Despite elite German engineering, my 1962 brain is sadly old tech. It means that I'm WiFi allergic. So is my wife. Think actual migraines for her, nasty brain pressure for me which leaves me feeling toxic upon longer exposure. As a result, our home computers hardwire to a tp-link router whose WIFi is disabled. It means no tablet remotes. That disqualified audiophile servers which rely on them. Until now.

Lumin's poker-faced Li On had kept me updated on how to use an iPad in wired LAN mode. When he contacted me post Munich HighEnd 2018 to announce availability of their brand-new X1 flagship streamer for review, I asked whether I could use our existing 30-metre long RJ45 LAN cable to the X1, then jump from there to the iMac via a short link. "For networking, you couldn't usually connect directly to your iMac without a second long cable from the router. But say hello to the X1's special feature, dual network ports. The X1 has a regular Gigabit RJ45 LAN port and an optical network port. You can use regular RJ45 cable with a small optical/RJ45 adapter. I will include such a media converter. So the connections will be your regular long RJ45 LAN cable from your router to this media converter which connects to the X1 via the included short optical network cable. The X1 then connects via short included RJ45 LAN cable to your iMac. I will also include a regular iPad and the adapter to use LAN not WiFi on it. But now we have a new problem. As the iPad also needs a RJ45 LAN connection, we need one more network cable/port. One simple solution would be a small network switch connected to the X1's LAN port. Now your iMac and the iPad's LAN adapter tap into that. Of course you could share your iMac's WiFi as hot spot for the iPad like normal people would. But I guess you won't allow that. Anyway, my head is starting to hurt! -:)"

Since ours wouldn't, I assured Li that I'd handle the network switch on my end. Having to deal with abnormal folks like us, I'd given him enough guff already. Rather than farm out yet another Lumin review to a contributor whose more hi-tech grey matter is immune to WiFi radiation, I could happily accept this assignment myself. Li had already confirmed that if I ran Audirvana—I have it though PureMusic is my default player—the X1 could access our iMac's iTunes library over the network. Go Lumin. As a normie, your Lumin X1 setup would mirror theirs from Munich: networked WiFi with an iPad remote, streaming Tidal, Qobuz & Co.; perhaps even their matching Lumin Amp for a simple two-box affair. No fuss, no muss. 21st century tech.

As a flagship player, the X1's business end could seem spartan. Whilst dual network ports go the extra mile, digital outputs are just USB/BNC. The more robust 5V AES/EBU is absent. Lumin probably figure that their twin Sabre S9038Pro DAC with native DSD512/768kHz PCM is so good that few would buy an X1 with the intention of bypassing it. Now the only outputs one uses are their 3V/6V RCA/XLR analog ports coupled via Lundahl LL7401 transformers. Their absolute polarity can be inverted inside the Lumin App. To keep the X1's milled aluminium extrusion tidy and exploit physical separation for dirty power, Lumin's linear power supply occupies its own chassis.

The X1 innards show dual-mono architecture with dual-stage linear regulators and a femto master clock under FPGA control. What they don't show is any form of drive, hence no built-in music storage via HDD/SSD. That has to pipe in via network-attached storage or—slower and with less browsing flexibility—a USB-connected flash or hard drive (single-partition FAT32, NTFS or EXT2/3).

The new power supply with twin power toroids also gets a matching solid billet case. It separates digital and analog power feeds and becomes an upgrade option

for existing S1/A1/T1 owners, with a then different multi-pin umbilical to account for a changed plug. Co-exhibitors and Lumin collaborators WestminsterLab offer an upgraded DC cable. Munich showed it priced at £800. For analog out, volume control is Sabre's on-chip digital. For the digital outs, it's by FPGA. The steps are progressive; 0.5dB from 100-80%, 1dB from 80-60% and >1dB below 60%. Output impedance is 20Ω/40Ω on RCA/XLR regardless. There are no user-selectable digital filters and Lumin don't specify whether theirs are Sabre's or their own FPGA code. Default playback is at native resolution up to DSD512 or 768kHz PCM.

