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The Head Monster Of Monster Cable Talks
About The Industry And HDMI

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Monster Cable's Noel Lee

Gary Reber

I had the opportunity to interview Noel Lee, the Head Monster, during the recent 2007 Custom Electronic & Design Installation Association (CEDIA) EXPO on the state of the consumer electronics industry and the direction that Monster Cable® is engaged. Noel addresses the challenges with regard to HDMI interconnectivity that I think our readers will find educational.

Gary Reber, *Widescreen Review*: What is your assessment of the world of consumer electronics, especially as it pertains to high-performance components?

Noel Lee, The Head Monster, Monster Cable: The consumer gets a lot for his money these days. In fact, what is now considered average performance was considered high-performance only a few years ago. As prices fall, new high-performance products today achieve next-level performance for the same price as before. The big advances in both high-resolution audio and high-resolution video are just happening as we speak. It's a wonderful time in consumer electronics today where the consumer is the benefactor of these high-performance audio/video components. The technology in 1080p and beyond displays, 120 Hz frame rates, and deeper color gives the consumer an incredible experience. New advances in sources, new firmware for high-definition [optical disc] players, and constant improvements in content of Blu-ray Disc and HD DVD makes it an exciting time today. It seems like there is a never-ending quest for innovation among display and electronic manufacturers and content providers.

WSR Reber: So what about the advancements in high-performance cables?

Lee: The performance of cables has gone up dramatically in the past ten years. With the advent of component video, the consumer has high-definition that goes way beyond that of the VCR and even standard DVD. Today with constant improvements in HDMI that go along with the improvements in 1080p displays, the performance of the cable is more important than ever before. With HDMI, we have transcended to an all-digital signal in both audio and video, the first time that this has ever happened in the



same cable. This puts high-performance cables on a whole new playing field. As digital signals travel through copper wire, we experience a whole new level of performance issues that challenge us in building better and better products. Today's HDMI cables need to be built to exacting standards to extract every ounce of performance that the display and the source components are capable of.

WSR Reber: What other high-performance components are available to the consumer today?

Lee: The latest generation of A/V receivers that are just hitting the market are the highest performance that we have ever seen. The advanced processing, switching, and consolidation of so much technology in one box is just amazing in the latest generation of A/V receivers. But it's not just about the display and the source component, the cable, and the A/V receiver; it is also about the content. Many people don't know that if you have the best of all of those components, that you still need specialized content. Of course, to take advantage of your 1080p display, you need 1080p content. To take advantage of the new advances of Deep Color that the latest displays are capable of,

you need to have content that is also encoded to output Deep Color. Consequently, all of this puts tremendous pressure on cable performance. We have yet to see all of these capabilities. In the next year, I imagine that we will take picture and sound quality to a whole new dimension. Of course, the cables need to be capable of delivering all of this performance, and that's what drives us.

WSR Reber: It is interesting to observe the advances in high-performance video and multichannel audio, yet, while picture quality is being embraced by end users, high-performance, high-resolution audio is struggling and is overall in decline. Why is this happening?

Lee: It used to be an all-audio world, and video was a small 13-inch TV sitting in the corner not tied to audio at all. Gary, you remember that in the early days of two-channel audio, we would be able to transform you to another place with the goal to reproduce the "original performance." For years we strived to achieve that pinnacle in audio reproduction. But video is much more dramatic to the average consumer, and is constantly active. Walking into a store, you see video, but unless the loudspeakers are playing you will not be hearing the audio. It's incredibly impactful to see this bright big picture coming at you and forget the audio that is needed to go along with that video. Audio needs to be demonstrated along with video, but with the pressures of retail these days, and the lack of space on the sales floor to be able to properly demonstrate audio with video, and the lack of qualified sales people makes demonstration all but impossible today. It's a shame, Gary, because as you and your readers know, it's incredibly impactful for high-performance audio to not only play movies but to play our recordings in a way that we've never been able to experience them before. But if consumers cannot hear this, we cannot expect them to buy it. It's all in the "art of the demo." I think we need to do something about that decline.

WSR Reber: What direction and measures do you think need to be embraced to put some steam behind high-performance, high-resolution audio?

