Network-attached upsampler/DAC Made by: Data Conversion Systems Ltd, Cambs Supplied by: dCS Ltd Telephone: 01954 233950 Web: www.dcsltd.co.uk: www.ab lutesounds.com Price: £12,500

NETWORK-ATTACHED DAC

dCS Lina Network DAC 2.0

Nestled at the heart of dCS's three-box Lina headphone amp solution is the Lina DAC, now refreshed with APEX-level firmware as a springboard into its mainstream range Review: Mark Craven Lab: Paul Miller

hen dCS was founded in 1987. the idea that hi-fi hardware could be comprehensively upgraded without the need to lug it back to the shop might have seemed the stuff of science-fiction. Skip forward some 40 years, however, and firmware updates – delivered over-the-air for networked products – have become the norm. They're often used to squash 'bugs' and tweak minor settings, but what the Cambridge-based company has done with its Lina Network DAC is more noteworthy.

This unit debuted in 2022 alongside two other Lina components: the Headphone Amplifier and the Master Clock [HFN Nov '22]. All similarly styled and of the same desktop-ready size, the Lina system was aimed at head-fi enthusiasts. Since then, however, dCS has returned to the Network DAC and done what it perhaps should have done from the outset – open up its potential as a standalone DAC so that it more obviously serves as the entry point to its higher-spec Bartók [HFN Apr '23], Rossini and Vivaldi APEX [HFN Jun '22] models.

SIX APPEAL

۲

In the spring of 2023, a firmware update to 'Lina 1.1' status introduced a digital volume control, allowing the Network DAC to be used directly into a power amplifier. But now we get 'Lina 2.0', which not only makes further 'ease-of-use' adjustments but unlocks more of dCS's processing potential and DAC technologies. Described by the company as a 'major performance upgrade', the firmware update is available free of charge to those who have already bought the Network DAC, and is managed by dCS's Mosaic app [see p65]. Naturally, you'll find the Lina 2.0 firmware running on all newly bought models.

RIGHT: A StreamUnlimited 800 series platform [bottom] enables the network functions. The 2x48 matrix that comprises the RingDAC core [centre] is addressed via a Xilinx Artix-7 FPGA [upper left]. Note also the 48kHz/44.1kHz clocks [left] and fully balanced, mixed op-amp analogue output [right] with its own regulated PSU

Apart from a new channel balance feature, and the ability for the Lina Network DAC to be controlled via a dCS remote. the headline changes are those actually predicted in HFN when we reviewed the unit in 1.0 guise, and they will satisfy hi-fi tweakers Rather than limiting the linear phase-type filter selection to two choices, the Lina 2.0 offers the same six-strong filter choice you will find on dCS's full-size Bartók and Vivaldi DACs. There are

also now three 'mapper' settings for the unit's custom Ring DAC while DSD upsampling has also been uprated to DSD128. dCS debuted its Ring

DAC converter over 30 vears ago and it's now a

highly evolved and practical technology that seeks to combine the pure monotonic conversion of a genuine 'single-bit' DAC with the operation of a PWM bitstreamstyle converter. The current Ring DAC hosts all its custom DSP, including the digital filters, on a Xilinx Spartan processor, truncating incoming LPCM data (and converting DSD) to an average wordlength of 4.6 bits. This is sufficient to address the

48 'identical' current sources that comprise the Ring DAC – this is the component matrix that's clearly visible in our inside picture [see below].

KEY WORDS

'The band were

aiming for a bar

room boogie

atmosphere'

Rather than use these wordlengths to control the length of time a single current source is held open or closed as is the case with traditional PWM/bitstream/hybrid DACs, the Ring DAC treats

all 48 current sources as equal and switches one or more 'on' to define the overall magnitude of each consecutive 'bit word'. In practice, however, the elements in the Ring DAC matrix are

not precisely equal. To address this, dCS randomises the mapping of bits to these current sources so that errors manifest themselves as a slight increase in noise rather than harmonic distortion. The new mapping options added to the Lina 2.0 also double the address rate to the Ring DAC, pushing this 'error noise' out to even higher (inaudible) ultrasonic frequencies [see PM's Lab Report, p67].





From the outside, dCS's Network DAC looks just as elegant in its compact, 22cm wide black alloy casework. The front panel offers nothing beyond a smart LCD display with touch-sensitive buttons below and a standby button that's almost hidden away on the underside. There's a power switch around the back, next to a comprehensive set of connections including dual AES, USB-B, USB-A and S/PDIF inputs; an Ethernet port (there's no Wi-Fi here); and balanced XLR and unbalanced RCA analogue outputs. Network functionality includes Roon Ready status, Apple AirPlay 2, local file playback and, through the Mosaic Control app, streaming platform integration.

