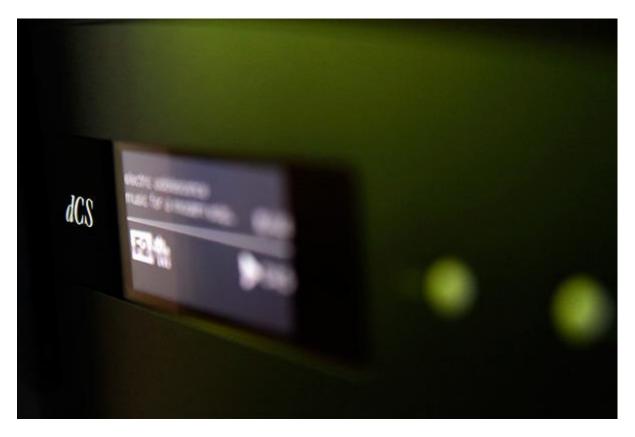# dCS DeBussy to dCS Rossini: A comparison review of two DACs
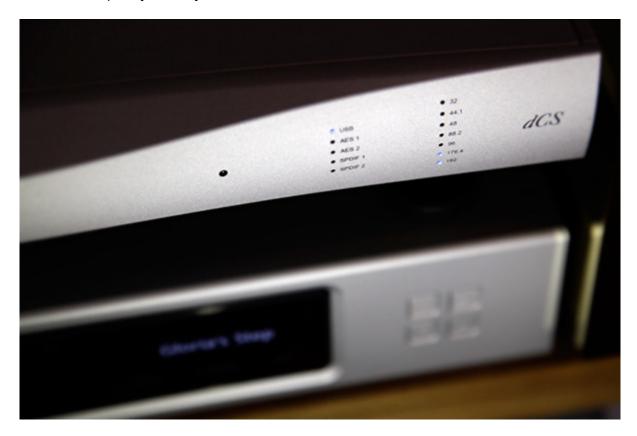
Rafe Arnott | Sep 24, 2018

I watched, a smile slowly spreading across my face while I sipped my tea, as the little chickadee gracefully alighted upon the string holding the small set of wind chimes hanging in our back garden causing them to delicately tinkle in the quiet morning air. The bird's movements and the pure sound of the chimes instantly put me in mind of the listening session I'd had the evening before with the dCS Rossini network-streaming DAC.

The chickadee's lighter-than-air swoops, dives and sudden rests on pliant plant stalks as it explored the overgrown and rain-dampened flora of the yard not only surfaced as a metaphor for the sound signature of the Rossini in my mind, but the balance of the DACs sound too. Much like this little bird is part of nature's balance in the outside world that occupies the area demarcated by fence, hedge and home that I am privy to witness through my dining-room sliding doors. So too, the dCS is part of the balance of my home's high-fidelity ecosystem which I am fortunate enough to be privy to bear witness to.

Whether a marketing stroke of genius, or merely as an honest statement of intent in their naming conventions, choosing 18th and 19th century composers' names to represent their hi-fi efforts is appropriate for the sound capabilities of the dCS DACs I currently have on

loan. John Quick, the General Manager for dCS Americas Inc. shipped out a Debussy and a Network Bridge post haste after we had an initial phone conversation a couple weeks after I took the helm here at AudioStream and I've been thankful ever since as my personal time with dCS gear had been limited – I'd heard their kit in the context of several rooms at a number of shows and at a friend's home in Seattle – up to the point I took delivery of the Bridge and Debussy. But, it was the impact every encounter with the dCS gear built upon from each previous encounter that was starting to leave a mark; an imprint if you will, on my level of respect for what the company was achieving sonically with their designs.

I've written previously of what I would describe as the dCS "house" sound: open, organic highs and a midrange that draws you as a listener into every cut being played, with equal parts warmth and resolution, and deep bass without masking any critical frequency information between the lowest octaves. Let me put it this way, they make it sound like this level of sound quality is easy, when I know for a fact it isn't.

