Network-enabled digital audio player/network bridge
Made by: AQ Technologies S.r.l., Milan, Italy
Supplied by: Elite Audio Ltd, Fife
Telephone: 01334 570 666
Web: www.aquahifi.com; www.eliteaudiouk.com
Price: £4982 (£5999 with Roon and UPnP modules)

AUDIO FILE

hi-finews HIGHLY COMMENDED

Aqua LinQ

Packed with proprietary technology, this network bridge is the obvious partner for Aqua's own DACs. But does its appeal extend beyond a one-brand digital set-up?
Review: **Andrew Everard** Lab: **Paul Miller**

ABOVE: The LinQ keeps it simple, its fascia having little more than toggles to select the modular boards (up to four may be loaded). Switches to left select power and display on/off

Never let it be said that AQ Technologies is either a follower of fashion or a taker of the easy route: the Milan-based company behind the Aqua range always does things its own way. And while that might sometimes seem like an exercise in making life difficult for itself, the policy typically pays off in the performance, as we discovered when reviewing the Aqua Formula xHD Optologic DAC [*HFN* Apr '20]. Under the Nextel-finished anti-resonant aluminium casework of that model – one of three DACs in a total Aqua lineup of five products – is a galvanically-isolated resistor-ladder converter of novel design.

Now, for a network source to feed the DACs – there's also a CD transport in the lineup – the company has developed its own network streaming solution, which is at the heart of the £4982 LinQ we have here. Add the DAC and this network 'transport' together, and you have a complete streaming player with a tag around the £16,000 mark, or you could start at a lower level with the LinQ and Aqua's La Voce S3 DAC, and do the job for a little over £9000.

ON THE CARDS

So what actually is the LinQ? Well, the connections to the rear tell the story better than the front panels. There's just an Ethernet port for network connection here, and a range of digital outputs, so this is effectively a network bridge, designed to bring streaming capability to the company's DACs. But intrinsic to the design is its modularity, with the LinQ's chassis able to accept up to four cards designed to add functionality [see PM's boxout, p53].

As standard for your £4982, the LinQ will come equipped with either a Roon-ready card or one for UPnP/DLNA streaming, but include both Roon and UPnP and you increase the bill to £5990. At the moment those are the only two cards available for the LinQ, but we are promised more, the module in use being selected by simple front-panel toggle switches.

It's worth noting here that this modular architecture allows each board to be optimised for its function, rather than squeezing all the functionality through a single one-size-fits-all board. In addition to the LinQ itself having separate C-Core transformers for its network and digital decoder sections, each board has its own PSU regulation. There's also a bespoke LAN switch module included, increasing isolation from the user's network.

And that, almost, is your lot when it comes to things to play with on the LinQ, as the only other controls are a power switch and one to turn off the display. There's no remote (though an RC5 handset is available as an option), and neither does this player have a dedicated control app.

> 'The LinQ does absolutely nothing – but in a good way!'

ROON TO THE RESCUE

Now I get the whole 'no need to reinvent the wheel' thing when there's a good range of third party UPnP control/player apps available, from PlugPlayer and Bubble UPnP to mConnect and Kinsky, but I can't help feeling an app 'skinned' with the Aqua aesthetic wouldn't go amiss here, reflecting the company's idiosyncratic approach.

Oh well, I suppose there's always Roon, which renders the whole subject moot, coming as it does with its own ultra-slick and intuitive app interface, which is quite unlike that of any conventional UPnP software. You can even 'drive' the LinQ from a laptop or desktop computer using Roon, as well as from your phone or tablet – but bear in mind that you're also going to need a means of running the Roon Core software (which could be on that computer) and of course a Roon licence.

So is the LinQ only for owners of Aqua's DACs, or does it have wider appeal than that? Well, that sort of depends what you want from your network bridge, for unlike just about every device of this kind, the LinQ's output of choice isn't a USB port to match up with virtually every aftermarket DAC. Instead, the principal digital output here is something called 'AQLink Pro', on an RJ45 'Ethernet type' socket – just don't be fooled into thinking this is some kind of network connection.

