

FEATURE: Custom Corner - HD Video Distribution

David Birch-Jones

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As we reported late last year, 2010 saw significant changes in the HD video distribution landscape. And for 2011, progress has been made in HD video distribution advancements to address manufacturer and integrator issues that we previously highlighted.

Advances include the availability of more reliable HD signal distribution systems, although challenges still remain. HDMI is becoming a more prevalent distribution format, and while manufacturers and integrators both agree that reliability has improved, integrators we polled all indicated it's still not yet where it needs to be, especially compared to the tried-and-true component video connection method.

Advances in so-called "Cat cable" systems have increased exponentially, with a broader array of transmitting/receiving devices becoming available that are both more affordable and offer a bigger feature set, including, in many cases, bi-directional IR signal handling, as well as Ethernet capability. While still often referred to as "baluns," as we pointed out a year ago, the term really means a transcoding system that repackages the HDMI source signal into an encoded signal sent over a Cat cable that's re-converted back to an HDMI-compliant signal at the receiving end, and includes the necessary bi-directional data flow that allows HDCP encrypted handshaking.



Atlona's KIT-PROHD3 digital connectivity testing kit allows integrators to diagnose 99% of all system digital connectivity issues. In the kit is a signal generator, which allows users to send a variety of high-resolution test patterns in 2D and 3D formats, then pinpoint interoperability issues in any and all connected devices.

Fibre optic distribution remains an option, albeit still a high end, and therefore more costly, solution. But there are indications that in 2012, fibre may become a more viable option.

In our report last year on the subject, wireless HD distribution wasn't mentioned at all. While there's a smattering of wireless HD video transmission options currently available, indications are that in 2012, wireless may become a player. A number of equipment manufacturers interviewed for this report said that they're looking at wireless HD distribution as a serious option for the coming year, with one vendor providing us with a first look at its 2012 wireless HD product plans.

Analog Out, Digital In

Otherwise known as the "Analog Sunset", numerous factors are influencing the shift away from analog component video distribution in favour of digital, whether HDMI, Cat cable or fibre, or even wireless.

There are essentially two principal driving factors that appear to sound the death knell for analog component video distribution. The first is the need for the increased bandwidth required for wideband digital-only HD sources such as 3DTV as well as 1080p HD in both 24 frames-per-second (fps) and 60 fps flavours. The second issue is the discontinuation of analog component video outputs on Blu-ray players, a mandate from the Hollywood studios that the Blu-ray

Consortium agreed to when the format was first launched. 2011 model year Blu-ray players aren't equipped with component video outputs, forcing integrators to design around that limitation. The lack of HD component outputs similarly affects retrofit efforts in homes that were previously wired with component video signal distribution.

That's not to say that next year will mark a complete transition from analog to all-digital HD signal distribution, but it's clear that at least as far as residential custom integration is concerned, going digital is all but inevitable.

HDMI: Still A Four Letter Word?

Ask manufacturers if the various HDMI issues (of which there are legions) have finally been solved, and they'll mostly likely tell you that everything's hunky-dory these days. Ask them off the record, and many of them will acknowledge that that simply isn't the case, at least as of yet.



Featuring signal conditioning and able to provide 1,080p 2D and 3D over a single Cat 5/6/7 cable over distances of up to 100 metres is Atlona's new 16x16 high-speed HDMI matrix switcher. An 8x8 model is also available.

A number of problems have plagued the HDMI format since it was introduced, not the least of which is the mandated high definition copy protection (HDCP) scheme, another requirement of the Hollywood studios cartel. HDCP handshaking issues top the list of HDMI woes cited by custom integrators and equipment makers, and while progress has been made in the last year or two, there's still much room for improvement.

In addition to HDCP handshaking misery, cable length limitations hinder a whole-home video distribution effort, and long-length HDMI cables that work reliably aren't cheap. As well, extended display identification data (EDID) codes have been extensively revised along with the various HDMI iterations over the last few years, causing problems in getting a reliable connection between source and display devices.

For specialty/low volume manufacturers such as makers of HDMI distribution and switching equipment for the custom integration space, the costs to implement HDMI along with the required HDCP are not insignificant on a per-unit basis. For example, for a maker of HDMI

extenders, in addition to the cost of the TX (transmitter) and RX (receiver) chips themselves, they have to pay two sets of license fees, one to HDMI and another to HDCP. Makers of HDMI matrix switchers may have to incorporate a third type of HDMI chip (repeater) to their products if there is any HDMI signal processing involved, such as audio split-out.

