Look NO WIRES

WIRELESS SPEAKER & AUDIO

Could a new wireless transmission standard spell the end for speaker cable? ***Adrian Justins*** is your guide to the exciting world of WiSA

To some of us loudspeakers and speaker cable go together like Rogers and Hammerstein – the idea that one could operate without the other is almost unthinkable. But speaker cables are a nuisance, being prone to tangling, and considered by most of us to be as visually appealing as a discarded KFC carton on a pavement. Cables often have to be hidden behind walls, under floors or along skirting boards.

Wireless speakers are nothing new but when Bang & Olufsen recently launched its BeoLab 17 speaker it marked an historic day for the wireless speaker industry causing AV and hi-fi enthusiasts to prick up their audiophile ears. The BeoLab 17 was the first product to go on sale with the endorsement of the Wireless Speaker and Audio association (WiSA), a newly formed group with a unique mission to promote the standardisation of high-fidelity, cable-less audio transmission.

So far wireless speakers have been limited to listening to compressed music streamed from devices such as smartphones, tablets and computers. AirPlay and Bluetooth in particular have fuelled massive growth in the sales of wirelessly connected speakers, but neither of these support hi-res files and both are prone to being unreliable, especially when faced with interference.

Proprietary systems such as Sonos' and Pure's Jongo offer a ring-fenced solution to multi-room streaming and they integrate with online music subscription services but, like AirPlay, they require a home network and are intended to work with computers and portable devices rather than hi-fi or home cinema sources (although Sonos does offer a TV soundbar solution). WiSA has set its sights on the higher end of the market, offering the ability to stream uncompressed HD audio at native sampling rates up to 24-bit/96kHz. Its goal is to become the defacto standard for wireless audio, and to be as recognisable and easily understood as HDMI and USB. This is no easy task given the complexities of contemporary home entertainment devices, and that's before you try and take the wires out of the equation. Speaker cables and their connections can be visually assessed by consumers for their physical properties, but wireless connections require a huge leap of faith. But there is no standard for cables and for WiSA, establishing a proven standard would give it an advantage over cables in terms of performance and durability, which can vary massively with cables depending on their construction.

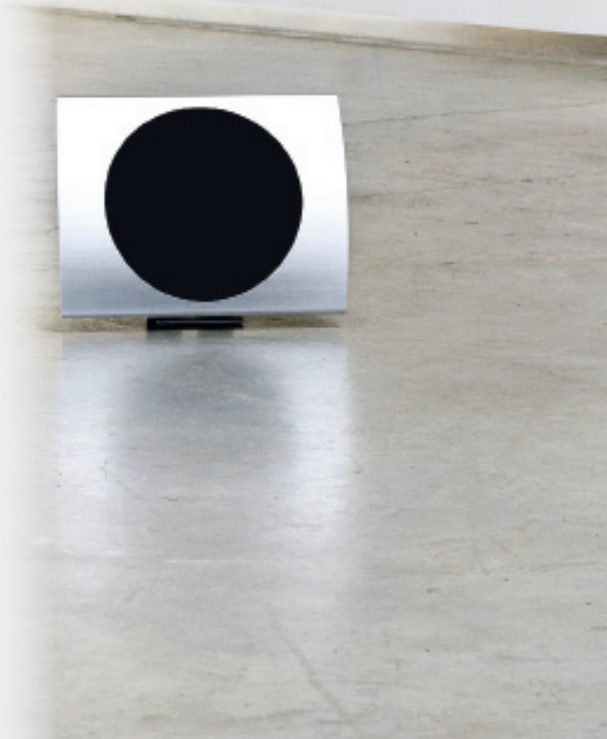
WiSA is a compelling proposition for those that want to ditch the cables

An essential requirement, therefore, for WiSA is establishing belief among the public that it is truly robust and able to withstand potential interference. Analogue wireless transmission systems are notoriously subject to interference while digital ones can hardly claim immunity. Who hasn't heard annoying clicks, hiss and drop outs when using a mobile phone, or even AirPlay and Bluetooth?

WiSA's solution is partly to avoid the popular digital audio frequencies around 2GHz used by wi-fi, Bluetooth, baby monitors and microwave ovens. Instead it uses a set of frequencies between 5.2 and 5.8GHz, which were for weather and military radar applications and recently became available for commercial use.

WiSA further minimises the likelihood of interference by requiring its transmitters to constantly seek out and use a totally unoccupied channel. The system uses Dynamic Frequency Selection (DFS), continuously scanning 15 channels and in the case of interference, jumping directly to a clear channel without losing any audio information. WiSA rules state that a channel must be clear for one minute before use and cannot be reused for 30 minutes after a conflict is detected. Due to the strict access rules there are only a few systems that operate in the DFS band and audio is ideally suited for DFS operation since it requires a steady stream of data rather than high-speed bursts. Another handy bonus is that WiSA-compliant audio does not interfere with existing networks so that wi-fi networks should not be adversely affected.