Lee: Through education and magazines such as yours—to teach that the audio is at

least as important as the video. In fact, one could turn off the video and still get immersed into the musical performance without the aid of the picture. We've been doing that for years. You could even get involved in the action and dialogue. Remember, we used to have radio before we had pictures. So sound is all-important and today sound is better than ever, as it comes in high-resolution and in 5.1 and 7.1 channels with tremendous impact; a far cry from yesterday's table radio. The picture should be an adjunct to the audio, not the other way around. Consumers, your readers, need to put pressure on the retailers to say that they want a high-performance audio demonstration; that they would like to hear loudspeakers that give all the dynamic range that you hear in a movie theatre or in a live concert. A music performance takes you to the live performance without having to drive in your car and get your shoes and clothing all dirty, trampling through grass and mud. Just sit down in your living room, put on your favorite high-definition music DVD, and get transformed by all that phenomenal video along with incredible audio. Music should be part of every demonstration and it's not. In fact, movies don't have a lot going on in the surround channels for a lot of the time when there is just dialogue. Whereas music is a constant compelling demonstration of constant surround if it's done right.

WSR Reber: Ever since the introduction of HDMI (High-Definition Multimedia Interface), and the subsequent five versions of the standard, it has been an ordeal for end-user enthusiasts and custom installers and retailers to determine the best HDMI cables to use for a system or project. Few know exactly what they are buying or selling. For those who want to know, it can be a real challenge to find out. Why is that?

Lee: HDMI has undergone many transformations and is really an incredible connection standard paving the way for future performance. Yet the Internet and consumers abound in a belief that all HDMI cables are the same. Well, nothing could be further from the truth. The amount of data that it takes to reproduce a standard DVD with HDMI or upscaling DVD player from 480p on HDMI to a true 1080p player is significantly more data. About six times more data, to be exact, and that's at a 60 Hz source component. We are going to see faster source components in the future, which will increase the data rates, and we'll see more than 8-bit color from a lot of our sources and content, which will push the envelope even further. So what we know as HDMI today is really a shadow of what it's going to be in the future. But consumers don't know that when they see an HDMI cable it could have been designed in



2003 when the standard first came out, or it could be one of our latest generation of cables, which is significantly higher performance than those that were invented five years ago.

WSR Reber: So what have you done to educate consumers to this situation?

Lee: We have just introduced to the consumer our speed-rated cables, where we actually publish a gigabit-per-second capacity of the cable based on certain lengths. This will give consumers a rating by which they know exactly what they're paying for and, more importantly, an installer to know exactly what they're installing. Other companies are doing the same thing, as HDMI cable performance is all over the map. The gigabit ratings tie directly to the current and future performance of components. But it always pays to buy the very highest technology cable possible since one will always be upgrading components, and you don't have to think that the cables would be inadequate to carry the signals of your source to your displays. Advanced displays are here, so it really pays just to buy the best cable possible.

WSR Reber: Well how will the end user know?

Lee: You really won't unless you look at Monster's speed rating and discover what rate that it's specified at, which is several times above the current HDMI 1.3 Category 2 standard. I know that another company, DPL, is ranking cables by performance as well.

WSR Reber: Explain what HDMI 1.3 Category 2 is.

Lee: This is the most advanced HDMI cable standard today. Great for today, but it may not be good enough for tomorrow and it may not be good enough over long lengths. So that's why we are determined to create even higher-performance cables that go above this standard, to offer our customers the very best in HDMI cable technology. You will begin to see these cables from Monster this year.

WSR Reber: At a conceptual level, end users, custom installers, and retailers figure if the cables are certified for HDMI Version 1.3 Category 2 and deliver a 1080p resolution at a specified length, they are assured that everything will work perfectly. But is that always the case and if not, why not?