For HDCP, the annual fee is US\$15,000, and a per-unit fee that's on a sliding scale. High volume customers (1,000,000 HDCP key sets per year) pay a half a cent per. Low volume customers, which would include specialty/integrator-centric manufacturers, pay up to 20 times that much, at a dime per. For HDMI, the annual license fee is US\$10,000, but the per device fee falls to only four cents per (there's no sliding scale), as long as the HDMI logo is on the product and the packaging and HDCP is implemented.

Adding to manufacturing cost pressures are the costs of the ICs themselves, where small manufacturers don't get the volume discount pricing that the big CE manufacturers enjoy. As well, when it comes to acquiring volumes of newly-updated chips, TV, Blu-ray and set-top box makers are first in line, providing purchase commitment volumes in the millions, pushing smaller manufacturers to the end of the line, often adding months of additional delay in acquiring the latest chip versions.



Using Key Digital's KD-CATHD500 HDBaseT transmitter and receiver, users can transmit 1,080/60 video up to almost 100 metres. It boasts IR, RS-232, and Ethernet; plus HDMI 1.4 compatibility.

Couple the various fees and costs involved with the misery of regular specification upgrades (the HDMI spec has been modified 10 times in only eight years, and the HDCP spec has been modified five times since it was first promulgated), and it's not hard to see why HDMI custom integration products can be pricier than one would normally expect, and why latest-spec HDMI options can be slow to reach the market.

In fact, Elan's U.S. Product Manager, Robert Ridenour, alludes to these constantly recurring updates as a key factor as to why the company has been cool towards HDMI in past years. He also notes that sister company Sunfire dropped out of the AV receiver business specifically because of it. He does point out, however, that it appears things have stabilized with this latest HDMI 1.4a specification, and he notes that very few products are on the market that take advantage of all of the features in the latest spec.

Ridenour is also in a better position to empathize with the challenges facing integrators, as he himself has 22 years of custom integration experience, going back to when he started up the CI division at Connected Technologies in Colorado back in 1987.

Taking the HDMI bull by the horns, Atlona this year introduced its digital connectivity testing kit, the KIT-PROHD3, which allows integrators to quickly diagnose 99% of all system digital connectivity issues, saving both time and overhead. The kit includes a signal generator (AT-HD800) which allows users to send a variety of high-resolution test patterns in both 2D and multiple 3D formats, and lets them pinpoint interoperability issues in sources, cables, extenders, switchers, AVRs, AVPs, distribution amplifiers and displays.



While more expensive than its other HDMI Cat cable extenders at \$600, Gefen's HDMI 3DTV Extender can deliver a full HD (1,080p/60) signal at distances of up to 100 metres with a single run of inexpensive Cat5e cable.

There's also a testing monitor (AT-DIS7-PROHD) that recognizes HDMI, DVI, VGA, or component video sources at both HDTV and VESA resolutions, up to 1080p or 1,920 x 1,200, and which allows integrators and installers to observe both digital audio and video signal behaviour in real time. As well, the kit includes an HDMI EDID Emulator (AT-HDSync) which fixes any EDID, hot plug, or sync issue. The kit is supplied with a battery pack (AT-BAT-DIS7PRO) that provides five hours of battery power if an available AC outlet isn't nearby.

At an MSRP of \$699, the kit is priced well below what some Ethernet cable testing systems cost. Peter Williams of Sound Designs in Toronto, ON, says the integrator has been using the system extensively since acquiring it six months ago. He notes that the ability to copy EDID codes from the source to the display is a key factor in solving many handshake issues.

Dan Tye, Atlona's U.S. National Sales Manager, notes that the KIT-PROHD3 has been a huge success for the company, and points out that the kit is available to any integrator. "It now gives our integration partners the ability to diagnose and solve these various issues, and provide information to them that was not possible to acquire in the past," he says. "It gives them the ability to diagnose issues up front, minimizing repeat visits to clients' locations, losing those labour dollars, and eating up profits on the job. We wanted to make it as easy as possible, and empower installers to create the cleanest and most trouble-free installs as they can."

Another oft-cited gripe about HDMI video distribution is the interminable delay when switching between sources, a common problem with whole-home systems where there's an HDMI matrix switcher in the mix. Although the HDMI specification can supposedly handle up to eight "hops" between a source device such as a Blu-ray player and the display at the other end of the chain, there's nothing in the spec apparently that provides for any sort of timing length limitation for the various handshaking steps to occur. That's a serious issue, as the time it takes to switch between various sources can have the customer waiting 30, 40, or even 50 seconds or more for picture and sound to materialize; an excruciating length of time for a client to be looking at a blank screen.

