Podcast Transcript

eg3.com Senior Editor Jason McDonald interviews BittWare President & CEO Jeff Milrod

Jason McDonald: *Welcome to the EG3.com editors choice podcast. I'm your host Jason McDonald, senior editor. As part of EG3.com's tech choice product awards, these podcasts identify today's hot technology trends for designers, as well as the companies and products that can help you turn technology trends into real applications. For more podcasts go to* www.eg3.com/podcast .

I'd like to welcome Jeff Milrod, President & CEO of BittWare to the EG3.com tech choice podcast. Jeff is going to speak with us today about FPGA-based board technology and, in particular, some news from BittWare on the AdvancedMC (AMC) standard. So thank you Jeff for coming into EG3.com's tech choice podcast.

Jeff Milrod: It's my pleasure Jason. Thank you for having me.

Jason McDonald: *Good. Well first of all, I always like to jump right into the news and then let's backtrack a bit into what BittWare does, and what you do, and all that sort of thing. So first of all, tell us a little bit about your Altera-based AMC board that you just announced – what is it, and, obviously, it's FPGA-based – what's so exciting about this new announcement?*

Jeff Milrod: Okay, that's a big question. What it is, is a Stratix IV GX – the latest chip that's come out of Altera – on an AMC format with all the bells and whistles and support circuitry around it that we feel is needed to create a very usable COTs architecture.

One of the things that I think is exciting about it is this is a new generation of product that I think is where FPGAs are starting to overcome the tipping point of traditionally having been glue logic and then ancillary processing, add-on features, things like that. I think the Stratix IV has gotten to a point where the performance is high enough, the density is large enough, and the power consumption is low enough that people can credibly house whole applications inside the one chip. The tools have gotten better. Development is still somewhat of a challenge on FPGAs. It's obviously harder - higher levels of experience required, harder to develop than high-level coding - but it's getting much more sophisticated, and the fact that you can fit it into one chip greatly simplifies it.

We're also excited about the new move for standards of COTS boards' formats from parallel buses to SerDes interconnects. And that's a term that I guess I wanted to find, I mean, high-speed serial ports, serializer/deserializers – everybody calls them different things – multi-gigahertz transceivers – that is the way that we see the future going, and it's dramatically changed my thinking as a board-level architect in that it used to be there was a great penalty for going off-board. You wanted to have as much critical mass on one board as possible because whenever you had to go off the board, over the backplane to another board, the performance/latency/determinism - all those things suffered tremendously - where as now, if you have multiple chips on one board, you connect them with these same multi-gigahertz transceivers, and if you have them on separate boards in adjacent slots, you connect them the same way. So there is literally no performance difference whatsoever. So by having a small form-factor like AMC - or Advanced Mezzanine Card – that is very savvy and sophisticated with implementation of these multi-gigahertz transceivers, you can allow and enable customers to build an optimal system with small granularity boards like ours that have an FPGA on it with all its support circuitry, and then scale it as you need.

Jason McDonald: *Okay. So you've got kind of a high-speed interconnect angle going on in addition to the AMC form-factor, so you've got a lot of new performance plus a lot of flexibility it sounds like in terms of getting the final design done.*

Jeff Milrod: Yes. To be clear though, the AMC is high-speed interconnect-based…

Jason McDonald: *Right.*

Jeff Milrod: …there's really no interconnect on AMC boards other than the high-speed SerDes on the backplane.

Jason McDonald: *Right, okay. Now what are the target applications for this sort of a board? Are they, you know, military, network warfare, are they medical – what sorts of – what would be your target application that somebody would be doing that this board would fit for?*

Jeff Milrod: In general, we don't target specific applications. And my philosophy is for signal processing - for high-performance and signal-processing - which is our core competency, the applications tend to have a lot more in common than people think. I've found that people coming in from a given application – telecoms tends to be a good example of this – have a fairly tunnel-visioned mindset of how an application should be implemented, and sometimes, that's completely reasonable and called for.

