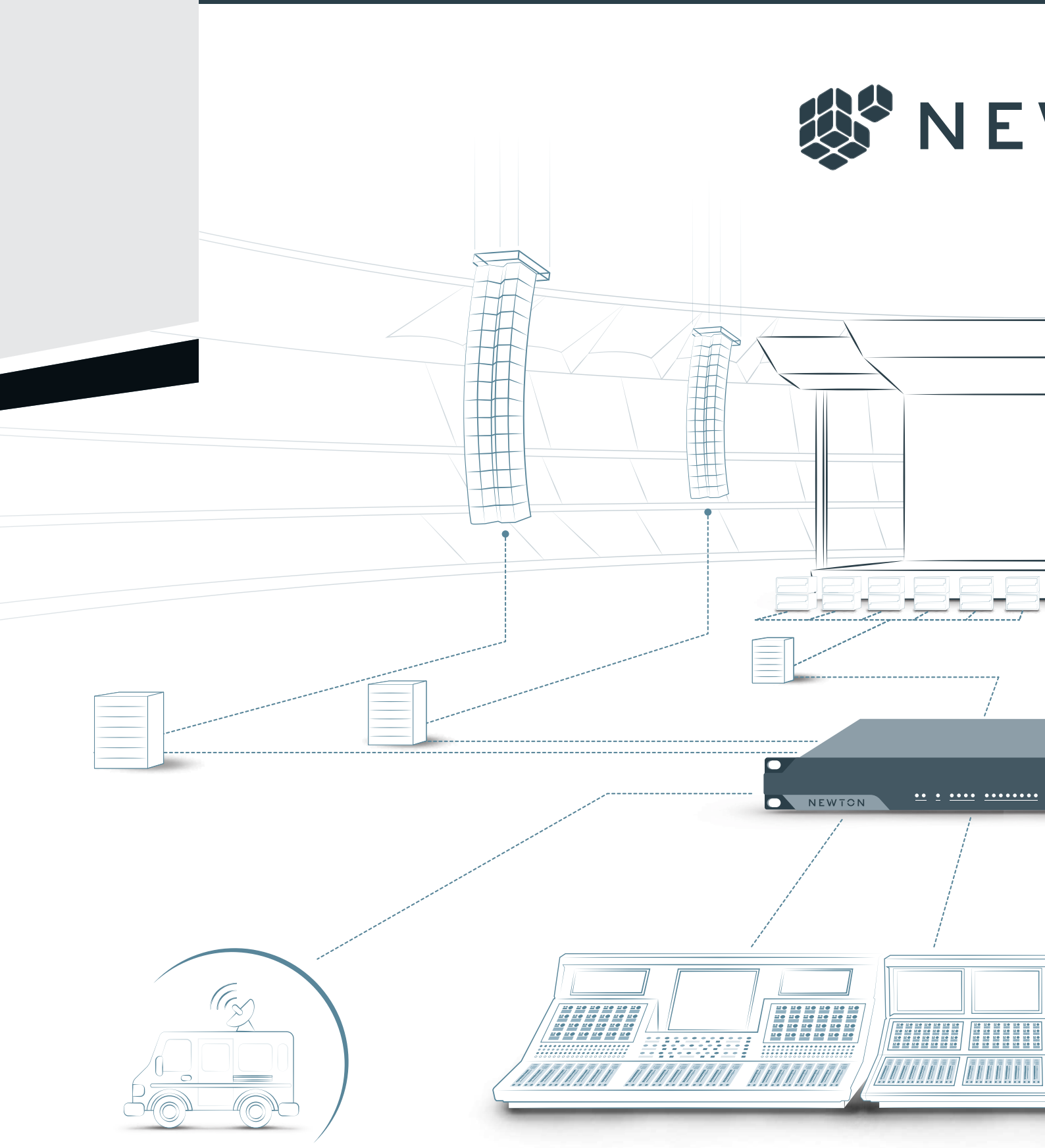
Each Newton processor combines powerful WFIR filters (unique to Outline), clock management and a very high number of input and output channels (up to 216 x 216). Internal synchronous and asynchronous sample rate converters manage all I/O operations and Newton can be synchronised with any one of the 14 choices of clock sources. Mix and Match Matrix I/O routing allows translation and re-distribution of digital audio over multiple standards simultaneously.