According to Savant's U.S. Director of Marketing, Craig Spinner, the expertise garnered from years of experience providing telecom switching systems gives the company a leg up in terms of switching HD sources quickly over HDMI. "We do feel we have the fastest HDMI switching available today. It's really lightning quick," he notes.

From a wired HDMI distribution standpoint, integrators polled on the subject all uniformly have had mostly negative experiences. Brad Trew, Systems Consultant at Entertaining Interiors in Toronto, ON, notes that the company has had mostly bad luck with HDMI extender devices, where one brand of HDMI Cat cable extender worked fine on one jobsite, but the same equipment at another location failed to deliver a reliable signal. For runs up to 75 feet, Entertaining Interiors goes with hardwired HDMI, but for longer distances, the integrator is often forced to use HDMI Cat cable extenders

Matt Scott, President of Omega Audio Video in London, ON, recalls numerous similarly negative experiences with HDMI Cat cable extenders, and sums it up by noting "If it's wired, it's better."

All is not gloom and doom as far as Cat cable extenders are concerned, though, as a few newly-introduced models incorporate HDBaseT technology that provides a much more robust connection. For example, Gefen has introduced its HDMI 3DTV Extender (\$600), and President Hagai Gefen notes that, "In the past year or so, we've had about 20,000 of our conventional HDMI Cat cable extenders installed in various commercial and residential spaces, and about 750 of our HDBaseT-equipped HDMI 3DTV extenders. Of the 750 HDMI 3DTV extenders that have been installed, we've received not one callback." He goes on to describe the HDBaseT technology as "bullet proof."

While more costly than other Gefen HDMI Cat cable extenders, the HDMI 3DTV extender can deliver a full HD 1080p/60 signal at distances of up to 100 metres with a single run of comparably inexpensive Cat5e cable. Other Gefen HDMI Cat cable extenders require either dual Cat5e runs (one for signal, the other for HDCP handshaking), or a single run of more expensive Cat6 shielded.

Not yet two years old, startup Transformative Engineering's recently introduced HD-1 HDMI extender (\$900) is also HDBase-T-equipped and features a host of connectivity options. It, too, can deliver full HD 1080p at up to 48 bit resolution up to 100 metres, and includes all of the features provided for in the HDMI 1.4a specification, including 3D capability, audio return channel, Ethernet carriage, and 4Kx2K ultra high definition capability. It also has bi-directional IR pass-through with the option of powered pickup at either end, and it's equipped with RS-232 serial control carriage. Both the transmitter and receiver boxes include Ethernet switching, with three RJ-45 ports on each. There's also fully automatic cable compensation, and both units have front panel diagnostic indicator lights.

While it's a pricier option than many other HDMI extenders out there, Phil Bond of TE's Canadian distributor, Positive Marketing-A/V, points out that the HD-1 can save integrators labour dollars and grief by providing an assuredly reliable signal connection right from the get-go. He shares one anecdote about the HD-1, where his Quebec-based sales rep had provided a sample kit to Montreal's KébecSon. On one job, KébecSon had installed a long HDMI run using a competitor's extender, and couldn't get it to work. Going back a second time to the jobsite, they swapped out the extender and tried another brand.

That one didn't work either. On the third visit, they tried yet another extender, and even that one didn't work. But this time, the technician had the rep's sample HD-1 extender on the truck and put it in place, and this time it worked. The dealer called Bond back and said "You're not getting the sample kit back; better send me an invoice."



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Bond notes that, "After three truck runs, whatever profit that was built into that relatively straightforward job must surely have vapourized." And, he also notes that the other extenders that didn't work were priced roughly in the same range as the HD-1.

KébecSon's Claude Latour concurs, stating that, "We've had many problems with HDMI extenders working fine on one site, but not working at all at another site."