If told to, the X1 can resample up to 24/192 PCM to DSD128; and DSD64 to DSD128. PCM can thus output as DSD128 via USB; and as analog. The X1 supports gapless playback, on-device playlists, Tidal, Qobuz, MQA, AirPlay and TunelN Radio, high-resolution album art and DSD as DSF, DIFF and DoP, PCM as .flac/wav, .alac/aiff and MP3/AAC.

For remote control, any iPad v2 or later with at least iOS 8.0 will do. There's full retina display support. Android devices need Android 4.0 (Ice Cream Sandwich) or later.

Physical real-estate take up for the Lumin kit is a footprint of 35x34.5cm WxD with just 6cm height and 8kg for the X1; and a 10.6x33.4cm WxD footprint for the PSU with matching height and 4kg. Finish options are silver or black.

Because I dislike not just WiFi but black-anodized hifi, I asked for silver. Here we see the innards of the external power supply with its linear voltage regulators and dual Plitron toroidal power transformers from their Klixon 17AM range ...

... and the same show closer up to identify top-drawer Nichicon caps and three vertically mounted Semi On Q J03 in the D1-3 positions.

The main unit responds with a ubiquitous XMOS transceiver for USB data and two quality Crystek clocks for the 44.1kHz and 48kHz audio/video families of sample rates.

Now top-down views shift sideways to put the Lundahl output transformers into proper relief...
... assorted bits and bobs for which you'd need the circuit designer to explain their functions...
... whilst finishing off with the inside connector housings for digital is self-explanatory. The long perforated casing is for the optical network port.

That signs off on the visual inspection and tech intro except to add that befitting the X1's elevated price, the external hewn-from-solid appearance was immaculate to cash in on expectations in these hifi luxury leagues of streaming DACs. It's where the half-priced LampizatOr SuperKomputer reviewed just prior had played it far more yeoman though it added full server functionality via built-in storage whilst subtracting Lumin's converter from the equation. With LampizatOr you must add a DAC, with Lumin USB or network-attached storage. "You can copy music files to a USB thumb drive or HDD and connect directly to the X1's USB port. Under Music Library in our app, select Lumin X1 USB Server to browse and play those files. To use the Lumin app, you need a UPnP/DLNA server to direct those files at the X1. Our recommendation is MinimServer. Then point your iTunes library at the MinimServer content directory to let it scan your files. Now you can select MinimServer inside the Lumin app to see all of your music."

Network error. It's what your display will say once its confident turquoise 'Lumin' extinguishes. That's because just powering up the X1 is insufficient. As a network DAC, it needs network access. You still need to connect a CAT5 or optical fibre cable. Unlike our Soundaware D300REF which will stream SD/USB media all day long without, the X1 needs its tablet controller - in this case, Li On's hardwired iPad. Swapping an SD card from D300REF to X1 via USB/SD adapter, then launching Lumin's app and opening its USB Server, I enjoyed instant access to the card's contents with full cover art. I could create playlists, turn off the X1's display (there are off, dim, normal and bright modes), set custom up/resampling modes for each sample rate including PCM-->DSD conversion and much more.

To stream our iTunes library on the iMac's 3TB FusionDrive to the Lumin, I went to UPnP in Audirvana 3.0.8's Audio System window and selected the X1 just as I would a standard USB DAC in its particular window. Nothing else was required. MinimServer remained undownloaded stranger. Roon stayed elsewhere. Endless file scanning was MIA. Audirvana's 'extreme' optimizations and sample options were in usual effect. In the below example, this shows a standard 16/44.1 file arrive as already 24-bit/352.8kHz at the Lumin whose display also showed proper associated meta data. In short, I could use the iMac's enormous Retina screen as I always do with our USB DACs. I could navigate our library or stream Tidal or Qobuz (which of course are embedded in Lumin's app, too). Now the iPad could retire unless I wanted to change certain Lumin settings; or just set it to display big cover art. The 'steering' of what tunes to play when happened inside iTunes as overridden by Audirvana. Yet the X1's display responded immediately to the meta data of any new track.