Lee: Well, there are things that go above just the resolution and data capacity. For example, the HDCP handshake has not always been consistent between many of the different components, especially with earlier versions of HDMI inside of those components. It is true that a higher level HDMI component, say a source, will work with a lower version of HDMI, for example, a display that will work with a DVD player with a previous version of HDMI. But it won't work the other way around. So feeding a high-resolution HDMI source of 1.3 Category 2 may not work properly going into an HDMI 1.0 A/V receiver or TV. It is very confusing during this transition of technologies as the chips get better and better and are able to produce higher and higher quality. That's kind of the penalty that we pay for progress. There's also CEC (Consumer Electronics Control). Many people are confused about CEC as a control standard running between components and whether the cable is capable of it or not. It's a great concept, and we believe that many of the component manufacturers will adopt it in the future. But currently it's anyone's guess if your HDMI cable provides for an adequate CEC signal, especially over long lengths.

WSR Reber: What is your take on component analog and HDMI distribution formats in terms of performance and trade-offs?

Lee: I feel that component video has served us extremely well, and it does not have the problems of HDMI over long lengths. However, it is a limited format, great for 1080i, but not universal for 1080p. It is also rumored that component analog will be



downrezzed to 480p and that 1080p will not be available over component video, at least not by everybody. It does not carry HDCP copy protection, which is its real limiting factor. And it is not a complete digital-to-digital, end-to-end solution. So like it or not, a digital connection is the future, and we need to make a transition to it. However, in this transition period, it's understandable that installers will run both component video with analog audio cables in addition to HDMI, especially over long lengths.

WSR Reber: So what is a long length?

Lee: HDMI is good for 25 to 50 feet, depending on cable performance at its highest ratings. Although our cables will work up to 100 feet, above that will require some electrical assistance, which we will be providing for runs up to 200 feet at 1080p resolution. It's absolutely incredible to be able to achieve this amount of data over such a long length.

WSR Reber: So why do HDMI cables degrade and are more sensitive than analog audio cables to degradation? After all, isn't it just a digital signal, and it either gets there or it doesn't?

Lee: True, it is a digital signal. But it is a lot of digital signal. And if you can imagine that this digital signal goes down an analog wire and is subject to all of the electrical performance parameters of copper wire—for example, resistance, inductance, and capacitance, we know start to round off the corners of square waves and limit total bandwidth performance, and over long lengths the signal will attenuate. The digital signal that goes through HDMI is no different. It is dramatically affected by resistance and attenuation due to length. Inductance and capacitance of the cable really slows the performance downward plus there are other additional considerations, such as the inter-pair and intra-pair skew lengths. The timing differences of the three pairs of cables and "jitter" of the signals as they travel through the cable increase as length increases. The arrival time of the three separate pairs of HDMI signal conductors are in the nanoseconds. Physically it has to be terminated within 1/20,000's of a second in order to be a high-precision cable. That's why in many cases you cannot look at an HDMI cable and tell if it's high-performance or not. You also need to look at things like environmental testing

and interference, or resistance due to corrosion. As the signal travels down the cable, it experiences more and more of this jitter distortion. The receiving component, on the other hand, needs to see all of this signal in the same condition that it was sent, otherwise, it cannot interpret all of the data after it's been distorted inside the cable. Consequently, you'll lose performance and the digital signal will be lost or thrown away.

WSR Reber: When dealing with long cables, the experience for many has been that HDMI signals might not make it to the other end on their own without peripheral devices to "boost" or "restore" signals or transcode the HDMI signal for distribution across CAT-5e/CAT-6 or fiber, or are not performing to full spec on their own. Why is that?

Lee: I think you can put that question right before my previous answer. I'm talking about the resistance, inductance, and capacitance of the cable. We also can talk about crosstalk between the three different cable pairs that are within the HDMI cable. Plus even the length of cable between each of the pairs is extremely critical. So make no doubt about it, the HDMI cable is a very sensitive part of one's home theatre system. It's probably one of the most sensitive in terms of how it's being handled or mishandled by installers and how it was terminated, which was critical to the overall performance. I should also note that connector quality, because it is very tight precision, needs to be right on. Any deviation in the spacing between the internal wires in the connection and the construction of the connector parts themselves will distort the signal. Many of the lesser connectors that we've seen will take a reasonably good cable and have it fail when it comes to the end of the connection.

WSR Reber: How can end users, custom installers, and retailers be assured they are getting the most bang for their HDMI bucks?