Combining power and flexibility with an easy to use control interface, Newton forms the nucleus of next generation audio systems. Multiple Newton devices are easily interconnected to form a network that is scalable to meet all audio applications. Powerful processing features and multiple audio network standards combine to make Newton the ideal control core for any audio system from Touring to Live Broadcast Events and Fixed Installations.

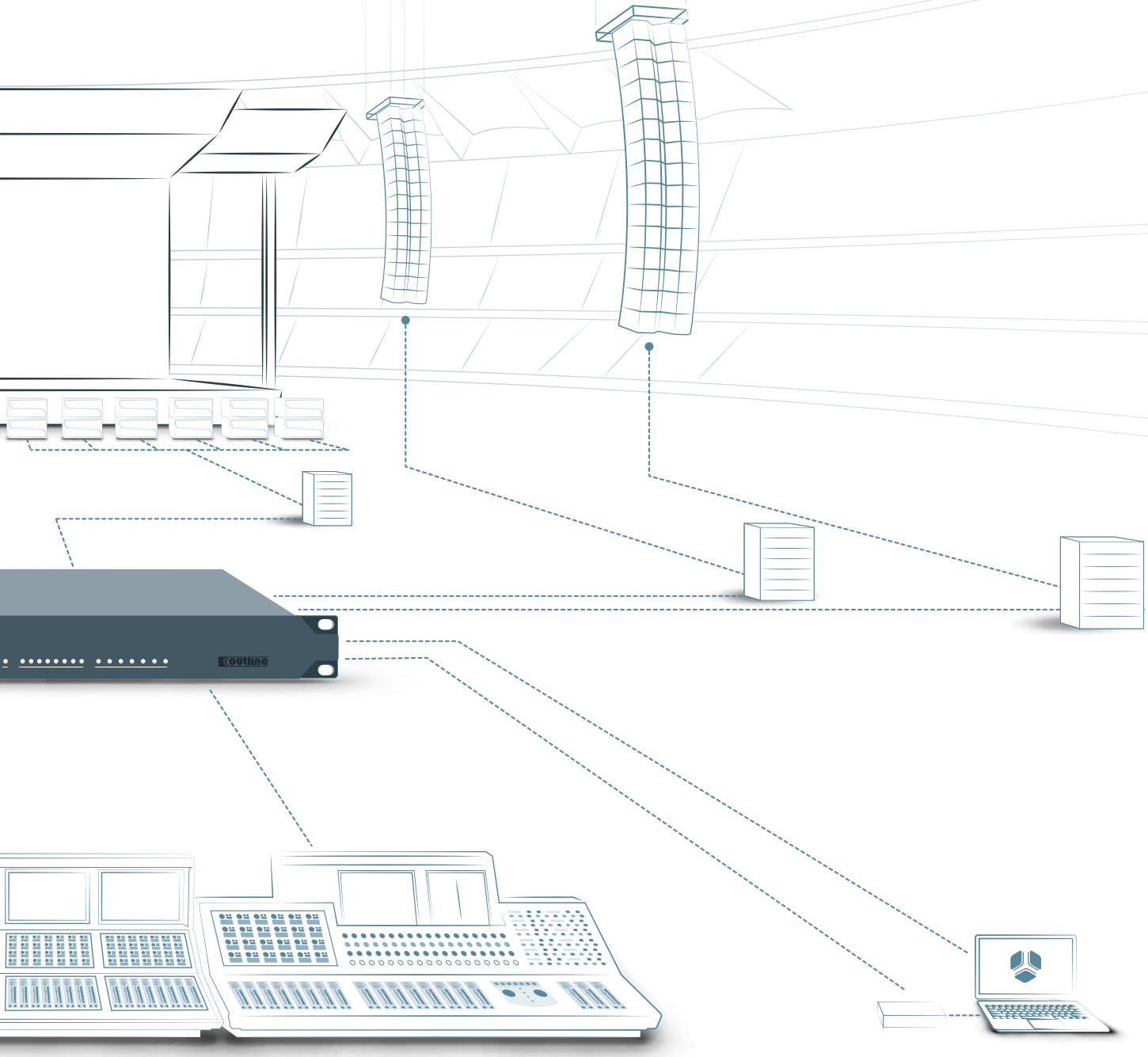
NEWTON



ONE OF THE (ALMOST) UNLIMITED NEWTON APPLICATIONS



WTON



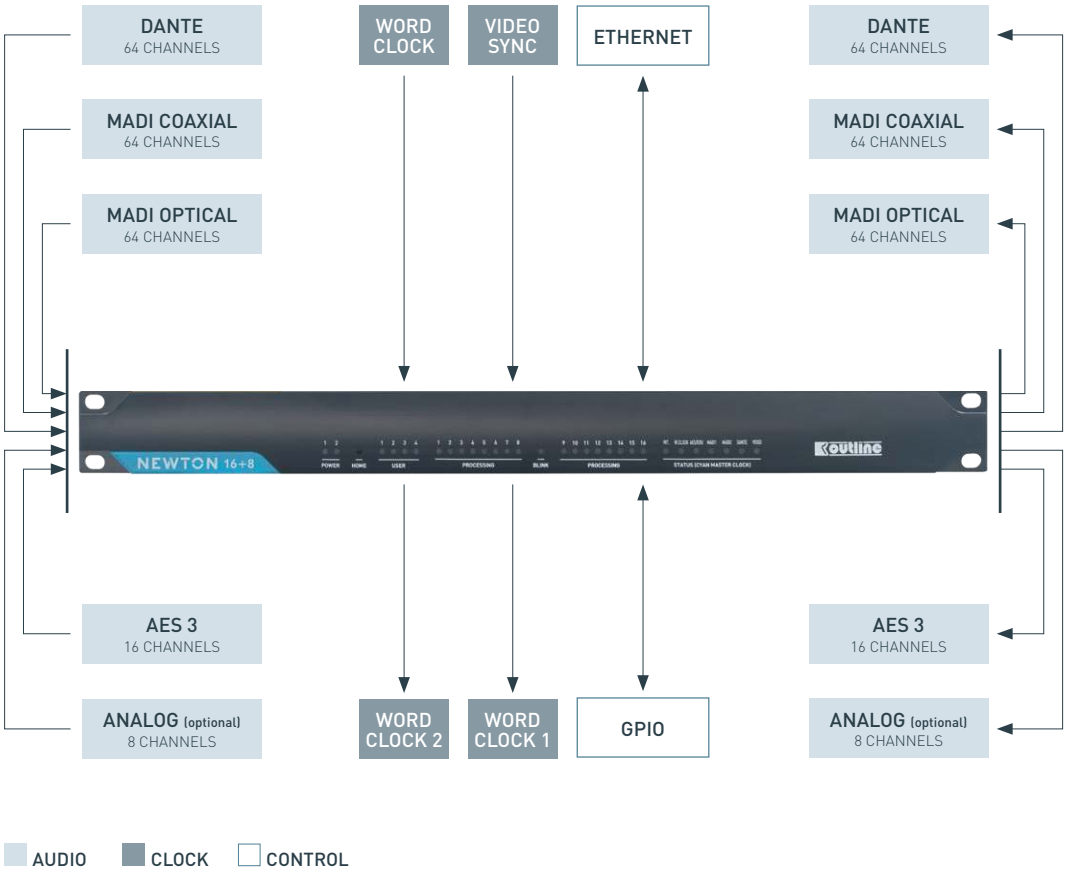
POWERFUL I/O AND LOTS OF IT

96 kHz PROCESSING

Newton comes in three hardware versions: Newton 16, Newton 16+4 and Newton 16+8. Newton 16 offers simultaneous signal connections over Dante™ (AES67 compliant), AES3, MADI Optical and MADI Coaxial, with the capability of fully processing up to 16 Inputs and 16 Outputs simultaneously. All processed signals and direct outputs can be routed out of Newton using any of the available audio standards. This, as just one example, would allow signals to be received over MADI, processed and then transmitted to multiple amplifiers on Dante with an AES3 output for backup. This direct out, processing and routing ability can also be used to create a backbone for a multiple Newton Network to share signals.