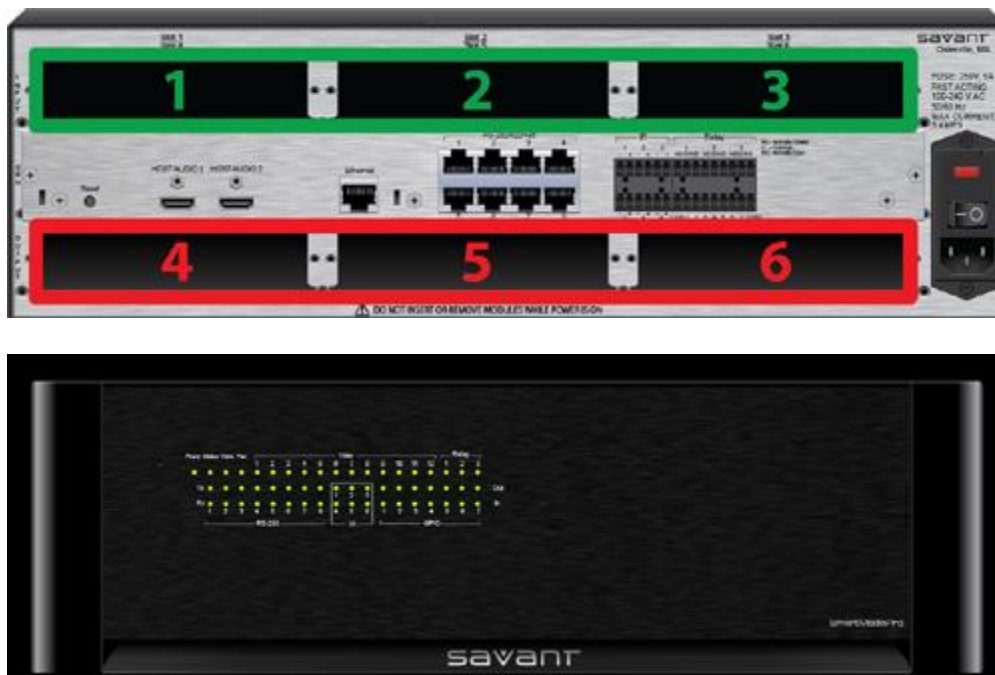
Atlona has recently announced two new high-speed HDMI matrix switchers that incorporate HDBaseT technology, an 8x8 model and a 16x16 model (AT-PRO2HD88M, AT-PRO2HD1616M). Both are said to provide full 1080p 2D/3D delivery over a single Cat 5/6/7 cable over distances up to 100 metres, and they feature signal conditioning, including the ability to amplify, equalize, and re-clock the signal to ensure HDMI-accurate transmission without quality loss.

Is Fibre a Factor?

For sky's the limit installations, integrators can completely avoid long runs of HDMI and not have to deal with Cat cable problems by specifying fibre optic. However, that's traditionally been a pricey proposition (integrators polled for this feature uniformly pointed to Crestron as their key vendor, as far as fibre distribution is concerned). For more modest jobs, there often aren't enough dollars in the budget to allow specifying a Crestron-based system. Fortunately, more affordable fibre-based switching and distribution systems are on the way.

Savant debuted two new HDMI-over-fibre I/O cards for its SmartSystem line of modular matrix switchers and controllers at the recent CEDIA show in September. The VIM-F004 and VOM-004 input and output cards provide four HDMI-over-fibre channels connectivity, enabling fibre distances of up to 1,000 feet. They also introduced the HRX-F001, a single port HDMI-over-fibre card that delivers a simple interface for a single display as part of a complete SmartMediaPro system. Savant expects the cards to become available in early Q1 2012. The cards are compatible with Savant's new 3U SmartMediaPro matrix switcher (SSP-0600), which provides up to 12x12 1080p video switching or up to 24x24 line-level stereo audio switching, or a mix of both.

Savant's Spinner notes that, "Fibre is important in the commercial space, but presently less so in the residential space, but we see that segment as growing." Savant is planning to add more fibre HD transceivers to its line in 2012.



Savant's new 3U SmartMediaPro SSP-0600 matrix switcher provides up to 12x12 1,080p video switching or up to 24x24 line-level stereo audio switching, or a mix of both. And it's compatible with the company's new VIM-F004 and VOM-004 input and output cards.

Wireless: Still in Beta?

Over the last two years, the number of TVs equipped with WiFi streaming capabilities (so-called "Smart TVs") has exploded, and industry estimates indicate that perhaps half of all TVs sold by 2013 will be Smart TVs. The comparable explosion in sales of wireless-equipped tablets in the same time frame has similarly changed the landscape.

When it comes to distributing HD video wirelessly from a custom integration standpoint, there hasn't been a whole lot going on. But there are signs that wireless HD may become a more viable option in the very near term, at least as far as point-to-point is concerned (matrix switched/distributed HD via wireless is another matter; none of the manufacturers polled had any confidence that it would be happening anytime soon).

The Wireless Home Digital Initiative (WHDI) is a relatively new wireless HD technology, and works in the 5 GHz band, occupying a narrow 40 MHz slice of the spectrum. At press time, computer accessories maker IOGEAR announced the impending availability of its Wireless 3D Digital Kit, which transmits 1080p/3D video and 5.1 digital audio at up to 100 feet, through standard walls

IOGEAR points out that by using the relatively uncrowded 5 GHz spectrum slice (relatively uncrowded at least at this point in time), the technology is generally less susceptible to wireless network interference, and can carry much more data than can be accommodated in the 2.4 GHz spectrum space, which is utilized by many consumer cordless phones, WiFi, and the like. The kit includes a transmitter box and a receiver box; the transmitter box can stream HD from two sources.