Lee: Right now there is no way to tell. In fact, we've found HDMI cable performance all over the map. We've tested cables from every manufacturer. As far as cost goes, get and install the best HDMI cable technology you can find. Don't skimp here. The difference [in price] between the least expensive and most expensive cable is relatively minor compared to the cost of the display. My recommendation is for consumers to buy the

best possible cable from the best possible manufacturer so that they're assured of getting the quality of performance.

WSR Reber: What is entailed in your "Need For Speed" education program?

Lee: Well we just launched this, Gary, and it's been extremely successful. The whole industry is thanking us for educating consumers on the "need for speed." In fact, what we do is we take an analyzer with an eye-pattern test and generate signals way above the HDMI standard over various lengths so one can see what the performance of the cable is and then be able to judge whether it's the right cable for them. Now we don't publish any speeds other than our own but we have all of that data for our records. Of course, we feel with all of this very expensive test gear that we can engineer or make the highest performance cables for a given price point. So today, you have from us, Standard Speed, which is really the original HDMI; High Speed, which is the HDMI 1.3 Category 2; and then going above that we have Advanced High Speed; Ultra High Speed; and eventually Ultimate High Speed. These are extreme cable technologies that significantly advance the performance of standard HDMI. How do you tell? You can look at the speed rating that we have for each of the cables. The speed ratings are very conservative and represent worst-case unequalized. Any speed rating should be unequalized so you are looking at only the performance of the cable.

WSR Reber: Well, how do you know what speed it is?

Lee: Look for our next generation of cable products. You'll see the speed clearly labeled, right on the package. We think all of your readers will enjoy the fact that these cables are easily distinguished from one another so that they are "easier to shop so consumers know what they are getting."

WSR Reber: The latest certification program announced at CEDIA is the Digital Performance Level (DPL) ranking system, which is supposedly based on mathematically conveying how HDMI cables and accessories will actually perform based on all of the known electrical characteristics of an HDMI cable. The characteristics consist of bandwidth, capacitance/dielectric loss, supply line current, display data channel corruption, DDC-12C Inter-Integrated Circuit EDID



and HDCP (High-Bandwidth Digital Content Protection) communications, delay, eye pattern, impedance, intra-pair skew, inter-pair skew, and jitter. All these parameters are to be measured and the overall HDMI cable or accessory performance level ranked according to a single number, from 1 to 5. Manufacturers participating in the DPL ranking system will receive a detailed engineering report on how their cables or accessories perform in real life. Do you support this system? If yes, why, and if no, why not?

Lee: DPL greatly supports everything we have been saying:

1. That the HDMI cable performance varies all over the place.
2. It's impossible to distinguish cable performance, one over another, because of lack of specifications and test methods, which is why DPL and Monster has chosen to do them.
3. The price of the cable. We've found that just because you paid a lot of money for the cable doesn't mean you get higher performance.
4. Any rating system is better than no rating system.

So yes, we support DPL, although we don't know all of the parameters that they're measuring or how it's measured. I don't believe that they measure speeds above HDMI 1.3 Category 2, but it is possible for measuring other parameters to come up with a "ranking system." So I suspect that if our cables were tested that we would come out on top, which would validate our testing with their ranking. But I, in fact, don't know that, because we have not given them any of our latest cables for testing.

WSR Reber: So what does the future look like for Monster's HDMI initiatives and where do you see it going?

Lee: We anticipate greater and greater advances in shorter and shorter amounts of time. It took four years in HDMI to get from a 2.2 gigabit to now over a 10 gigabit and greater throughput in terms of data requirement. Imagine this, Gary, that in the old days of CAT-1, CAT-2, and CAT-3 networking cables, that if you knew that CAT-5 100 megabits was going to be available and that 1-gigabit Ethernet would be available soon

after that, you would just install the better quality cables, wouldn't you? So today, you have CAT-5, CAT-5e, CAT-6 and even CAT-7 cables for networking. So had you known about these future advances in cable, wouldn't it have made sense to install that into your homes and your businesses so that you don't have to upgrade the cable as you upgrade the devices that you hang on either end? I anticipate that home theatre will have significant advances. Displays will get even bigger as people want bigger and bigger size but also demand equivalent picture quality as the size gets bigger. Today that's not available to them. So 1080p is not the pinnacle of high-resolution. I believe it's the beginning of high-resolution. How fast is the frame rate? How deep can the color be? It's anyone's guess. I believe that the processors and computers used in creating computer games and animation for movies are rendering at a much higher rate than our DVD players can play today. Much like the DVD-Audio and SA-CD of yesteryear is now available to everybody on an HDMI cable.

