Intel

The Next Generation Intel® Xeon® D SoC and Platform Built For The Edge

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PRESENTATION

Shawn Li

Welcome, everyone, to the Intel Network Builders Insights Series. I'm Shawn Li, Sales Director, Next Wave OEM & eODM at Network and Communication Sales Organization at Intel Corporation. I am your host for today's webinar. Thank you for taking the time to join us today for our webinar titled "The Next Generation Intel Xeon D SoC and Platform Built For The Edge".

Before we get started, I want to point out some of the features of the BrightTALK tool that may improve your experience.

There is a Questions tab below your viewer. I encourage our live audience to please ask questions at any time. Our presenters will hold answering them until the end of the presentation.

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Intel Network Builders Insights Series take place live every month, so please check the channel to see what's upcoming, and access our growing library of recorded content. In addition to the resources you see here, we also offer a comprehensive NFV and 5G training program through Intel Network Builders University.

You can find the link to this program in the Attachments tab, as well as the link to the Intel Network Builders Newsletter.

Today, we are pleased to welcome Pompey Nagra, Craig Carter, Gopal Mundada, and Vikas Mishra.

Craig is based out of Phoenix, Arizona in the USA, and he is the Product Line Manager for Xeon D in Internet of Things group. The IoT group is focused on Edge applications such as industrial robotics, video analytics, aviation, government programs, retail, energy, and other areas. He has been with Intel for 24 years in many different roles.

Pompey is the Product Line Manager for the Xeon D-2700 and the 1700 Series families of product within the Network Platforms group, bringing to market products that enable customers to build and deliver the infrastructure and capabilities for the network and Edge.

Gopal is a Senior Principal Engineer and Lead platform architecture for Xeon D products. He has been with Intel for over 23 years, and has led the platform architecture and the design for multiple generations of Intel products.

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Vikas has been working with Intel for 18 years and has worked towards developing multitude of the industry-leading Intel x86 processor-based platform architectures, including laptops, Netbooks, tablets, 4G smartphones, and density optimized servers. His key focus area includes power and performance and system cost optimizations.

Welcome, Pompey, Craig, Gopal, and Vikas, and thank you for taking the time to join us today. I will hand it over to Pompey to start off.

Pompey Nagra

Thanks, Shawn. Thanks for the introduction. Great to be here, very excited to bring to the team here the next-generation of Intel Xeon D products. These products really have started to take a shape and form of their own, driving the adoption of the next-generation of infrastructure.

Before I get into the details here, just wanting to give an overview of where we are with the Xeon D Series of products, the 2700 and 1700, formerly known as Ice Lake. This product was launched on 24th, so it is available and is ready for purchase. There are two forms of the product: the 1700 Series, scalable to 10 cores, and the performance-oriented 2700 Series, scalable to 20 cores. These solutions are based on a BGA substrate that provides a lower TDP, and can deliver a much higher performance than our previous generations of products. The 2700 Series brings up 32 lanes of PCIe Gen 4, as well as supporting PCIe Gen 3. The 1700 brings together the same value prop of PCIe and I/O, but in a low and smaller form factor, and we'll get into the details there. These products are provided with a multitude of capabilities. There is an integrated Ethernet component that drives up to 100-Gigabits of Ethernet, and is based on our previous generation of NIC products. So, these are field-proven technologies capable of various different interconnects, and allows different speeds as we go to the different interconnect types. So, a range from 10-Gig, 40-Gig, all the way up to 100-Gig. They have security built in with our crypto technologies for both inline and Look-Aside security, as well as having the Intel platform security built in as well. So, a very comprehensive set of products, with the latest generation of technology for security, and for AI capabilities with the DL Boost, the Vector Neural VNNI capabilities, as well as the ability to accelerate the network.

Just going on to where the 1700 and 2700 are really leveraging the market, we can see that there are various different workloads from the wireless RAN to the upcoming 5G network, the network Edge, and so these are all control plane type of solutions. The security appliance, whether you're SASE, or having a secure appliance, a CMT type of appliance, or switches and routers, cloud networking solutions, as well as storage appliances, and IoT applications, we have Craig here who can give a lot more color on the IoT applications, but in short, these workloads that we're driving to are the next-generation requiring integrated functionality for computing, for security, with crypto compression. The 1700 is capable of up to 20-Gigs of crypto, the 2700 Series is capable of 100-Gig crypto, 70-Gigs of compression, all targeting these various different markets. The cloud networking-- as you can see, in cloud networking, there is a latency impact when you keep going back to the cloud. A lot of the clouds are now moving towards the Edge. This gives a lower latency, higher throughput, better performance to the end users, as well as having the ability to drive through the Intel storage libraries, as well as RDMA, the capability to drive the storage market at the high throughput.