Another advantage of operating between 5.2 and 5.8 GHz is that bandwidth is relatively abundant and there are fewer



errors due to interference so latency is very low at 5ms. However, in the case of communication errors, the system falls back on traditional recovery methods similar to those on CDs. These include: forward error correction; error concealment where missing (uncorrected) data is filled in a way that is unnoticeable; a play-out buffer, which allows longer concealment ability; and if all else fails, silence rather than noisy artifacts.

Keep it clean

WiSA compliant components are tested to ensure clean communications within a 100m² area even when interference is present. Frequency selection and correction must operate quickly and be free of noise.

WiSA signals do not require line of sight, but one key difference between WiSA and the likes of AirPlay and Bluetooth is that it offers reliability and quality over reachability. In other words, it can't go through walls so can't be used in a multi-room set-up, but WiSA is looking into ways around that.

It's also looking at increasing the specification in terms of distance. The current WiSA Certification Test Specification (CTS) calls for a system to pass a minimum distanced test of 10m by 10m but the association knows from experience that a system will transmit and receive much longer distances. As such, it believes there is a big market beyond the home waiting to be exploited. WiSA president Jim Venable told me: "We had a prototype system from one of our members set up in a ballroom at InfoComm that measured 60 feet by 40 feet with a 20 feet high ceiling along with about 150 people in attendance. The speakers were pushed against the walls and it worked just fine. We are currently looking to extend the specification to a distance of 100m line of sight for the commercial/pro market, but that won't be finalised until sometime next year."

Of course, severing the physical link between speakers and the source requires a significant alteration to the functions of the various components. The speakers can no longer remain passive, but must be actively powered (thus requiring a power source) and must have a receiver built-in. The player or amplifier must also feature a signal decoder and a transmitter, although the latter can be a separate unit. The transmitter must accept sample rates of 44.1, 48, 96 and 192kHz, it must be able to locate the speakers and the listener. The receiver must select the correct output, provide coefficient tables for making the correct crossover, and adjust the sample rate, output levels and delays. It receives decoded sound from the transmitter and delivers the relevant information for each channel as a PCM signal. Digital crossovers then split the signal

WISA PRODUCTS

At launch WiSA is focussing its attention principally on the audio visual sector. The first speakers out of the traps are Bang & Olufsen's BeoLab 17, a compact model featuring dual drivers (one 6in midrange/bass driver and one 3/4in dome tweeter), individually powered by 160W amplifiers. These can be used as a stereo pair (see other box out) or in a multi-channel configuration, optionally with the distinctive BeoLab 19 subwoofer, which also boasts dual 160W drivers in the shape of two 8in woofers. Composed of an exceptionally rigid polyhedron that comprises 12 regular pentagon, unlike most subs, the BeoLab 19 is designed not to be hidden away behind the sofa, intentionally catching and reflecting the light. It uses Adaptive Bass Linearisation (ABL), which automatically responds to extreme peaks by reducing bass throughput. The same technology has been used on the BeoLab 18, a column speaker featuring 21 vertical lamellas and proprietary tuning. All three products can be used in a wired setup as well as wireless.

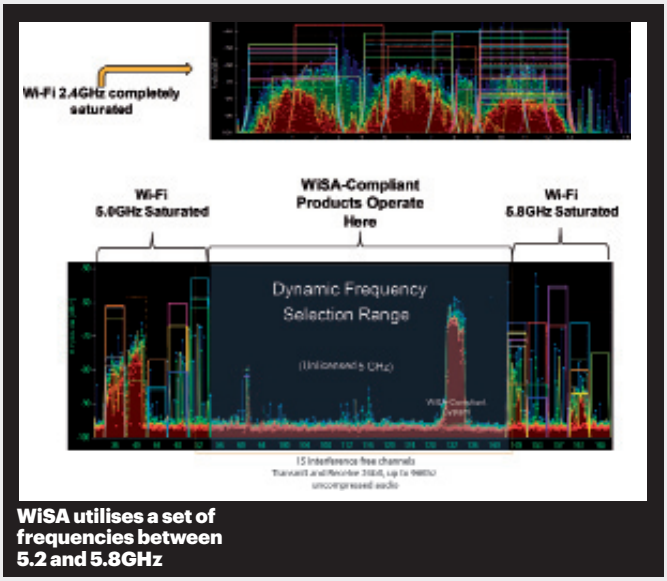
These three speakers fall within the umbrella of what Bang & Olufsen is calling its Immaculate Wireless Sound concept, effectively the Danish company's more exciting name for WiSA.

The first HD audio player on the market with WiSA status comes from an unlikely source, namely Sharp, who has been absent from high-end audio since the mid-seventies. The company's universal WiSA player, which can spin Blu-rays, DVDs, CDs and multimedia files including WAV, FLAC, DSD, WMA, MP3, MKV was voted a CES Innovation 2014 Design and Engineering Award Honoree and will go on sale (in the US at least, the company has yet to announce its intention to sell the deck in Europe) soon.

Also expected soon is an audio hub from Hansong, which connects by wires to a CD player, Blu-ray, cable/satellite box, or video gaming console and beams HD audio to WiSA wireless speakers. It also includes Bluetooth connectivity for smartphones, which allows users to stream music from their smartphone to the WiSA transmitter then onto the WiSA speakers.