WSR Reber: What about the audio capabilities of HDMI?

Lee: High-performance HDMI is probably the best audio cable that's ever been made. Yes, we had coax digital, and we had fiber-optic in the beginning. It wasn't until we had DVD-Audio and SA-CD were we able to achieve the same level of sound quality that was being recorded into the studio on a ProTools desk. As we know, those formats failed because of the connection type, the need for separate software and special players, and a host of other reasons. Today, 192 kHz, 24-bit high-resolution audio is available in 7.1 on an HDMI cable. SA-CD in 7.1 is available on an HDMI cable. So we have achieved the highest pinnacle of audio cable technology, yet we're not celebrating it with high-performance amplifiers and high-performance loudspeakers in our homes and living rooms. What a shame! We are still listening to stereo at 44.1 kHz sampling rates and worse yet, MP3 and even lower resolutions of audio. Really, it is a pity when we think about what we wish for and now we have it. But the consumers are not taking advantage of the wonderful audio technology. It's through the

educational efforts of people like you that we'll be able to open their eyes to improve their audio systems with higher-quality amplifiers, processors, and A/V receivers and go through some of the inconveniences of installing a full 5.1, 7.1 high-resolution audio system, but the result will be an experience that they can't even get at the movie theatre that will just knock their socks off.

WSR Reber: Why did you embrace the Z-Wave wireless home-control technology and what products support it? What are the alternatives and your assessment of each?

Lee: We are so excited about Z-Wave and, as you know, Gary, we introduced the Monster Central Control System with what we call the "world's most powerful hand-held controller." But what really makes it exciting is our IlluminEscence lighting technology that incorporates Z-Wave. Can you imagine that 20 years ago you had to manually open your garage door—get out in the snow, in the rain, and open up your garage door so you could pull your car into your garage? That would be unthinkable today. Yet, lighting in the home is still manual. You know how it is Gary, every time you leave the home your wife says, "Can we turn off all the lights before we leave? Can we turn off all the lights before we go to sleep at night?" And then you have to run around the whole house flipping on all the light switches and flipping them off every time you enter or exit the home. What a waste! So we would love to bring the wonders of automated lighting to the masses.

WSR Reber: Well, why hasn't this been more widely embraced? After all, lighting technology has been available for years.

Lee: Yes, but lighting has always been extremely expensive and not very affordable. You need boxes, infrastructure, radio-controlled repeaters, and you need to have a qualified programmer that programs every light switch in your home to make it all work together. Then if you want to combine that with your A/V control system and allow your Crestron or AMX system to control it, that would require many more programming dollars and even more equipment. So it's been really out of the reach of the average consumer, at least until now. So for example, we

are going to be offering a handheld controller that does complete A/V with complete macros that can be programmed over the Internet by the consumers themselves, and four lighting modules to do most home theatre systems for less than a thousand dollars. Now that's progress. To answer your question about Z-Wave, we feel it is the most robust technology for the least amount of money. In fact, we have two Z-Wave chips in each light switch because the light switch is a receiver and a broadcaster, so there's no need for repeaters. These light switches are also intelligent, in the fact that they memorize all of the commands that you've given them, so if you've ever had a lightning strike, there's no box that controls all of the lighting. All of the intelligence is in the lighting system itself.

WSR Reber: That is very clever.

Lee: That's not only clever, but it's the only way to do it. And it should have been done that way, had the technology been available. So Z-Wave is the best of today's technology. It doesn't have some of the problems of other wireless home networks, and it is, indeed, the most affordable.

WSR Reber: Will you be developing product supported by Internet protocol (IP) digital network technology?

WSR Reber: We will be entering the home-control space, because it is related to interconnectivity, in our next generation of products that we really can't talk about yet, but I would ask your readers just to stand by. We hope to make life a whole lot easier through many of our products, especially our power products. That's all I can say.