We've got Craig here, who could give a lot more color on the IoT applications. Craig, did you want to say anything there?

Craig Carter

Sure, I'd like to, yes, just a little bit right now, and we'll cover in more detail in a couple of slides. But as you're starting to-- the next couple of slides, we're going to talk more about the product features, a little more of the details here, obviously, and be thinking about this in some of the most rugged, almost corner case applications. A lot of the use cases we've seen for this product would be in jet airplanes and aviation, often in an industrial setting in factories, where it's in a sealed fan-less box, it's on a factory floor, on a post with high heat, vibration and things like that. This is a great Xeon class product, which is in this BGA SoC package that's really helpful for IoT applications, and be thinking about that, as you're going to be seeing this next couple of slides, and we'll talk about IoT more here in a little bit. Thanks.

Pompey Nagra

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Thanks, Craig. So, as you can see, with the advent of these next-gen services, there are workloads that are currently in this involving infrastructure, moving it from a centralized to a decentralized Edge type of solution, and the 2700 and 1700, with their capabilities based on BGA, are targeted for these rugged environments that Craig was just alluding to. So, they could be indoor/outdoor in different types of environments, targeting the access Edge and user device spaces in a very effective and efficient manner. And we'll get into a lot of the core details on these capabilities, as Craig mentioned, in a few slides.

Just to let you know about where we stand on these two products, both have the Intel Xeon D capability. So, these are tried and tested, built, proven compute solutions that are out there. For the ruggedized environments that Craig was alluding to, we have eTEMP solutions, so extended temp solutions, that goes down to 40 degrees centigrade, and up, depending on the SKU, to 90 degrees centigrade. We are targeting different power ranges, and there's a different memory profile, so the 1700 can support up to three channels of DDR4, whereas the higher compute and performance-oriented 2700 Series supports up to four channels of DDR4. We support different types of DIMMs, as noted here, all the way from LRDIMM through RDIMMs, and as noted earlier, there's a variety of different throughputs depending on the different SKUs you can take, so 100-Gigs, as noted, all the way down to 10-Gigs, and even lower on some SKUs there.

We have our crypto technology, the Gen 4 QuickAsssist on the 1700 Series, and on the 2700 Series we have the Gen 3 1.8 version of crypto and compression. These enable both inline as well as Look-Aside crypto on the 2700 Series. We mentioned the different I/O capabilities, primarily targeted around PCIe 4.0. There are also a number of different I/Os, or flexible I/Os that can be supported, which we'll cover in a few more slides. But in essence, we allow a variety of different I/Os from the standard PCIe 4.0, which is the base, as well as a flexible PCIe 3.0 or SATA or USB connections, all integrated into the same device. So, a very robust, very stringent device, capable of high-performance compute, high-performance Ethernet that is very flexible in terms of I/O, as well as security and AI.

When we look at the performance, and we have measured against our different Intel Xeon D products, namely the 2100 Series, we compared the 2700 Series, and for the different workloads, we saw an exceptional increase in the performance. We can see that for the security side, we were looking at VPP, we were up to 1.52x in terms of increase in security workloads. For the 5G, we had a UPF workload that we were calling and measuring against, and we were 1.74x in terms of improved workloads. For the telco appliances, the vCMTS, we were 1.5x improvement, and then for web services, like NGINX, and with security, we had a 1.8x improvement in workloads. And finally, you can see the increase in our AI capability. This is based on the accelerated engines that are built into the actual device. We saw, using ResNet-50, a 2.4x increase in visual processing. So, collectively, we see a vast increase in the capabilities, in the performance, and the overall offering that the 2700 Series can deliver to the market.

Craig Carter

Pompey if it's okay for me to chime in on that last slide. So, in the IoT space, most of our customers don't refresh as frequently as in the network area, or just in the normal computing area, because some of these long certification times and some of these products go into devices, they're going to be working in 10 years, 20 years from now. And so in comparing this to the last IoT product, which was Broadwell DE, the D-1500 Series, no surprise, the performance is even higher, and we did not put those numbers on the screen because it can be confusing, but just brute CPU performance is around three times faster. But the biggest improvement is on the video AI, which is over seven times faster, and there's been a lot of enhancements over the last couple of years in this area, which allows for this Ice Lake D, this D-2700 or the D-1700 product to just handle a lot more video input, do inferencing much faster. So, wanted to point that out. So, for our IoT customers, they're going to see a dramatic increase in performance versus the last processor we offered, which was Broadwell DE, the D-1500.