The Debussy and Bridge were very recently followed-up with delivery of the next model up the dCS chain: the dCS Rossini network-streaming DAC. Jumping from the Debussy/Bridge combo decreases your box count as the Rossini no longer required the Bridge to connect online streaming services such as Tidal™,Spotify™ or AirPlay™ with my system. That ability is built in with the Rossini via an RJ45 10/100/1000 network connection.

The idea behind this climb up the dCS ladder of DAC offerings was to firmly acquaint myself with their sound signature in the context of my home system, their presentation of differing file formats (FLAC, MP3, DSD, WAV, etc.) and proprietary software interface capabilities and to prepare for the imminent release of the Debussy replacement, the Bartók which I previewed briefly here.

The Debussy is a perfect example of how dCS treats it's lineup of products. On the market in roughly the same basic construct since 2010, it should be noted that the original 24/96 USB hardware received an upgrade in late-2011 to the current XMOS chipset, that now incorporates the model's final software version that was released in December 2017 and handles DSD128 and DXD. Basic specs from the dCS website are as follows:

- Asynchronous USB input allows direct connection of a computer and supports high resolution audio up to 24-bit, 384kS/s and DSD/128 in DoP format (DSD over PCM).
- An array of independently-selectable digital inputs completes the versatility of this powerful machine, elevating the performance of Red Book CD or high resolution audio from digital streamers and servers to a new level.
- The enhanced digital volume control allows direct connection to a power amplifier, removing the need for a separate preamplifier.
- Maximum output can be set at either two or six volts to suit different amplifier and loudspeaker combinations.
- Debussy also benefits from the 'soft' approach to programmable logic, allowing new software to be loaded from a dCS update disc or connected computer in order to add new features and adapt to future changes in digital audio.

The Network Bridge (MSRP $4,750 USD) hit the market in the first half of 2017 and was hailed as a hydra-headed toolkit for connecting digital devices in your system. Some basic specs off the dCS website:

- Streamlined FPGA-based design.
- Accepts data from UPnP, asynchronous USB-on-the-Go and Apple Airplay.
- Streaming services supported include TIDAL, and Spotify Connect
- Roon ready.
- Optional down-sampling to match legacy DACs.

- Auto clocking system improves ease of use and minimizes jitter.
- Multi-stage power regulation isolates digital and sensitive clock circuitry.
- Firmware-upgradeable from the Internet for future functionality and performance upgrades.
- MQA™ Core Decoder unfolds the MQA™ file once to deliver even higher than CD-quality. The first unfold recovers all the direct music-related information. Output is 88.2kHz or 96kHz.

The $11,999 USD Debussy, like the $23,999 USD Rossini uses dCS' proprietary Ring DAC™ technology which oversamples all incoming data to 5-bits at 2.822 or 3.07MS/s. Also like its bigger brother, it has a plethora of digital inputs including Dual AES EBU, 2x SPDIF, 1x RCA Phono and 1x BNC and Asynchronous USB (Type-A and Type-B USB handle 24-bit PCM at up to 384kS/s plus DSD64 and DSD128 in DoP format on the Rossini), unlike the Rossini, the Debussy has no Network interface (hence reliance on the Bridge), which on the Rossini handles 24-bit 384kS/s as its native sample rate, plus DSD64 and DSD128 in DFF/DSF. Like the Rossini it has adjustable output (2V or 6V, preference is yours), balanced and unbalanced outputs, but it doesn't feature a full-spec MQA™ decoder, multi-stage power regulation and the Debussy also does not feature the dCS 'auto-clocking' architecture (minimizes jitter, said to significantly improve sound quality) or the latest dCS Digital Processing Platform that is used in the company's flagship Vivaldi digital-playback system.

So, you're getting a lot more tech and hardware/software capability for your money with the Rossini, plus a dedicated Rossini app that I found as easy and intuitive to use as the Network Bridge app.