My first iTunes hookup used the new-for-this-review 1-in/4-out tp-link network switch aka RJ45 outlet multiplier like a star ground. In went the 30-metre CAT5 stretch from our tp-link router in the utility closet. Out went three short spurs to the iMac, X1 and iPad respectively. Presto, everything was on the same network. This worked without hiccups. But it clearly didn't sound as good yet as having the X1 stream straight off SD card (my stand-in for NAS media). That's likely because not just player commands but actual audio traveled through our generic €25 network switch. Audiophiles demonize computers as not being made for audio. Shouldn't they voice equal horrors over consumer-grade routers and network switches with their noisy wall warts? Time for a rewire. Enter the X1's special network input. Now our best CAT7 link with Telegärtner plugs connected iMac to the X1's RJ45 port direct. The X1 met the switch via Li On's extra tp-link Ethernet media converter through its optical port. The iPad's CAT5 connection to our network switch remained untouched. The result of this rewire? Audio data now traveled straight down the CAT7 pipe to bypass our cheap switch altogether. Only player control instructions went through it. Meanwhile the switch's wide-open back door to the Wicked Wild West of the global Internet ran into effective optical isolation at the Media Converter's fibre output. Electrical grunge from cheap network appliances never mixed with any precious audio data. And that really did sound better!

Not part of the stock Lumin X1 package.

Having ascertained that everything worked flawlessly; that Lumin's app was as intuitive, sorted and comprehensive as its reputation... I had to create appropriate comparative context. For that I wanted to eliminate the iMac from the equation. After all, the vast majority of prospective X1 owners will use network-attached storage by way of external HDD/SSD. Because we don't usually network music, that had to mean pure SD card mode. Assembling in the corner opposite the X1 would thus be our Soundaware D300REF leashed AES/EBU to Kinki

Studio's Vision DAC-1. It and X1 would alternate XLR interconnects on Nagra's Classic Preamp. That fed FirstWatt SIT-1 monos and Zu's Submission sub. Loudspeaking referees were Cube Audio's astonishing point-source Nenuphar. We'd listen to them ever since their review. Our household had grown very familiar and fond. Their extended loan meant that we'd become inseparable. On raw resolution, presence, speed and immediacy, they're the next step up from our Audio Physic Codex. On bandwidth, they're very close. Hence they aren't just pleasure machines or representatives of an extremely niche genre. They're eagle-eyed sonic inspectors. Their magnification powers enlarge small differences. With modern digital, small tends to be the order of the day. Sharper glasses win.

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In this iPad screen overlay, we see both cover art of the playing album and behind it, the Lumin app's custom sampling options. The small chassis display was set to bright.

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On the X1, I had already explored DSD resampling both via speakers and HifiMan HE-1000 headphones. As it had earlier with different gear, DSD again presented as sweeter, slower, softer, less open in the treble and spatially enhanced if minorly fuzzy. My default allegiance remained with PCM. Just so, 'hot' recordings were nicely tamed by resampling. For the review's A/B chapter, I would simply set Lumin's custom sampler to 'off' and run all files natively. Exploring flavourings with digital filters and declaring favourites is for actual owners. "The X1 plays up to 32-bit 768kHz PCM and DSD512 at 22.5MHz. For now there is almost no real content at such high sample rates so the feature is still mostly a paper spec. However, some like to upsample in player software like Audirvana or Roon. After searching the Internet, I found at least one music file for each of those high sample rates. These two highest-rate files should play fine via an external server like Audirvana or MinimServer. With directly attached USB storage, there could be some stutter. We just released an X1 firmware update. The Lumin app will automatically prompt the update. This has some minor bug fixes and system optimization. After the update, you might try 768kHz and DSD512 playback." I didn't. I think that the pursuit of such high sample rates, their concomitant file sizes and download speeds, sends entirely the wrong message. And what's reasonable about so-so music at ultra-high resolution? Can one polish a turd? But those who view recordings above 24/96 as relevant now know that the X1 anticipates their ultra-rate future and is ready for it; today.