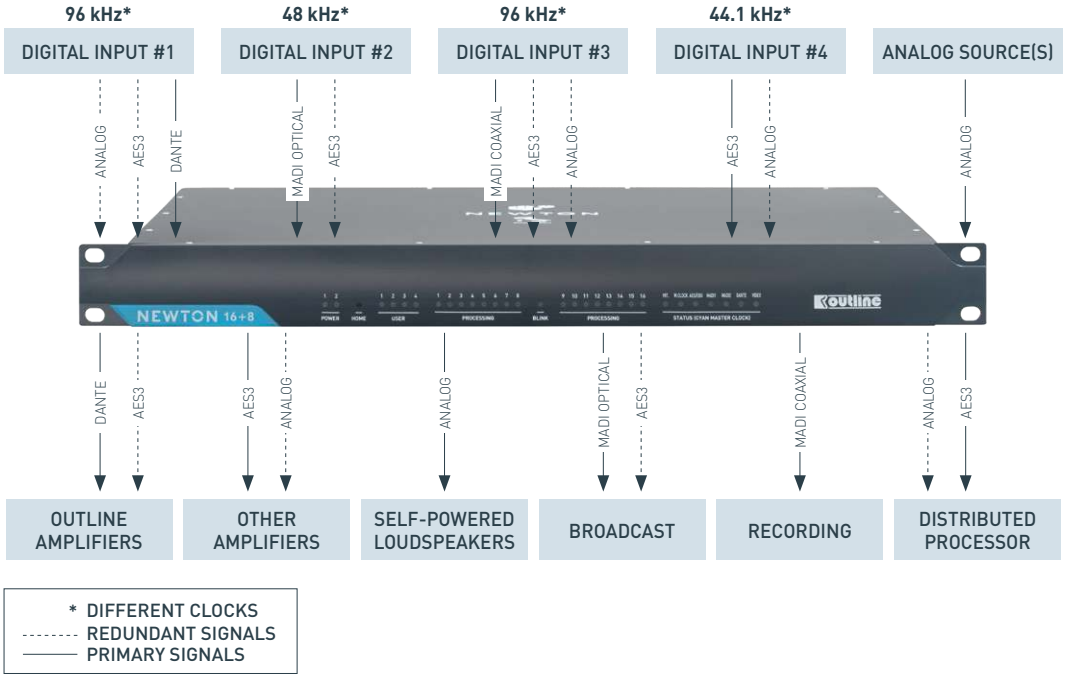
Internal processing is all at 96 kHz, with an internal data depth up to 64 bits. In each processing section users have precise control over Level, Delay, Polarity and Raised Cosine Filters (implemented within WFIR Equalisers), all functions that are required to manage and optimize a loudspeaker system.

While Newton 16 is an all-digital device, Newton 16+4 and Newton 16+8 add the useful capability of local analog inputs and outputs. Newton 16+4 adds 4 auxiliary analog inputs and outputs while Newton 16+8 adds 8 auxiliary analog Inputs and outputs. Each analog input is also provided with additional processing and matrix allowing inputs to be processed, routed and mixed into the main matrix. All three versions of Newton share the same motherboard and it is possible to upgrade from Newton 16 to Newton 16+4 or Newton 16+8.



Dante™

Newton 16+8 connection, an example with multiple consoles and multiple destinations.



ASYNCHRONOUS AND SYNCHRONOUS SAMPLE RATE CONVERSION

SAMPLE RATE CONVERTERS
CLOCK MANAGEMENT

Managing the multiple digital audio inputs and outputs provided on Newton and reliably interfacing them to the outside world is all about timing. The Newton design team at Outline recognise that in the real world the synchronization, timing and sample rate conversion between multiple digital audio protocols and clocks is the single major limitation to practical and reliable system operation. The solution to this is a feature we call 'Multiple Clock Source Management'. This powerful capability provides both automatic and manual settings for the timing references and source clocks of all digital audio signals under Newton control. This advanced capability ensures seamless synchronization and reliable operation between Newton and all outside devices, no matter what sample rate or clocking sources are supplied.