I decided to reach out to Quick and get the company line on several aspects of the Debussy and Rossini, here is our Q&A:

dCS Rossini DAC Q&A

Rafe Arnott: *Having lived with the Debussy for a couple of months, receiving the Rossini and listening to the two back-to-back revealed a significant step up in the realism to tone, timbre, resolution and musical drive, to say nothing of the increase in overall cohesiveness to the playback – regardless of genre. Considering the jump in price, this was in-line with the expectations I had cultivated before hearing the two DACs. Can you talk about the major circuit-topology, transformers, materials, components and chassis differences between the Debussy and the Rossini?*

John Quick: *"Well, the differences between Debussy and Rossini are pretty big, and they should be; aside from the Rossini DAC being twice the price of Debussy, there are major differences in the hardware and what software we can run on each model."*

"Debussy represents the distillation of the best features and technologies we developed for our previous-generation processing platform and RingDAC™ analog board. This platform was originally developed for our previous flagship, Scarlatti, in 2006, and the same processing core and analog board were used in the four-box Scarlatti and Paganini systems, the Puccini CD/SACD Player/DAC, and the Debussy DAC. The Scarlatti and Paganini separates benefitted from multiple power supplies and processing cores, each dedicated to a critical part of the digital playback chain; whereas, in Debussy (and Puccini, for that matter), everything is/was contained in one chassis, meaning everything shares one power supply and one processing core."

"Rossini also represents the distillation of the best features and technologies developed for our third-generation digital playback reference system: the four-box Vivaldi, launched in late-2012. Compared to the previous generation (that includes Debussy), for generation three we redesigned and vastly improved the processing platform, the RingDAC analog board, the power supplies, chassis construction… pretty much everything across the board. In our view – taking into careful consideration what customers are looking for today and what we project they will want for the foreseeable future – Rossini needed to replace both Paganini and Puccini from our previous generation."

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"Working toward that goal, Rossini shares an identical RingDAC analog board with the Vivaldi DAC; network hardware identical to that found in the Vivaldi Upsampler; and twin power supplies like Vivaldi (and in the Debussy's generation, Scarlatti) DAC; however, unlike trickle-down models derived from our previous flagship, we developed a new, dedicated processing-platform for Rossini that would have enough grunt and storage capacity to allow the single chassis to do more and perform better than any one-box dCS in the past."

RA: *dCS utilizes a significant amount of proprietary technology in their designs, with a production model that seems to see the upper echelon of components implementing and benefitting from the latest innovations of the company's constant research and development first (clock architecture, FPGA fine-tuning, digital processing platform advances, UPnP software improvements) and the entry-level models seeming to benefit later in the form of "trickle-down" updates, many of which dCS provides free of charge through firmware updates. Is it safe to say the company sees this as a matter of fact, rather than a favor to owners of older, or lower-echelon models?*

JQ: "What you describe is pretty much the way we've always developed products, and definitely more just how we do things rather than a favour to owners at either end of the

affordability spectrum. As far as we're concerned, the launch of any new dCS product is the start of its product development lifecycle, not the end. Each new generation of dCS products (Vivaldi, Rossini, and Bartok are generation three) begins with a flagship that needs to be at the cutting-edge of state-of-the-art performance; needs to accommodate everything we've learned and developed to date; AND needs to have significant processing headroom and storage capacity to allow us to add features and make performance improvements as we continue ongoing R&D. We scale our flagship back from there in the least compromised way we know how. In some cases, less expensive models actually get new features before our flagship does, but in general because what much of what we do is determined by software, we have great flexibility to continue to offer upgrades over the course of a product's life."

RA: *Upsampling, clock integrity to minimize 'jitter' in digital signal pathways and isolation of delicate analog and digital circuitry seem to play key roles in the overall ethos of dCS's approach to music reproduction. Can you talk about the company's core values when it comes not just to fidelity of playback, but to what dCS stands for as a respected entity in the hi-fi industry?*

JQ: "I guess you could say dCS is a company of agnostic and objective problem solvers. When it comes to engineering in general, despite what some say, there really is no 'no compromise' solution; rather the best know what to do to find a balance with the least compromising trade-offs. Present our engineering team with challenges to improve performance, to get the most out of PCM, DSD, or MQA… and dCS will find the least compromised way to achieve state-of-the-art performance."