Oftentimes it represents an historic narrow-mindedness if you will, that, if you take a step back and… In our role we support military and aerospace/defense-based applications, medical imaging, high-end instrumentation, telecommunications and other applications, and we feel that our job as a COTs board vendor is to create an architecture that supports all of these. Granted not optimally; we do have different flavors of different boards to – you know, because some are very memory intensive and some don't need memory at all - so we can cost-optimize and reduce real-estate and such, but in general we'd rather optimize for performance and flexibility and environmental performance in the case of military applications, rather than making them application-specific. We feel that is really the value-added that our customer brings to the table.

Jason McDonald: *Okay, so you're really the broad platform. So let's just backtrack a little bit from this, and tell us a little bit about BittWare and - what is your value proposition? What is the elevator pitch for BittWare and what the company does, and where the value-added is?*

Jeff Milrod: Okay. We believe that we can create products that can simplify our customers' implementation, integration, and deployment of systems so that they can get to market quicker. We don't think that we have the corner on any given technology; most of our customers are quite technically savvy. Many of them could easily design and develop boards as complicated as or more complicated than ours. The problem is they don't have the time or energy to do so, and they have hopefully more important things to deal with – their unique value-added. So we believe by looking at a broader customer base, we can synthesize a better architecture than many customers who are single-application focused and create a board that's going to be a lot easier for them to use and leveraging our wide range of experience over many years, we can provide them features that maybe they hadn't even thought they needed.

One of the things, for example, that we found was very helpful is instead of having all the host command and control interfacing in the one big FPGA, we have a second smaller FPGA there that is running, in our case with Altera, a NIOS II micro-processor with Linux on it, on the board that handles all of that, and we have standard overlay software that takes away that complication. So when our customers are working on their

FPGA application, they don't have to mess with that at all, it's already done for them. It's something they might not have thought of and we've been working on this for many years, so it's an incremental step for us to integrate this onto a board whereas for a customer to do that it would be a huge effort.

Jason McDonald: *Okay. Now one of the things I saw in your release, and certainly on your website is this ATLANTiS™ FrameWork, and I guess this touches a little bit on what you were talking about - BittWare interfacing with your customers and a kind of division of labor there. So does that ATLANTiS FrameWork - is that something that your customers use to help them customize the board for their applications, or, what is this software framework ATLANTiS do, what is that?*

Jeff Milrod: That's a good question, and it's one that I get a lot, and to tell you the truth, we have a hard time explaining it. I think we've done a better job engineering it than marketing it. It's I think a relatively new concept, something that occurred to me years ago, and we've invested a tremendous amount in.

The concept is FPGAs are a blank page that can be quite overwhelming to have to have every application start from scratch. So what happened years ago in the board industry – we're not the first people to make FPGA boards – is people make a set of components that they would give with the FPGA board that says here's our DDR2 PHY, or here's our communications PHY for this protocol. And you have what we call a, BittWare has sold previously as a developers kit or a library of components. The problem with that is, the state of the tools tends to be that interconnecting those components can be rather haphazard. The semi-conductor vendors have their own libraries, there are third-party libraries with algorithms, and even when they try to all use the same interconnect protocols, they often are very hard to integrate. We found when we were doing that, our customers were having to develop less components, but were spending much more time integrating than probably if they just developed the components from scratch, and often we'd have customers do that, just throw our stuff away.

The concept of ATLANTiS is to not just provide the components, but also the infrastructure necessary to implement, simulate, synthesize, validate, and finally deploy a complete FPGA. One of my statements internally that our Marcom person might not like me saying out loud on a podcast, is that I think of it as the FPGA is already done, you just need to do something with it, which kind of sounds silly at first glance, but the idea is that we've got a full project that already works on the FPGA. We can move data from point-to-point, you can bolt on additional interfaces and algorithms, and drop in your application to an existing FPGA that already fully functions. There's very little integration required. We use standards from Altera – their Avalon interfaces both for streaming data and memory mapped – that we believe have made it extremely easy to synthesize and reconfigure bus-widths and timing and hold offs and all those little detailed interface/implementation issues that can make integration such a pain. We really believe that we've taken away a lot of that burden from the customer and will make it far, far easier for them to be at a deployable phase with a working FPGA application.