FAIL-SAFE BACK-UP STRATEGIES

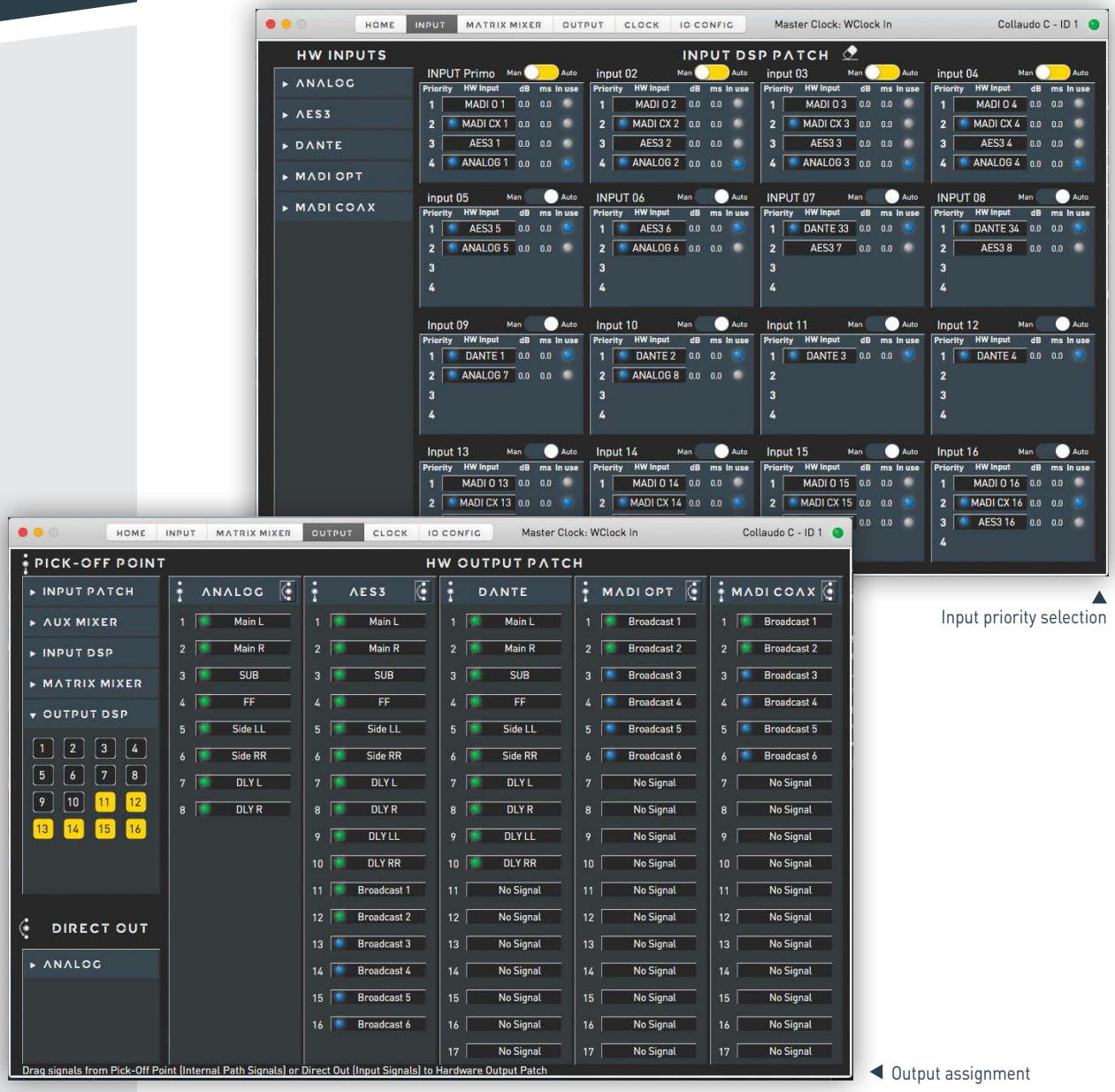
FPGA PROCESSING

FAIL SAFE BACK-UP STRATEGIES

Production projects of all sizes demand audio backup strategies, Newton provides several, ranging from dual redundant universal AC mains supplies and dual cooling fans to automatic clock source and audio signal switchover.

Newton's architecture itself is based on a complete fail-safe design. The Linux kernel takes care of network communication, while an independent and powerful FPGA chipset looks after audio signal processing. Outline Dashboard™ software gives the user the ability to define a backup strategy for all I/O and establish audio failover priority. If the designated primary source fails, then the second designated source takes over, if the second is not available, then the third one switches in, etc.

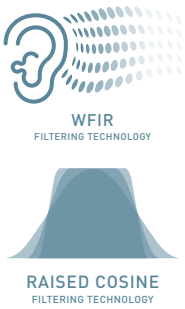
This architecture also enables Newton to establish priority and failover strategies between different signals on different protocols (MADI coaxial, MADI optical, Dante™, AES3 or Analogue) on different physical connectors, each with different timing references and establish priority and failover strategies.