RA: *The dCS Network Bridge and Rossini apps have a very similar look, feel and intuitive performance and interface. How important is software app development to the company when there are elephants in the room like Roon in the software segment of the market? Was it key to dCS to design and implement their own app from the ground up as opposed to letting another company do any of the heavy lifting software-wise? And was it because of a difference in how dCS sees the streaming or local library browsing experience? Was it a holistic pursuit for the software to reflect the hardware ethos?*

JQ: "From the moment we decided to include a network input on the Vivaldi Upsampler in 2012 we knew that as much as its performance had to be world-class, the interface was equally as important to get right. We began work on a custom interface then, and we continue to improve and adapt each of the dCS Apps today. For the same reason we were eager to add support for Roon in 2015-16; it is a world-class interface, and we're proud to offer dCS owners both options."

RA: *What in layman's terms is the RingDAC™, is it merely a proprietary Trademark name for a dCS researched and developed R2R DAC? What sets it apart from other designs on the market?*

JQ: "The dCS RingDAC™ design and name is patented and trademarked, but it's actually something very different from a R2R 'ladder' DAC."

"R2R DACs of any design have great intentions to offer less compromise over using off-the-shelf DAC chips that are, by far and large in today's world, designed for low-power-consuming portable consumer electronic products. As much as that seems like a genuinely wonderful goal, R2R DACs are, in fact, highly flawed."

The first problem with R2R DACs is that they start off life best-intentioned, but highly imperfect. An ideal R2R DAC requires increasingly inapproachable resistor values that move further from ideal the more complex it gets: the required accuracy of each resistor doubles with each additional bit added to the architecture. Some manufacturers resort to physical modification ("trimming") of the resistors to get their ideal values closer; others resort to software to make the actual value of each resistor in the ladder closer to the ideal value when processing its contribution to the DAC's output. The problem with either/any approach to an R2R DAC is that component values change with age and temperature, and this causes processing errors associated to this normal process that are CORRELATED to the music signal; this means that WHEN a component in a R2R DAC changes, there is ALWAYS distortion in the SAME PLACE in the signal, and at the SAME LEVEL."

"This type of distortion crushes low-level detail, causes high intermodulation distortion (i.e. the ability to simultaneously play two or more frequencies/harmonics that are near, but not at the same frequency is mutilated), and in general guarantees the DAC will sound and measure worse over time."

The dCS RingDAC™ is made up of a FPGA-centric central processing core and the RingDAC™ analog board. All incoming digital signals first run through proprietary digital filters (written expressly for each sample frequency supported) that are then oversampled to a unique 5-bit synchronous format in the FPGA processing core. This signal is then presented to the RingDAC analog board through a mono pair of FPGAs that run a proprietary algorithm that "maps" the 5-bit signal to 32 of 48 equally-weighted current sources (per channel) at a rate of 2.822-6.14 million times per second, depending on model/setting and the incoming sample frequency."

"The summed low-level signal from the output of the current sources is mixed, filtered for out-of-band switching noise, and then amplified by a discrete Class-A output stage to yield an output of 2V or 6V, with an output impedance of under one-Ohm. All stages of the

conversion process are known and planned for, meaning as the signal flows from one stage of the process to the next, a minimal number of compromises are made – and most importantly: any variance in parts values/tolerances over time and temperature cause errors that are DECORRELATED to the music signal and are filtered out by the filter/mix stages as noise. This means that, over time, the RingDAC™ will provide consistent, exemplary performance because the usual suspects that contribute to DAC performance degradation are dealt with up front, by design. There is nothing else on the market that does this, and for this, the reason nearly 30 years later, is why we still base all our designs around the RingDAC™.

But what about sound quality, sonic differences?