WiSA president Jim Venable

"The big guys tend to come in and exploit a market once it's established rather than nurture it"



WiSA utilises a set of frequencies between 5.2 and 5.8GHz

according to the number and type of drivers, each of which has its own Class D amplifier.

WiSA's interoperability requirement dictates that a consumer can buy WiSA products from different manufacturers without worrying about compatibility between makes, so you could have, say, an Onkyo deck and a set of Paradigm speakers. Scaleability is another requirement, allowing enthusiasts to add additional speakers to a stereo system in order to create a multi-channel one or change speakers to a larger or smaller size. Regardless of the speaker make, parameters such as phase and networking issues including discovery, addressing, and protocol must be taken care of automatically.

Setting the standard

The WiSA standard allows for channel assignment and speaker positioning to be made either automatically in the case of more expensive systems, otherwise by using a smartphone app or onscreen. Speaker positions can be changed by dragging icons with the transmitter automatically assigning channels and determining the distance between speakers. From there, the components correct for volume and the delay in the room. The listener position can also be changed and the system instantly adapts by again changing the volume and delay for all of the speakers.

It's not quite plug and play, but does offer a more affordable entry to a WiSA system than more fully featured speakers that use ultrasonic transducers (or pingers). Where each speaker contains a pinger, from one speaker the distances are measured to all of the other speakers. This automatically maps the locations of the speakers and their channel assignments just by turning on the system. With the addition of another pinger to an optional WiSA-compliant remote control, the listener position can also be determined automatically. The transmitter, which never contains a pinger, can also support manual setup.

Products built without the ultrasonic transducers do not require line of sight, but to take advantage of the sweet spot location and auto calibration features, line of sight is required. In other words, consumers are expected to be at least a little bit savvy about the limitations of the technology.

In terms of multi-channel support there is currently a limit of eight channels, although the maximum configuration is 7.4, with four subs sharing one channel. The WiSA roadmap calls for increasing the number of channels and for an increase in the bit-rates – no dates have been set for either.

From a standing start in 2011 WiSA has seen its membership grow rapidly, and the association now numbers over 20 members including the likes of Accusound, Amber, Accent Ceton, Dali, Gibson, Onkyo, Nyne, TEAC, Paradigm, Pioneer, Polk Audio, Definitive Technology and Sharp. So far, none of the world's biggest consumer electronics companies such as Samsung, Sony and Panasonic have shown interest, but Venable says: "The big guys tend to come in and exploit a market once it's established rather than nurture it." He expects the big guns to get on board in due course.

WiSA signals do not require line of sight and offer reliability and quality over reachability

WiSA recently opened an authorised test centre in Sunnyvale, California, where members can submit products for accreditation. The association has plans to establish four further centres, three in China and one in South Korea.

The driving force behind WiSA is Silicon Image, a US-based technology company that has its fingers in a number of popular transmission standards including HDMI, MHL and DVI. HDMI has recently been the subject of some confusion and controversy following the launch of the new 4K or Ultra HD video standard. The problem has been that the transmission standard failed to keep up with the manufacturing, resulting in a number of 4K screens being sold with HDMI 1.4 sockets that are unable to accept 4K. Manufacturers have offered different solutions including hardware and firmware upgrades, but some screens look likely to become redundant once 4K broadcasts start. Doubtless, the HDMI 2.0 debacle will die down and arguably the decision of TV makers to press ahead before the standard was agreed was not the fault of Silicon Image, but understandably WiSA wasn't exactly shouting from the rooftops about its HDMI connection, no pun intended.

Of course, HDMI is an essential component of any HD screen, player or receiver whereas wireless speakers will always remain an option. The important thing, though, is that thanks to WiSA, that option now exists in what has the potential to be a compelling enough proposition for those who do want to ditch the cables ●

WiSA MEMBERS:

PROMISES, PROMISES

B&O suggests pairing its speakers with one of its BeoPlay 11 screens, which feature a built-in WiSA transmitter. For a TV, AV receiver or music system of another brand, it suggests its BeoLab Transmitter 1. "Just attach the little white box to the main source of the desired product, and you're ready to start," says its website. But there's a problem controlling the volume as the speakers don't have a remote control and nor does the transmitter. I hook up a Samsung 46F8000 TV to the transmitter using the screen's Toslink and am able to wirelessly connect to a pair of BeoLab 17 speakers. The volume on the TV's optical output is set to its max and can't be altered so my ears are only just able to bear the phenomenal power output of the BeoLab 17s. The Transmitter's only other inputs are USB and RJ45 sockets so B&O's solution is to supply me with the Playmaker, which has a variable gain and acts an intermediary streaming device, connecting by AirPlay or analogue line-in to portable devices and by RJ45 to the BeoLab Transmitter. Hooked up to an iPhone, this provides a convoluted way of listening to the speakers and being able to control the volume. To connect to a TV I will need to use an Apple AirPort Express, which has a digital optical audio input as well as variable gain control.

This all feels a million miles away from the core tenets of WiSA and its promise of pain-free high-resolution audio enjoyment. Maybe a little more clarity is called for on the part of those involved with promoting this exciting new technology, which has undeniable potential.