Up to two HDTVs can be accommodated, one in the main room where the transmitter resides (using the box's HDMI loop-through, or local port), and a second set in another room where the receiver box is. An IR feedback feature from the second room is provided, and the kit includes an IR blaster that connects to the transmitter box in the main room to control source devices such as a Blu-ray player and cable/satellite set-top box. Canadian pricing wasn't available at press time, but the suggested list for the product south of the border is US\$379.95.

Going forward, it appears other manufacturers of HD video distribution systems plan to add wireless HD products to their assortments. For example, Michael Lakhter, President of Key Digital, says that the company had previously done development and testing of wireless HD technology three years ago, and abandoned the effort as the reliability factor they required simply wasn't achievable back then. Key Digital has since begun renewed R&D efforts over the past year, and Lakhter notes that the technology has substantially improved.





Start-up company Transmotive Engineering has developed its HD-1 HDMI extender, which can deliver 1,080p HD at up to 48 bit resolution up to 100 metres, and includes all of the features in the HDMI 1.4a specification.

Key Digital still recommends a hard-wired backup plan anywhere wireless is considered in commercial installations, though. While the company is still a ways away from making any definitive product announcements, the fact that it's back working on a wireless system is indicative of the growing interest in wireless HD.

Atlona's Tye reveals tantalizing hints of new wireless HD products that the company will debut at CES in January, based on WHDI 5 GHz technology under the new LinkCast sub-brand, including a LinkCast wireless product for mobile devices (smartphones, tablets), a LinkCast KVM adapter that will allow for better integrating a PC into the home theatre experience, and another LinkCast product for shuttling HD video from HD source components to the HDTV.

None of the integrators polled for this month's column have had any experience with WHDI-based products as of yet, and it remains to be seen if the claimed 100-foot transmission distance is realistic. As the transmission/reception frequency is way up there at 5 GHz, it's worthwhile noting that the higher up you get in the microwave spectrum, the more easily the signal is attenuated and/or corrupted, which, in both commercial and residential spaces, is caused by

obstacles such as AC wiring, HVAC metal ducting, plumbing, masonry, plaster over lathes, and other wireless congestion such as dual-band 802.11n WiFi, and RF emissions from super-fast PC microprocessors (each one's a miniature radio station, RF-wise).

Sneak Peaks, Continued

SnapAV's G. Paul Hess reveals some details about new HD distribution systems that the company will be rolling out over the next few months. In December, the company will begin shipping its B-100 4x4 HDMI matrix switcher, to be followed in January with the B-300 4x4 switcher that adds single Cat cable (Cat6 STP) connection with bi-directional IR. In March, there are plans to launch 8x8 versions of the above two models, and sometime in Q2 2012 will be an 8x16 switcher with single Cat6 STP output capability.

Looking Ahead

When we visited the topic of HD video distribution last year, the column featured extensive mentions of Gigabit Ethernet as a distribution medium. A year later, the topic never even came up, which speaks to how rapidly things can evolve over a relatively short period of time.



Ideal for spots where component video may still be preferred to HDMI for distributing HD video, such as in bars or restaurants, Audio Authority's HLX Modular Matrix System can support up to 12 pathways for component video and audio, and up to 64 zones over distances as long as 300 metres. It works with Audio Authority's standard Cat5 receivers, and is compatible with Ethernet, serial, and IR control systems.

HDMI issues, while still prevalent, appear to be abating, aided in no small part by the burgeoning availability of HDBaseT-equipped products, and the fact that the technology is already migrating from HDMI Cat cable extenders to full-on HDMI matrix switchers. That the technology is being embraced by manufacturers such as Atlona, Gefen, Key Digital, Savant and

Transformative Engineering, suggests that going forward, HDBaseT might rapidly become the definitive HD delivery option that provides the reliability that custom integrators and their clients demand.

Overview

- Over the past year, we've seen more reliable HD signal distribution systems come to market; but we're still not where we need to be
- There are indications that in 2012, fibre may become a more viable option, along with wireless HD video transmission
- The need for increased bandwidth for 3DTV, and the discontinuation of analog component video outputs on Blu-ray players, are driving the death of analog component video distribution
- HDMI issues continue to exist, including HDCP handshaking problems and EDID code-related woes
- Integrators have had mostly negative experiences with HDMI extender devices
- **HDBaseT may become the definitive HD delivery option to meet the needs of integrators and customer**