▲ Input priority selection

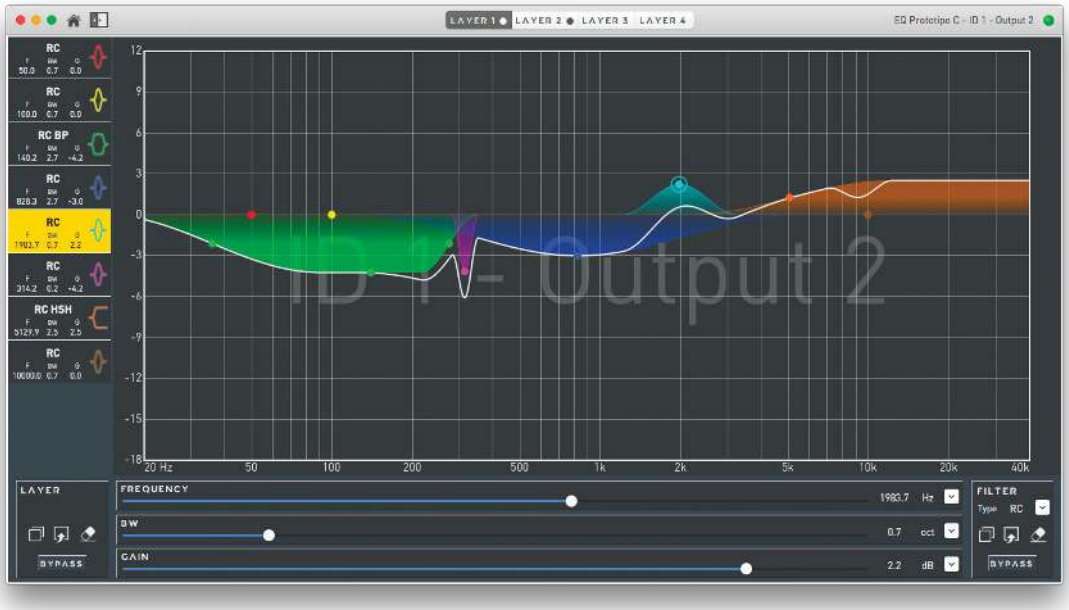
◀ Output assignment

WFIR TECHNOLOGY*
A STEP BEYOND IN EQUALISER PRECISION



Sophisticated equalisation is an established requirement for modern sound system optimisation and Newton's equalizers are unique. While classic FIR (Finite Impulse Response) technologies are known to have characteristically poor low frequency resolution, Outline's approach is a new development based on powerful WFIR (Warped FIR) algorithms. Developed by the same engineering team responsible for our proprietary iMode control system, WFIR technology enables Newton to deliver an almost constant resolution per octave, enabling the generation of complex frequency responses with extreme accuracy. WFIR also enables Newton to apply multiple equalization layers and groups on each single channel without adding latency.

* PATENT PENDING



OUTLINE DASHBOARD™

In order to control all the features of Newton, a fast and reliable tool is required. For this reason Outline's IT team developed Outline Dashboard™, a step forward in loudspeaker systems control. One Newton or a distributed network of Newtons can be controlled by software that offers real time monitoring of the machine's status and quick access to all its parameters. A very powerful feature is the ability to manage multiple layouts of windows for fast recall of different working space configurations. Dashboard™ has been developed for macOS and uses a lot of native multi-touch gestures including Virtual Spaces and Mission Control.

NEWTON

ONE NEWTON OR MANY?

Newton builds on its many core features by allowing the interconnection of multiple Newtons, thereby providing a comprehensive Audio Network solution. One Newton or a network of Newtons are efficiently managed and controlled from the Outline Dashboard™ application software for MacOS.

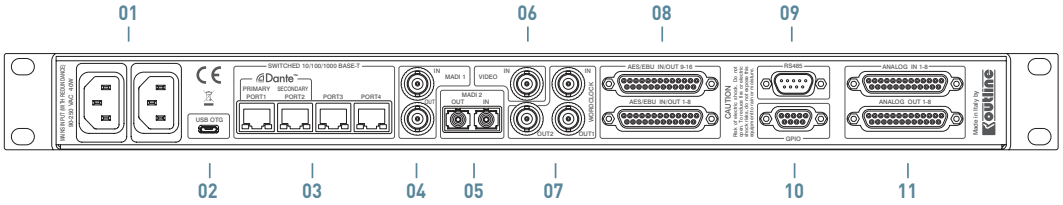
GROUND LOOPS: NO, THANKS!