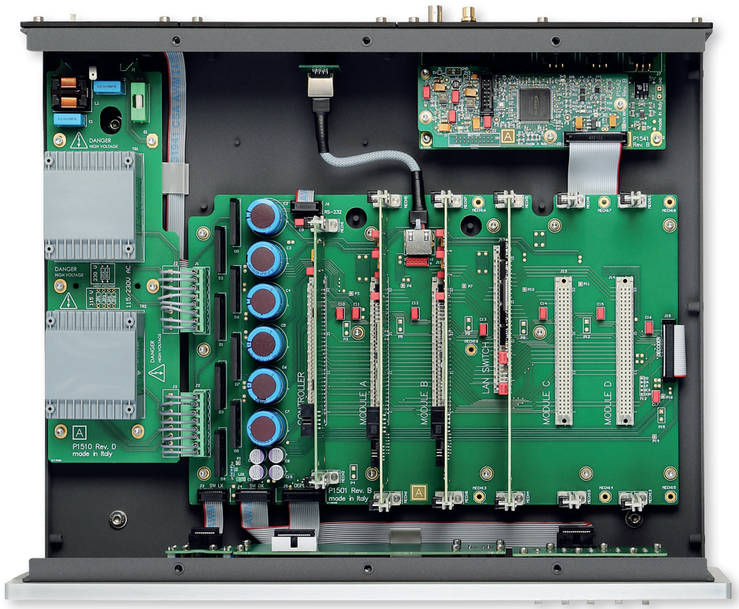
STRIPPED DOWN

Of course, Aqua's DACs have this connection, which is a proprietary spin on I²S, and able to carry audio formats up to 384kHz/32-bit LPCM and DSD128, as is the dual AES/EBU connection, should your DAC support that. The remaining single AES/EBU and two S/PDIFs – one apiece on BNC and RCA – are capable of delivering up to 192kHz/24-bit and DSD64. Why no USB audio output? Simply, Aqua says it has chosen to leave it out to avoid the conversions needed to implement it, which it feels are detrimental to sound quality.

The same goes for other elements of the somewhat stripped-down network interface found here, so you'll search in vain for any sign of wireless connectivity, whether that be Wi-Fi or any flavour of Bluetooth. The LinQ is optimised for wired networking, and nothing else – although if your controller app supports it, you can play music from your smartphone, for example, via UPnP to the LinQ.

So, the use of the LinQ with one of the Aqua DACs could be seen as something of a no-brainer, so closely are they designed to work together. Use them with a UPnP control app such as the mConnect Player and you can access your own files stored elsewhere on your home network, as well as online services such as Qobuz and Tidal, along with Internet radio. And you can also enjoy files up to dual DSD and DXD.

For those of us without recourse to an Aqua DAC, things are a little more limited – but that's where Roon comes in, with its ability to convert files before sending them to the LinQ, not to mention a much more enjoyable and flexible interface than any of the commercially available UPnP apps.



RIGHT: Two transformers [near left] feed separately regulated PSUs [blue caps] that supply the custom LAN switch card [far right], Roon and UPnP DLNA cards [centre] and digital decoder [on an Altera FPGA, top right PCB]

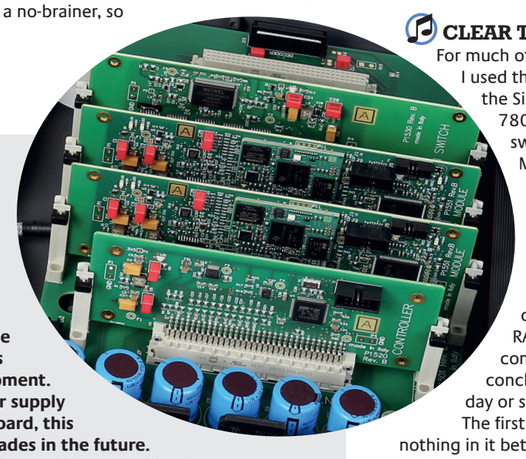
CLEAR TO HEAR

For much of the testing here, I used the LinQ alongside the Simaudio MOON 780D v2 [see p40], switching between MOON's onboard MiND2 streaming implementation and the LinQ connected via an AES/EBU connection, and between UPnP operation and Roon RAAT connectivity, before coming to a couple of conclusions after only a day or so of listening.