Pompey Nagra

Thanks, Craig, and I think that's a great point. We will be seeing that there's a generation-over-generation increase across the portfolio of products, and with the acceleration engines we've put in here, the capabilities, and not just in terms of function, but in terms of form,

I think the IoT applications are able to, as noted earlier, really play in different environments. Did you want to provide any more details on that?

Craig Carter

Yeah, and actually, on the next slide, I'll even talk about that more, as we talk about more on IoT, but what hits me as you were talking too, a lot of this artificial intelligence, as you can see on the right, visual processing and things, it's dramatically increasing because of the software improvements. We've been talking to our team actually, based in some other countries around the world, and it's amazing as we're tweaking the software, tweaking the software, as you can even see glancing at this slide, it's an AI area we're getting huge performance gains, and this will continue generation after generation.

Pompey Nagra

Right, and I think you've hit on a great point there, Craig, where we talk about the software. The software that we've used on previous generations are directly leverageable on the current generation, so there is software compatibility here.

Craig Carter

True, and actually that's a good point. Whether you go up to the Xeon SP, or the core, or even down to Atom, a lot of the software will work across all these different products, which saves-- again, my background's finance, it saves you a lot of R&D and internal development costs, and increases your time-to-market.

Pompey Nagra

Absolutely. So, with that said, I'm going to transition and maybe you want to give some color on the platform value prop.

Craig Carter

Sure, I sure can. So, basically, there's a lot of increase. I'm going to focus in, drill in on the IoT, then we'll talk about some other areas. Again, as you think about these very ruggedized applications of this product-- again, back in aviation, every size of jet you can imagine; potentially in space; a lot of government use; industrial, think the factory floor, the video AI, but even like medical imaging, a lot of these use cases require long government certifications and things like that, often with real-time functionality. The IoT-centric SKUs, there's around 40 SKUs, but about 10 of them are IoT-centric, some of those then have real-time functionality. All of them have Slim Bootloader. So, by Slim Bootloader, it greatly reduces the amount of time it actually takes to boot up to pull in the OS. We're working on the specs right now, but it's dramatically faster. So, for some applications, that's very helpful. As we talk about long life also, for customers that need this product five, 10, 15, or beyond years from now, these SKUs will be offered for a long period of time. As you can see on the screen there, like Pompey had referred to, some of these also had the extended temperature ratings, which are really helpful.

Pompey Nagra

Thanks, Craig. Yeah, and we can see that we've got a generation-over-generation increase with our newer capabilities. We have a lot of leverage in terms of proven technology that's already in the market, but we've integrated that into a smaller, more robust form factor that can target various types of applications, various types of workloads, as well as driving towards next-generation of infrastructure, where timing and coordination of packets going across networks, through time coordinated computing, SyncE or PTP, is a key requirement for those markets. These are all integrated into the current set of products. And with the different workloads coming in, the memory capability and functionality at a higher speed with PCIe Gen 4, certainly allows the throughput to be delivered, as well as the acceleration of security applications, which can be really intensive at times. So, we have a robust solution through the platform here.

And with that said, I'm going to transition over to Gopal and Vikas, who can really talk about the configuration within the device itself. So, Gopal and Vikas, did you want to...?

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Vikas Mishra

Sure, thank you, Pompey. So, let's dive a little deeper on the internet solution, which, as Pompey mentioned earlier, we have the integrated Ethernet that really brings a lot of good capabilities in the Xeon D-2700 Series. So, what you see on this chart is a distinction of the various SKUs. So, you can have a 100-Gig Ethernet SKU, or you can have a 50-Gig Ethernet SKU. And then the next column shows you the various ways you can utilize the capability. You could have a 2x 100-Gig, and you can go all the way down to 8x 10-Gig for 100-Gig SKU, and for 50-Gig you can have a single 50-Gig port, and go all the way up to 4x 10-Gig with four 2.5-Gig ports. So, really the various combinations which you can use to exercise to get the capability of building Ethernet.