Everything that deeply impressed me about the Debussy/Network Bridge combo, the Rossini does exponentially better. Tonality, timbre, pitch and bass definition were the immediate standouts for the most basic differences apparent right out of the gate, yet both possess that unique ability to instantly engage me in what's being played and not in a "shiny bit of foil over here" way, but in an introspective and erudite manner. This isn't a sound about flash, or crazy 'oomph' or bells and whistles, in fact it's the exact opposite of that, it's a sound that lures you in, makes you think, elicits emotional responses and triggers memories. Much like a great novel, film or piece of music is capable of, it captivates your attention more with its subtlety, undercurrent of power and finesse of the 12 notes that nestle between the octaves that music calls home. All my listening was done with the Debussy being fed via dual-AESBEU from the Network Bridge, local files via USB two-terabyte hard drive and outputting via XLR into a McIntosh Labs C2600 preamplifier, driving McIntosh Labs MC611 mono blocks via XLR and Audio Note AN-E/SPe HE loudspeakers. The Rossini was fed streaming files via ethernet, local files via the same USB two-terabyte hard drive and outputting via XLR into the same McIntosh Labs/Audio Note combo. All digital cables used were Tellurium Q, with Clarus Crimson AC cables used throughout the system.

Playing Tidal HI-Fi 16/44 and MQA tracks through the Rossini via its network interface and a dedicated two-terabyte audio hard drive filled with a mix of high-resolution FLAC, WAV, DSD and even MP3s was a revelatory experience that showed off the DAC's ability to clearly unravel densely-packed, hyper-threaded tracks like those found on Radiohead's Amnesiac.

Through the Debussy the crushing sonic wall of noise was disassembled with ease, but playing the same tracks through the Rossini brought further clarity, insight and musicality to every track – along with a noticeable increase in resolution – a firmer grip on instrument and vocal placements within the recording and an increase in bass response that felt as if the DAC had plumbed fully past a further octave to grunt out the lowest registers without a trace of compression, convincing me that the Rossini has real headroom to deal with big dynamic swings and not at the expense of microdynamics or detail, all with a genuine analog warmth that reminded me more of my current Thales TTT-Slim II, Simplicity tonearm and EMT JSD VM moving-coil cartridge set-up than any approximation of analog.

This was simply analog listening as far as I was concerned. Presentation within the context of my system is of the more laid-back variety, quite different than the more forward disposition of the totaldac d-1 direct ($20,500 USD) I spent time comparing it to. I found myself leaning in to listen more closely whereas the d-1 tends to push me back into the sofa more – soaking it all in. Both are equally adept at loosening any aural knots that a recording may present to challenge a DAC's ability to loosen-up massed strings, or dense electronic passages with the Rossini's tenor tinged slightly more to the warm side of the spectrum, but again, ears are ears and YMMV.

Whether it was EDM, jazz, rock, pop, disco, classical, punk, country or a closed-mic'd singer alone with their guitar or piano (Johnny Cash, American IV: The Man Comes Around) the Rossini brought me closer to the recorded moment than some may be comfortable with, but despite the emotional weight and heft that the DAC embued every track with, I kept coming back for more. Trumpets, saxophones, trombones all shone with

deep, burnished brassy glory, high hat and cymbals all crashed with shimmering delight, piano notes had real gravitas, bloom and delicious decay and wood-bodied instruments were all represented with aplomb with believable body resonance, resin-on-bow squeals, scale and weight to plucked or strummed strings. Ditto for sticks and brushes on the skins and kick drums put a foot through my bass drivers.

Having gotten exceedingly familiar with the dCS sound, I can say without pretense that it is a standout among heavyweight DACs I've heard. Fair warning: Acquiring a dCS Rossini puts one in peril of physically succumbing to the heartache, melancholy and rapturous beauty that the best recorded musical events are suffused with. Much like that small chickadee captured my attention, so too, did the Rossini wholeheartedly capture mine. Buyer beware.

Look for a follow-up to this comparison in the coming weeks when dCS release their V2.0 of software and firmware updates for the Rossini platform, of which Quick had this to add:

"The 2.0 upgrade will bring to Rossini what 2.0 brought to Vivaldi: an improved mapping algorithm for the pattern that fires the 32 of 48 current sources in each channel of the Ring DAC analog board that builds up the analog signal from the incoming digital one… MAP 1 and MAP 3 run at ~6MHZ (5.644 for 44.1k-base material, 6.14MHz for 48k-base material) and offer different balances of 2nd- and 3rd-order harmonic distortion (meaning one highlights space and resolution, the other highlights texture and tonality); MAP 2 is the 'classic' algorithm that runs at 2.822/3.07MHz as Rossini does today.