The first was that there was nothing in it between the sound with the 780D v2 fed by its internal MiND2 module and the LinQ/780D v2 path. The second was that switching between the LinQ's UPnP module and its Roon board made not a jot of difference to the sound.

So for the rest of the listening period I mainly stuck to controlling the LinQ via Roon and using the 780D v2 as just a DAC. I also tried a few experiments such as feeding the Aqua's inputs into my Naim ⟶

CUSTOM DIGITAL



There is very little indeed that's 'off-the-shelf' within the LinQ even if its lack of a USB output, proprietary or otherwise, remains something of a puzzle. In practice, the LinQ is based on a series of completely independent modules, each optimised for a particular function. In addition to the Roon Ready bridge module and UPnP DLNA streaming module there's also an HQ Player NAA solution in development. Each module has its own dedicated power supply and plugs into a connector on the base board, this architecture also enabling swap-out upgrades in the future.

The current modules are based around TI's AM335x Arm/Cortex processor running proprietary UNIX code and a custom Linux kernel for the Ethernet stream. The modules boot swiftly, assigning the router/modem DHCP IP within seconds. There's also a Xilinx FPGA for the clock and digital routing, with further proprietary code developed to implement the S/PDIF, AES/EBU and dual-AES outputs. Finally, the communication lines between each module are galvanically isolated, with further separation afforded by the internal LAN switch module, developed by Aqua. Indeed, Aqua claims the use of this built-in LAN switch is key to obtaining the best sound out of the LinQ. PM

ABOVE: Aqua offers a single wired Ethernet port by way of input, feeding single and dual-AES/EBU outputs on XLRs, S/PDIF outputs on coaxial and BNC connectors, and an I²S output via an RJ45 connection (this is not a network port)

ND555 [*HFN* Apr '19] via digital in, and drawing comparisons between the two 'network transports', as well as trying the LinQ with various other DACs and 'digital input' amps I had to hand [NAD M33, *HFN* Aug '20].

The upshot of all this fiddling about? Well, the Aqua LinQ does absolutely nothing – but in a good way! I rapidly became aware that I was listening not to anything being added or removed by Aqua's 'network interface', but to the sound of the digital converters to which it was connected being fed with a clean S/PDIF or AES/EBU stream.

SOARING RIFFS

So, when thundering out the live version of 'Telegraph Road' from Mark Knopfler and Emmylou Harris's collaborative *Real Live Roadrunning* set from 2006 [Nonesuch/Warner Bros 44417-2], the sound was both open and unmistakably live, with a real sense of event and a fine insight into Knopfler's ringing guitar work and his husky voice.

Meanwhile in the duets with Harris the two voices play off each other in a delightful fashion, while at the same time being totally distinct, the backing band, all accordion, pedal steel and organ, creating a warm, lush backdrop. And then on 'Speedway At Nazareth' Knopfler lets loose with stabs of guitar and soaring riffs, the transparency of the LinQ really taking the listener into the heart of the band.

With an entirely different genre, it's something it also does with the precision and reverberant ambience of Anna Prohaska's *Bach: Redemption* collection [Alpha Classics ALPHA658; 192kHz/24-bit], both bringing out the detail of the small musical forces involved and allowing Prohaska's lovely soprano voice to fill the church acoustic in which the album was recorded.

The open clarity also suits well the effortlessly natural-sounding production of Bob Dylan's *Rough And Rowdy Ways* [Columbia; 96kHz/24-bit download], whether with the darkness of the track 'Black Rider' or the chugging blues of 'Crossing The Rubicon'. Here the whole set has a 'stick a microphone in front of the band' feel, and the crisp rendition of the unforced sound – if one can have such a thing with an album so obviously produced to within an inch of its life – even makes the convoluted closer, 'Murder Most Foul', compelling. Yes, all 17 minutes of it!

Every single detail of the mix is delivered through the Aqua LinQ into whichever DAC you choose to use with it, and it's a sound you'll find yourself listening to repeatedly, just to hear those little nuances in Dylan's near-spoken vocals.