Jason McDonald: *Now what is the relationship between ATLANTiS and - I don't recall the name - but the Altera software toolkit that you get for their FPGAs. Is there a relationship there between the Altera-based tools and ATLANTiS?*

Jeff Milrod: Not at this point in any official way. Their basic tool package is called Quartus® II…

Jason McDonald: *Quartus II, okay.*

Jeff Milrod: … and they also have another development tool, higher level, called SOPC Builder – System on Programmable-chip – and that uses the NIOS II and their Avalon interfacing to automatically create the communications buses on-chip as you add peripherals. There are challenges with that though.

Jason McDonald: *So there's no connection then between these two softwares at the present moment. Between ATLANTiS and…*

Jeff Milrod: We leverage the same underlying technology and we create Quartus II projects, we use the same bus structures that SOPC-builder does, but we think we've done it in a way that is much more friendly to high-performance embedded applications.

Jason McDonald: *I see, okay, very interesting. Okay and then, one of these trends that we see and cover is this whole vague idea about out-sourcing, and that can be everything from doing some of the design in India, to a company that used to do their own boards entirely themselves looking to a company like BittWare to do some of the board, or purchase an off-the-shelf board from BittWare and then semi-custom.*

In our board study that we did over the summer - we did a survey of our user community and we found that a lot of times, people take the off-the-shelf board and that's kind of almost a starting point of a discussion with the vendor, and that board becomes the first phase or reference design, and then they customize it more. So tell us a little bit about the process that a vendor works with BittWare in terms of purchasing boards. How much of that is just purchasing them off-the-shelf and there's no modification, and how much of that is a custom or semi-custom kind of outsourcing if you will, relationship between you and the vendor?

Jeff Milrod: It's true that historically, not just BittWare, but most board vendors have made most of their revenue from higher volume relatively speaking, semi-custom type of developments, working hand in hand with a given customer for a specific application. At BittWare, we try to avoid that for a number of reasons. One is that we believe if we have not supported most of the applications, we've probably done something poorly in our board architecture and designing for flexibility. Having said that, there's always going to be a case where our customers need something that's out of the ordinary and atypical, be it mechanical or - mechanical often comes up with heights or widths or something special with the packaging requirements - special memory requirements, or an oddball interface for a legacy reason. What we try to do with those customers is work with them to put modular daughter cards on our boards – all of our boards support either standard - well not either, they're all standards - of daughter cards for expansion capabilities. PMC, XMC, and now the VITA 57 standard for front-panel mezzanine cards, that are high-speed support the multi-gigahertz transceivers, have front-panel access off of AMC and VPX, and customers can add, or we can add for them, specific features up there rather than having to respin the board. One of the problems…

Jason McDonald: *So you have kind of a modular concept…*

Jeff Milrod: …one of the problems with respinning from the get go is the amount of validation and testing that we put into a new product is tremendous. It's many, many man months and it's a cost that we'd rather not make our customers bear for a specific thing. We think that by coming up with these modular type approaches, we can reduce that, and ultimately get them a better product, quicker for less money.

Jason McDonald: *I see. Now, so it sounds like you use kind of a modular - it's a modularity concept to deal with this whole custom versus off-the-shelf.*

Jeff Milrod: Generally, but having said that, we do do the semi-custom work from time-to-time, as we work with our customers and are forced to do so.

Jason McDonald: *Oh, well, very interesting. Now another issue that comes up is approaching an FPGA design, some people kind of choose Xilinx or they choose Altera, or maybe they choose Lattice or Actel or whomever, and that in a sense can become a limiting factor for who they can work with on the board level, and it seems like - and correct me if I'm wrong - that BittWare is pretty much Altera-only…*

Jeff Milrod: That is correct.