Incidentally, I feel the same about MQA. Until mastering studios give up on dynamic compression and stop overproducing, optional post treatments on the consumer or mastering end matter little. Try Tony Minassian's Drums & Bell. With 50dB of recorded dynamic range, this CD is proof positive that standard 16-bit/44.1kHz resolution can be vastly superior to so-called hi-rez files. It's perfectly sufficient. It just needs to be exploited properly before the industry at large calls out for a replacement. If one hasn't mastered the basic tools, what good are more advanced ones? It's not the superior camera that takes the better pictures. It's the creativity and imaginative vision of the photographer which captures the superior shots even on an iPhone. But here too the X1 plays it

pragmatic. Whether MQA remains a fashion fad or enjoys mass adoption, this deck already has it.

"I awoke to what's euphemistically called birdsong. It was more of a bloody racket, nine parts screeching to one part singing. In England the dawn chorus is genteel and melodious and inspired poets to wax lyrical about sparrows and larks ascending. It's blessedly short too. The poor creatures, demoralised by the damp and cold, sing a few bars to prove they're still alive then pack it in and get on with the day. Things are different in Calcutta. There are no larks here, just big, fat greasy crows that start squawking at first light and go on for hours without a break. Nobody will ever write poetry about them." From A Rising Man by Abir Mukerjee [Harvill Secker, London]. Crowing so wasn't on the X1's docket. Genteel was. If anything, I wondered. Did Lundahl's Swedish iron inject a wee bit too much pastoral elegance? Did it bleed out some vitality, scrub off a certain tension in the process? Amongst other things, it had been the element of drive—propulsion, urgency, grit—which returned me to transistor amps. That was after a sabbatical through mostly single-ended tube land and its sunny climates of 45/300B/6CC3. Names like Ancient Audio, Art Audio, Trafomatic, Woo and Yamamoto spring to mind. The X1 could undoubtedly do mellow, elegiac, elegant and gorgeous; more no-feedback triode than feedback pentode. That was different from LampizatOr's DSD-based flavour for their SuperKomputer reviewed just prior. Having met the X1's particular relaxed effect before, for enablers I'd nominate its output transformers. If so, it'd be a mark of distinction. It'd separate out from the pack of fundamentally alike digital.

Comparative sessions showed tonality very similar to the Vision DAC-1. This placed the Lumin firmly on the robust materialistic well-saturated side where tone isn't glossed up like Photoshopped cover girls but instead allowed to exhibit naturally matte, dry but warm textures. Functionally, it did the job in one far costlier though smaller deck where I otherwise needed two bigger chassis and more cables. Even though the Soundaware too can be accessed via tablet—I've not done so to know what the GUI of its recommended apps look like—it's not accompanied by its own app. And whilst Soundaware and Kinki build very well, on sheer styling and carved-from-billet curviness, the X1 still took the lead. Part and parcel of its app are processor tweaks on word length, upsampling and resampling of PCM to DSD128. Particularly the latter makes for à la carte seasoning. 'Remaster' your entire PCM library to DSD on the fly. Do it strategically for select tracks or fancies. Don't do it. You're boss. With file-based music, accessing specific albums/tracks quickly is key. So is snappy playlist creation. Here Lumin's app explained why it's held in high regard. It's a mature piece of code writing. It has crisp graphics with full featurization. It represents serious in-house IT chops. Other houses hide their lack behind 3rd-party apps (easy to do when Roon reigns popular); or cruder attempts of their own. Lumin offer a truly complete package that's been massaged from industrial design to friendly usage to build to sonics. And yes, its sonically distinctive feature, subtle but pervasive like a quiet undercurrent, was this more 'genteel' gestalt.