And it's affecting musically, too, more than which one really can't ask. Yes, it's arguable there are less expensive ways of achieving the same effect when networking an existing DAC, but Aqua's following of its own ways certainly pays dividends here.

HI-FI NEWS VERDICT

Any sound quality score here is somewhat arbitrary, simply because the Aqua LinQ brings nothing of itself to the sound, and merely lets the DAC to which it's connected perform at its best. Arguably still better connected to one of the company's own DACs via the proprietary AQLink connection, it certainly offers a very clear path twixt network and digital conversion, and it's hard to argue with that.

Sound Quality: 84%

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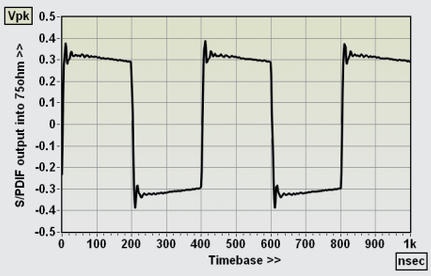
LAB REPORT

AQUA LINQ

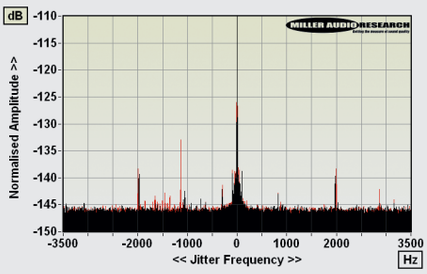
The LinQ's closest bedfellows in the hi-fi market are products like the Pro-Ject Stream Box S2 Ultra [*HFN* Oct '18] and dCS Bridge [*HFN* Jun '17], all of which are digital signal conditioning devices without either onboard ripping or storage services. In practice this means re-clocking and formatting data between Ethernet and, in this case, AES/EBU and S/PDIF output formats. The LinQ's S/PDIF output falls a little outside the 0.9-1.2V IEC-958 specification at 766mVp-p but deterministic jitter is well within the ±20nsec window at ±1nsec. Aqua uses a wideband line driver that confers a 'fast' 5.8nsec risetime with minor ringing and overshoot into a standard 75ohm termination [see Graph 1].

Otherwise, as the music data remains in the digital domain in and out of the LinQ, any uplift in subjective performance over a conventional NAS or PC/Mac can only be inferred via a third-party DAC. Secondary re-clocking or jitter suppression within the attached DAC is also a factor here, so a DAC with excellent performance may not express a significant difference. Similarly, a DAC that incurs jitter at the chip level will not improve regardless of the LinQ's re-clocking of the digital data. A good example of the former is provided by Mytek's Brooklyn DAC [*HFN* Aug '17] which employs an ES9018 converter expressly recognised for its built-in jitter suppression.

So there was no difference in the 115.5dB A-wtd S/N ratio between both instrument-grade PC and Aqua LinQ/Mytek combinations and essentially no difference in the 8psec/7psec jitter (48kHz/96kHz sample rates). However there was a reduction in non-jitter spuriae between the custom PC and LinQ [red and black traces, Graph 2, below]. A similarly high level of performance was measured via Musical Fidelity's PCM1795-equipped MX-DAC where jitter remained <10psec at all sample rates with the Aqua LinQ as the interface. **PM**



ABOVE: S/PDIF data pattern from Aqua LinQ coaxial output into a default 75ohm receiver



ABOVE: 48kHz/24-bit jitter spectra from a Mytek Brooklyn DAC over S/PDIF (red, via instrument-grade PC with dedicated digital out; black, via Aqua LinQ)

HI-FI NEWS SPECIFICATIONS

Digital inputs	1x Ethernet
Digital outputs	AES, dual-AES, I²S, 2x S/PDIF
S/PDIF (output level/risetime)	766mV$_{p-p}$ / 5.8nsec
Digital jitter (Mytek Bridge)	8psec (9psec via PC S/PDIF)
Digital jitter (MF MX-DAC)	9psec (12psec via PC S/PDIF)
Power consumption	5W
Dimensions (WHD) / **Weight**	450x100x370mm / 9kg