WSR Reber: Well what about your power products? Can you tell our readers why you think it is necessary to have power enhancements?

Lee: We have just announced a whole new line of products for custom installation and for high-end home theatre with big 20-amp circuitry—a new level of clean power filters designed by the Godfather of Clean Power, Richard Marsh of audiophile fame. We feel that power for both filtering and surge protection is more important than it ever was.

WSR Reber: Why is it more important today than it's ever been before?

Lee: Because we are experiencing greater and greater power outages, and all of those digital products put more and more interference on the line. As everybody knows, the power grid in this country is not very stable. It's not uncommon to have blackouts, low-voltage power during air conditioning, overloads, and just fluctuations in the power grid. As more and more things get loaded onto the power grid and as more and more products become digital, there is more and more static and information on the line that needs to be clean before it gets to analog amplifiers and digital circuits.

WSR Reber: Tell me more about the surge protection part.

Lee: Gary, it's just like your computer. You would not run a computer today without having surge protection on it to protect the hard drive and all of the sensitive electronics and processors inside of your computer. Well what is a big screen TV and A/V receiver and processor today other than a big computer? You will see TVs at the end of the year that have hard drives built into them; that will surf the Internet and bring in new areas of programming. So protection should be a part of every home theatre system, bar none. But the real secret is in carrying that power from the beginning all the way through to the end.

WSR Reber: What exactly do you mean by that?

Lee: As you know, the power is not very stable in lots of parts of the country and in many homes, especially when you have a large power load. Whereas projectors and plasma TVs and powerful amplifiers are designed to be run at their properly designed voltage. Well the AVS 2000 high-performance voltage stabilizer is a perfect example of how to stabilize that power before you clean it—the one that was reviewed in your magazine. I want to introduce you to the latest one we just put out for custom and you can see that it's a huge, massive microprocessor controlled variAC. It's extreme precision and very fast acting. That's the only way anyone should go if they've got projection systems, lots of amplifiers, and lots of power-hungry devices. You need to have something that's high current like this. Then you go to clean power and we recommend the HTS 7000 with the isolation transformers in it, which I know are kind of a new thing. Then you will want to take that power all the way through the power amplifiers into your multichannel system, so that should be all one complete integrated system. We call it the Monster Power backbone. And boy, is it impressive when you put that whole backbone into a system!

WSR Reber: Do you care to share any new developments coming up in power?

Lee: Gary, we have been the leader in power for the last 15 years, and we intend to continue to do so. We have a lot of things that we are going to do with power to continue to lead the industry and what a power center should be. While our competitors try to copy, we'll be far advanced.

WSR Reber: Do you have a lot of competitors?

Lee: Success breeds lots of competition. We welcome many of the competitors because they make the market and the awareness just that much larger. However, competition makes us better, and that's why we keep pushing for higher and higher

performance and higher value for the money for all of your readers.

WSR Reber: What new product development are you engaged in?

Lee: Well, Gary, we can't tell you because we'd have to kill you, I guess. Innovation is part of the Monster DNA, we've got a passionate, passionate group of product development engineers and product people. We hope that we can bring your readers cutting-edge products that will constantly redefine the art of home theatre and audio that goes with it. That's where Monster started from and that's where Monster will continue to focus efforts, and we thank you and all the people at *Widescreen Review* for continuing to educate the consumer for what is best for home theatre.

WSR Reber: Would you like to conclude with a summary statement?

Lee: I would like to thank you for your years of dedication in educating consumers through *Widescreen Review*. There's no one that I know that is more passionate about what you do, and for the love of what you do, than yourself. It's a tribute to where the industry is today through much of your education. I would ask that your readers support your efforts with dollars that support the products that your advertisers promote. At the end of the day, this industry needs to survive and prosper. You can't do it all yourself, you need your readers and advertisers to help and support you. That's what makes the world go round. You can feel confident that *Widescreen Review* is a major influence on the buying public, and that I and your fans appreciate you. I ask that all of the manufacturers join me in supporting your efforts as a home theatre crusader of the highest caliber. Good luck to you, Gary. Thank you for the opportunity to express some of my views during this interview. **WSR**

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