Because that wasn't accompanied by any ethereal lightweight tonal balance, it didn't generate a mood of 'all float, no punch' to adapt Muhammad Ali's mantra. It simply retained a certain civilized suavity. This suggested that its target audience will prioritize sophistication and not call classical music fit only for old fogies. The X1's purity really did luxuriate in classical. Of course good hifi plays anything you feed it. Just so, listeners experienced with swapping hardware know. Particular kit appears to guide our hand. It has us reach for specific music. If one stands back to watch this unfold without volitional interference, one may end up with a "X does particularly well at xxx" thing.

Looking at what music I streamed, a high percentage was minimalist moody fare à la ECM, Kirkelig Kulturversted or Al Gromer Khan's even more chilled paisley music: layered, atmospheric, less-is-more stuff with lengthy decays and the quietude to follow them through. It's where subtlety dominates over raucousness and how many speed notes can cram into a bar. The X1 knew that game too. But by temperament, it led more often to introspective fare. I also pulled out small-scale classical and chamber music. Think Brahms Clarinet Quintet, Schubert's Octet, Crusell's concertos with Kari Kriikku as soloist, the Dvorák Serenades. That seemed suggestive. Now to some screen shots to convey a feel for the Lumin app's skins.

At left is looking at an SD card folder containing 12 albums by the same artist. On the split right screen, we see a playlist assembled on one side, on the other the open folder of the album from which I'd just pulled the last three tracks of the playlist. As indicated at the very top, the very last track was playing just then in PCM-to-DSD mode.

At left, a fraction of the app's Option menu. At right, the contents of a folder containing two albums enlarged to full screen. Note the proper rendition of non-standard letters from the Turkish alphabet. Those cause Soundaware to insert Chinese glyphs instead and have tripped up many prior servers coming through.

At left, more items in the Option menu; at right, the Analog Audio Re-Sampling Custom window presents its choices.

Like its tag, the X1 isn't for beginners; not because it's difficult to use. It's not. First-timers simply wouldn't recognize its sophistication to appreciate it for what it really is (rather advanced). To reiterate, unlike USB DACs playing locally hosted files, this networking deck quips 'error' when your network connection goes down. Unlike just streamers, it includes a high-quality D/A converter. Unlike servers, it contains no storage memory. Whether by subscription or network-attached storage, you need to bring music to it, not get it out. If your tunes live on a Mac as do ours, consider Audirvana Plus 3 as your UPnP traffic cop and defeater of non-audio computing activity to optimize an Apple for music. You'll never have to scan when adding tracks. And the Lumin app is a joy all around. Getting to the X1's socketry tucked beneath the deep back overhang is far less so. But feeling aggravated should happen only to career wire wranglers. That's not regular users. They do it just once. As a device connected to the Internet through your home network, the X1 is fluidly updatable. Hence the Lumin app is preconfigured to automatically check for available firmware upgrades. Unlike the olden days—pack up machine, ship back to factory, get MkII upgrade installed, ship back, pay money—X1 type gear is rather more advanced. It upgrades itself without ever leaving your rack. For free.

Who is it for? An audience with money who wants turnkey integration, non-PC cosmetics, top PC functionality, silent operation, Roon ready, MQA, DSD, Qobuz, Tidal, Spotify and sophisticated sonic elegance. It fully expects to use tablet remotes. Here even the rare WiFI allergic has learnt that an iPad may be hardwired to an RJ45 socket. Reliance on WiFi remotes—note to self!—no longer is an excuse to X out this Lumin X1 from consideration. Fanciers of SD cards for playback will enjoy the Lumin app's USB Server facilities with full cover art, search/sort functions and quick playlisting. Really, this is perfectionist hifi done right. It means the complete package with zero excuses. Considering Lumin's track record and this being their 2018 flagship, that probably shouldn't have been a surprise. But then, I'd never done a Lumin before. On staff, Joël had; thrice. Dawid had twice. The boss had sat it out. Until now. So yes, the X1

proved to be a really dialled proposition. Thanks to Li On for setting me up with a pre-configured iPad, the adaptors to hardwire it and the optical converter kit. Otherwise I'd still be unilluminated. But now I've seen the light; or heard it as it were. I feel like a proper lumineer - a Luminear...