A final observation is that dCS will presumably update the Network DAC's user manual to reflect the expanded functionality of the Lina 2.0 firmware. The one supplied with our review unit made no

MOSAIC MUSIC

۲

dCS Lina DAC the easier to latch on to \ominus Once installed, the app will 'find' connected dCS hardware on your home network. As well as a button to choose your screen presents four menus. 'System Test' instigates a channel check and 'Display' lets you to dim the brightness of the Lina 'small' and 'large' font sizes. 'Device' includes the new balance is your port of call to see the sample rate of your current music, DAC mapper choices - changes are made immediately, ensuring comparisons are easy. There are also crossfeed functions available for when the Lina Network DAC 2.0 is driving dCS's partnering Lina Headphone Amp.

While the Lina Network DAC 2.0's display imparts plenty of information and gives access to its user settings, the best way to operate the unit by far is with dSC's Mosaic Control app, free for iOS and Android devices. Also used for control of dCS's other networked products, this has a clear interface that makes it fine for smartphone as well as tablet use, and is generally intuitive. music source - streaming service integration includes Qobuz, Tidal, Deezer and Spotify [see screenshots, right] – the home DAC's front panel, while also allowing you to choose between control feature, and clock and USB audio class selection, 'Audio' and explore the unit's extensive upsampling, filter and Ring

Reprinted from Hi-Fi News for global distribution www.hifinews.co.uk



mention of the mapper, filter and digital volume changes, and enabling the last of those required delving into the DAC's settings via the hardware display, as it wasn't possible through the app.

CLEAR TO HEAR

During my time with the Lina Network DAC 2.0 I used it both with a Rotel Michi P5 preamp [HFN May '20] before switching on the digital volume control and using it straight into both Primare A35.2 [HFN Dec '19] and – with one eye on my electricity bill - BAT REX 500 power amps [see p42]. Adjusting the volume from the app (or through Roon on a MacBook Air) meant having one less set of XLRs, and a whole other box in the signal chain, to worry about. And philosophically, a direct connection dovetails well with the Lina Network DAC 2.0's own

LEFT: The Lina DAC 2.0's glossy fascia/display has touch-sensitive 'buttons' for navigating the Source, Processing and Device menus that reveal the new digital filter, mapper and DSD x2 upsampling options

performance, which is all about uncluttered transparency and clarity.

As discussed by PM in our review of the Bartok APEX DAC, the effect of dCS's various filter options is dependent on the sampling rate, so experimentation is

certainly recommended even if you, like me, end up with no overall preference. On the other hand. I soon plumped for the unit's Mapper 3 option, as this seemed to yield a marginally richer and weightier presentation without scrubbing away any fine detail. The stomping, lurching 'swamp rock' of Tony Joe Watson's 'Bubba Jones' [Smoke From The Chimney, Easy Eye Sound; 48kHz/24-bit] had a rhythm section as hearty as a bowl of gumbo, but above it sat a clear, glare-free treble.

Guns N' Roses' cover of New York Dolls' 'Human Being' [The Spaghetti Incident?, Geffen Records; CD res] suffers in part from the band aiming for a bar room boogie atmosphere that, on lesser systems, can become a struggle to make sense of. The Lina DAC, however, did a good job of parsing its mishmash of elements, so the

lead and rhythm guitars, bass, piano, drums, multiple vocals and - yes -

kazoo weren't all tripping over each other. This made it all

www.hifinews.co.uk | Reprinted from Hi-Fi News for global distribution



۲



ABOVE: The Lina DAC 2.0 includes LAN, USB-B and USB-A (DSD128/384kHz), dual-AES (384kHz), 2x coaxial (192kHz) and optical (96kHz) inputs. Analogue outs on XLRs and RCAs are joined by Word Clock inputs for connection to the Lina Master Clock

the track's frantic, upbeat rhythm, led by Matt Sorum's snare drum which was delivered with real attack.

On this piece, and others, there was little sense that dCS's Lina DAC was smoothing over rough edges. It has a revealing nature across the frequency band, keeping percussion details well-lit and uncovering plenty of texture in both instruments and vocals, but leaving poorer-quality material no place to hide.

SPIT 'N' POLISH

۲

For example, Steve Earle's 'Feel Alright' [*I Feel Alright*, Warner Records; CD res] was wide, vibrant and polished, with excellent detail to his acoustic guitar, an authentic rasp to the harmonica, and wellrounded basslines. Conversely, 'Beyond The Grave', by American metal band Jungle Rot [*A Call To Arms*, Unique Leather Records; CD res], came across with all its lowbudget foibles intact – a narrow presentation, and a thick, muddy sound dominated by the lower-mid.

The title song of Def Leppard's multi-selling album *Hysteria* [Super Deluxe Edition, Phonogram; CD res] has no such mixing/mastering issues – producer Mutt Lange and the band spent years honing a sound that would appeal to the MTV masses – and dCS's Lina DAC handled it with real panache. There was detail and dynamic attack, but the mellifluous quality of the production remained, making the song easy to dive into.