Jason McDonald: *…okay. And one of the reasons you chose Altera, and on the flip side, do you ever have customers come to you that are Xilinx customers and is it, just, you either persuade them to go with Altera, or they go elsewhere, or how does that whole thing work with Altera versus Xilinx, the kind of two big players in the FPGA space?*

Jeff Milrod: Well, to answer the last question first because it's easier, yes we are Altera-only and if somebody absolutely requires a Xilinx FPGA, we are not the right partner. We will just not do that anymore; it just doesn't make sense for us for a number of reasons.

Jason McDonald: *So you're an Altera vehicle basically.*

Jeff Milrod: Yes, we're an Altera partner, and as such, I think we can add a lot more value to our customers because we are a trusted partner with Altera since we are exclusive with them, and we get the exposure to the dirty laundry shall we say, I mean nobody's perfect. Altera has an incredible track record delivering product on time and reasonably bug-free - I don't think there is such a thing as a bug-free product - but because we have such an intimate relationship with Altera and we are exclusive to them we've forged relationships where we get some pretty good inside scoops on some of the potential gotchas and things we need to avoid. When a customer comes up with some anomalous operation, we have a relationship that we can call on and talk to their product engineers, process engineers, test engineers if required, to say hey, what happens in this case? Is this something we've done wrong on their board? Is it something they've done wrong? Is it possibly a glitch in the chip that hasn't been dealt with yet? By having that relationship, we really do believe that we can add more value to our customers' process rather than having to say – I don't know, call the help line.

Jason McDonald: *I see. Okay. Now, another issue that's somewhat related to that is that there are a fair amount of vendors out there, and there's certainly been a big transition to FPGA-based boards versus the DSP-based boards that we used to see historically. If you kind of just - devils advocate - if you put yourself in a customers shoes, and they're looking, maybe they've already decided that they are going with an Altera solution, and now they're trying to figure out who would be a good board partner for them, what sorts of question would you, what question list would you recommend that they ask as they try to figure out a good partner? What are the kinds of hot-button points that you think they should ask?*

Jeff Milrod: Well, there are a lot of things, and of course some of them are self-serving, but I'll try to refrain from giving just a sales pitch. I've been in the industry a long time and I'm very passionate about being a COTS board vendor, not just BittWare-centric. If someone is looking for simply chips soldered down on a board, I think the criticality is much less of a concern. It also depends on whether they're looking for a handful, for prototype/development-type of work, or whether they need a production-type of quantity. Once they get away from just having, you know, bare silicon - they want the bare metal just so they can put their own software on - there's a lot of architectural value-added that board vendors can provide for the customers.

Then, at the production level, there's a lot of operational requirements, excellence, configuration management, quality assurance, testing things, that can also be valued added to the customer depending on what their needs are, so, I don't think there's a one-size fits all set of questions that should be asked.

Depending on the customer on the value-added side, I would ask how their host/control interface works, whether that's completely instantiated or whether that's something that the customer has to get involved in at the low level with HDL types of languages. Is there existing software, can they test their board from a host computer somewhere, dedicated interfaces to them, development tools that support their integration and testing as they get ready to deploy - things like that. On the other side - quality assurance issues. In this world now, things have gotten so complicated with these circuits, it's really astounded me over the last two decades how things have changed, and the heat density is one that has been a particular challenge for us and everyone else I believe.

Jason McDonald: *Yes, certainly.*

Jeff Milrod: **W**hether its board vendors or end users who are building their own boards – this stuff gets hot. And not only does it get hot, you can pack so many chips into a small place now, that they get each other hot. We have a dedicated mechanical engineering team, thermal chambers and a lot of other board companies do - again, I'm trying not to make it just a BittWare sales pitch - but in general, COTS can add a lot of value to the customer because that mechanical and thermal modeling has been done, and validation over all temperature, those things have hopefully been well thought out and managed. Then of course on the production side, there's the timeliness of product, the ability to deliver quality product in a timely fashion with support for lot tracking and serial number tracking and all those kinds of things.