The analog inputs and outputs in Newton 16+4 and Newton 16+8 employ sophisticated galvanic isolation to avoid ground loops. Galvanic isolation between the main digital board and the analog input and output boards prevents the flow of loop currents between the analog grounds of the input or outputs and the digital ground of the Newton.

ISOLATION
ANALOG CIRCUIT DESIGN

EXTERNAL CONNECTIONS

All external physical audio I/O connections are made on Newton's 1 RU rear panel along with GPIO, four Ethernet ports, RS485, Video Sync, Word Clock connections and dual IEC power inlets. To facilitate reliable temporary portable connections, Outline also offers an optional series of cabled expansion rack panels, providing access to all the analogue and digital signals available on rugged, industry standard connectors.



01. 2 Redundant Power Supplies

02. USB OTG (On The Go)

03. Ethernet Switched 100/1000 Base-T
(Port1, Port2, Port3, Port4)

04. Coaxial Input and Output, both capable of 64 Madi channels

05. Optical Input and Output, both capable of 64 Madi channels

06. Video Sync Input

07. WordClock Input / Output

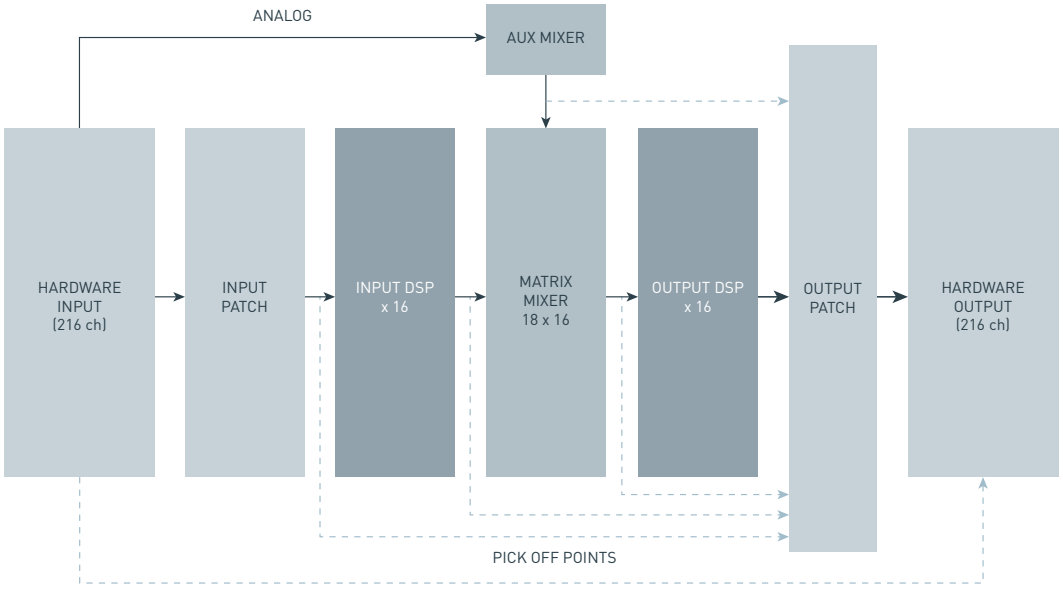
08. 8 AES3 Inputs / Outputs
(providing a total of 16 input and 16 output channels)

09. RS485 control

10. GP I/O (2 In and 2 Out)

11. 8 Analogue Inputs / Outputs

▲
Cabled expansion rack panels for Newton: CABLANWT-ANL (8 analog in and 8 analog out) and CABLANWT-DGT (Dante, Madi, AES3, Clocks and Network connections) housed in a convenient 4U rack (AMP-RACK4U).



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Complete Newton processing flow: 16 processing input and output channels, complete routing with SSRC (Synchronous Sample Rate Converters) and ASRC (Asynchronous Sample Rate Converters). ASRC are required for digital sources with a clock that is different from Newton's Master Clock; SSRC can be used if the source and Newton have the same clock reference, but different sample rate multiplier (i.e. 48 kHz and 96 kHz).

▲

A Newton "Home" view, from which users can have fast and immediate control of each parameter (input selection, signal generator, equalisers, delay, polarity, levels, mute, matrix, output assignement and clock management).

All this, in a few words, is NEWTON

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