When you change pace to music of a more intimate, low-key nature, the Lina Network DAC follows suit, using its superb resolving qualities to present a soundstage with air and nuance. And it's arguably here that the potential of dCS's Ring DAC platform comes to the fore, bringing a naturalistic, organic feeling to the ethereal soundscapes of Bjork's 'Pagan Poetry' [*Vespertine*, One Little Independent Records; 48kHz/16-bit]. Here the Icelandic singer's voice is lathered in reverb, floating free of an instrumental background of keyboards and effects. It builds up, layer upon layer, until coming to a dead stop – Bjork is suddenly close-mic'd and alone, centre stage, and this change in presentation was delivered superbly.

It's a performance of impressive authority, where detail retrieval and soundstaging aren't exaggerated at the expense of the feel of the music. Joni Mitchell's 'River' [*Blue*, Rhino/Warner; 192kHz/24-bit] ebbed and flowed beautifully, with no trace of sibilance or harshness to her high-flying vocals, and softly struck piano notes fading away with grace. The Lina Network DAC 2.0 might be designed for desktops and headphones, but its true destiny lies in partnership with larger systems. ()

HI-FI NEWS VERDICT

dCS should be applauded for taking its most affordable DAC down the upgrade path so soon after launch. Now with variable line outputs to drive a power amplifier, and with greater options for 'sound seasoning', the Lina Network DAC is still desktop-friendly in design but is now even better equipped to front a conventional hi-fi set-up. Performance, meanwhile, is bang on the money.

Sound Quality: 89%

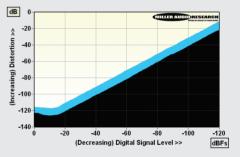
LAB REPORT

۲

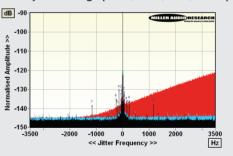
DCS LINA NETWORK DAC 2.0

Alongside the considerable gains in flexibility and subtle gains in performance, the Lina DAC 1.0's 2.05V/5.91V balanced out(s) and 109.1dB/117.0dB A-wtd S/N ratio(s) – 2V and 6V modes, respectively – are unchanged, as is the usefully low ~10hm o/p impedance. The new M3 Ring DAC mapper offers reduced ultrasonic noise over the M2 option, with M1 and M3 trading fractionally higher peak level THD (0.00019-0.0003% vs. 0.0001-0.00025%) for a reduced *minimum* of 0.00004-0.0001% over the top 20dB of its dynamic range [see Graph 1]. Jitter remains very low at ~20psec [DXD upsampling; black, Graph 2] while the HF shift in requantisation noise offered by the new DSD x2 mode [blue, Graph 2] is very clear vs. DSD x1 upsampling [red, Graph 2].

The new six digital filters are culled from the Bartók [HFN May '19] and Vivaldi APEX [HFN Jun '22] so the DAC 1.0's F1 and F2 options - steep and slow roll-off linear phase types, respectively are equivalent to F1 and F4 in the Lina DAC 2.0. The response(s) depend on your choice of filter, all six delivering a ruler-flat ± 0.02 dB (20Hz-20kHz) with CD media albeit with variable stopband attenuation (125dB, 35dB, 12dB, 6dB and 125dB, F1-F5, respectively). F5 is a minimum phase type with significant post-ringing and F6 a linear phase type with lower amplitude, but more extended, pre/post ringing. F1-F4 are linear phase with responses of -22dB/45kHz, -0.6dB/45kHz, -29dB/39kHz and -10.5dB/ 45kHz, respectively, with 96kHz media and -13.0dB/ 90kHz, -7.1dB/90kHz, -23dB/77kHz and -17.6dB/90kHz, respectively, with 192kHz files. These filters are applied before DSD and DSD x2 upsampling and have -3dB limits set at 78kHz, 68kHz, 64kHz, 30kHz and 29kHz (DSD) and 78kHz, 78kHz, 78kHz, 60kHz and 57kHz (DSD x2), respectively. PM



ABOVE: THD vs. 48kHz/24-bit digital signal level over a 120dB dynamic range (black, 1kHz; blue, 20kHz)



ABOVE: High res. 96kHz/24-bit jitter spectrum with F1 filters (DXD upsamp., black; DSD, red; DXDx2, blue)

HI-FI NEWS SPECIFICATIONS

Maximum output level / Impedance	5.91Vrms / 1.0ohm (XLR out)
A-wtd S/N ratio (USB / Network)	117.0dB / 117.1dB
Distortion (1kHz, 0dBFs/-30dBFs)	0.00019% / 0.00010%
Distortion & Noise (20kHz, 0dBFs/-30dBFs)	0.00030% / 0.00022%
Freq. resp. (20Hz-20kHz/45kHz/90kHz)	+0.0 to -0.0dB/-0.6dB/-7.1dB
Digital jitter (48kHz / 96kHz)	21psec / 22psec
Resolution (1kHz @ -100dBFs/-110dBFs)	±0.1dB / ±0.2dB
Power consumption	21W (1W standby)
Dimensions (WHD) / Weight	360x320x530mm / 9kg

www.hifinews.co.uk | Reprinted from Hi-Fi News for global distribution

100