Jason McDonald: *Okay. We're going to run out of time here real quick, but just a couple of little questions. First of all, just real briefly on the AdvancedMC or the AMC form factor, what is the customer gaining from going with these standard-based boards? Is that the ability to have multiple suppliers, is it some kind of lingua franca to compare the boards at, is there certain unique things in the AMC form-factor that you find exciting? What's the plug for AMC?*

Jeff Milrod: Well for any standard form-factor, AMC included, these things are pretty complicated and the fact of the matter is there's been dozens of people on these committees working on these specs, both electrical and mechanical, for literally years, and it's still being updated and improved as people find little gotchas and incompatibilities and things that – gosh, this board works and that board works, but they don't work together – there's a lot of….

Jason McDonald: *…community knowledge…*

Jeff Milrod: …expertise that's been brought to the table to try and iron it out and in some cases it can be somewhat limiting for some customers. And there are people who throw that stuff away and do either a semi-custom or full-custom application for a particularly critical application. But for most applications, I think you're much better off leveraging the expertise and experience that's brought to a standards body and to a standard format and then of course there is the critical mass factor that you need a doohickey to do what, and you can find a company that's making a board that does that already rather than having to spin it yourself and that's a huge advantage to using AMC or any other standard.

Jason McDonald: *Anything unique to AMC in particular?*

Jeff Milrod: AMC in particular I think is still emerging. I think it's finally mature, the specs are relatively finalized now, there is a huge critical mass. I haven't seen this kind of excitement since the early days of VME, which was in the '80s, with this many people jumping on and coming out with really creative and exciting board-level products to support this format, particularly for the MicoTCA applications…

Jason McDonald: *… I was going to say, right…*

Jeff Milrod: … more than AdvancedTCA, which is where this started. When the MicroTCA factor of board building and assembly for the chassis came into play, a lot of board vendors really saw that as a wonderful solution set and jumped in with some very exciting products, so there's a tremendous amount of support for that format now that I think make it very valuable.

Jason McDonald: *Okay.*

Jeff Milrod: I can't remember the guy – there's a guy who has a network law that the value of a network is equal to the…

Jason McDonald: *…right…*

Jeff Milrod: …square of the number of nodes on a network, and I think that's true with any of these formats too, the more board vendors, chassis vendors, backplane people, who are supporting a format, it becomes much more valuable and MicoTCA/AMC has clearly reached that critical mass at this point.

Jason McDonald: *I agree with that. Okay, finally, just real quick, somebody who's interested in working with BittWare, just point us to what is the best way to kind of start an engagement. Are there things on your website, are there any seminars, whitepapers, anything that you would suggest that they read about your company, or find out about, get started? Or, if they're real people-friendly, I suppose they could pick up the phone and call, so what would you suggest?*

Jeff Milrod: Yes, and thanks, I guess this is the time for the blatant sales pitch. All of our information is available at www.BittWare.com – with two't's. We have a lot of information up there. It's constantly a challenge to keep up with that - we're coming up with new things all the time. People like EG3 are really helping us to provide more access to more customers through your website. We are doing some seminars with Altera from time-to-time in the various markets, so, any of the Altera stuff we're featured at now. We have some whitepapers and articles up on the website, that come out, and, as you've mentioned of course, you can always call and talk to a human. Our number's 603-226-0404, and our engineers, I mean our sales people – excuse me – are engineers actually so we can usually engage in a deeper level than just how many boards are you going to order.

Jason McDonald: *All right. Well Jeff Milrod, thank you so much for talking to us about your new developments in the FPGA and AdvancedMC space; we really appreciate it.*

Jeff Milrod: Thank you Jason, I appreciate it.

The podcast can be downloaded here: **http://www.eg3.com/etc-awards/20090217-bittware.htm**