What you see in the next columns are the... how these various physical lanes, or the other various physical quads, which we call out, can be configured to achieve these various combinations. So, in the Xeon D SoC, there are eight physical lanes. Each lanes are capable of running independently at 25-Gig speeds. So, for the 100-Gig SKU, if you take an example, the topmost row where you have 2x 100-Gig ports, you could actually use a multi-lane configuration and use the four lanes from the first quad to build a 100-Gig port, and use the next four lanes from the second quad of the PHY to build a 100-Gig port. So, you can actually have physically 2x 100-Gig. The actual throughput of the solution is 100-Gig total, but you can have physically two 100-Gig ports, with the combined bandwidth as 100-Gig. Similarly, if you're looking for 50-Gig or a 40-Gig, these are all, again, the multi-lane port configuration, where you can use two lanes for 50-Gig and four lanes for the 40-Gig.

And similarly, when you go down to the 50-Gig SKUs, they go all the way from 150-Gig to 4x plus 4x 2.5-Gig, and you can see the various ways you can choose the lanes to achieve the various use cases, what you would like to exercise with this integrated networking. I also make a note that the configuration of the port assignments and the lane assignments are fixed, so that it makes it easier for us to adopt the former solution across the various combinations and permutations.

Okay, with this, we will go to the Xeon D-1700 Series. Very similar to what we have in Xeon D-2700, the two offerings, 100-Gig and 50-Gig. The 100-Gig can actually have-- you can get a 4x 25-Gig lane configuration that basically gives you all the way to 100-Gig, or if you're looking at a multi-lane at a higher port speeds, you can go up all the way up to 240-Gig ports, or you can choose the one where 40-Gig plus one port of 10-Gig, so these various combinations you can use for the 100-Gig SKUs. And for the 50-Gig, again, you could have a 4x 10-Gig plus 4x 2.5-Gig, so you can use all the eight lanes available in the SoC, or if you choose to have higher port speeds, you can go 1x 40 or 2x 2.5-Gig.

So, again, as you can see, what we show here is the highest speed combinations available. You could always go for the lower speeds as an example. It means that if it has been shown as 25-Gig port or the 25-Gig lane, you could actually get to 10-Gig or lower speeds.

So, having talked about the Ethernet capabilities and the various ways you can configure, let's look at the high-speed I/Os. So, Pompey has talked about earlier the Xeon D-2700 Series has got 32 PCIe 4.0 lanes, and the 1700 Series has got 16 PCIe 4.0. In addition to these PCIe 4.0 ports and the lanes, these SoCs also have 24 High-Speed I/O lanes. Now these 24 High-Speed I/O lanes can be configured based upon the use case which your application and design requires. This could be used as a PCIe Express 3.0, or it could be used as a SATA 3.0, or USB 3.0. The table here what you see is showing the various lanes, and how it can be configured. As an example, a PCIe can be bifurcated as a 8x or 4x or 2x, and if you bifurcate it by two, you get 12 PCIe 3.0 Root Ports.

Now, let's say you want to use a mix of PCIe and SATA, you could do that as well. You could configure a few High-Speed I/Os as a PCIe 3.0 and the remaining as a SATA 3.0. And for the use cases where you need USB 3.0, these High-Speed I/Os, we offer four USB 3.0 ports, so lanes 20 to 23 can be configured as a USB 3.0. So, various combinations which you can use as per your application suitability. And the thing to note in addition to these various combinations, which has been offered, there's also a throughput increase on the High-Speed iOS. So, with the Xeon D-2700 and 1700, you could get up to 14.5-Gigabyte per second throughput in each direction, which is basically a four times improvement from the previous generation High-Speed I/O throughput.

Okay, so Gopal, do you want to talk about the memory?

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Gopal Mundada

Thank you, Vikas. So, if you look at our memory configuration support for both the Xeon D-2700 and 1700, we have a rich set of memory configurations that are supported. 2700 supports up to four memory channels, and 1700 supports up to three memory channels, both of the SoCs support up to two DIMMs per channel and support eight-Gigabit and 16-Gigabit memory technologies.

If you're looking for the mainstream DIMM configurations like RDIMM, both of these SoCs support one TPC, one DIMM per channel, as well as two DIMM per channel using RDIMM configuration, which is a mainstream DIMM. You can go up to 2933 on D-1700, and you can go up to 3200 DDR4 speed on Xeon D-2700 Series. If you're looking for having a higher memory capacity system solution, you can use a LRDIMM on Xeon D-2700 Series to get that capability. If you're looking for power and space optimized solution, you can use SODIMM on both of these SoCs. If the products are really looking for a lower-cost memory solution, you can use UDIMM on both of these SoCs to get those capabilities. Overall, what you see is with both Xeon D-2700 and 1700, we have a rich set of memory configurations, supporting different market needs depending on your power need, your density need, your memory capacity, as well as going up to the mainstream DIMM, and the max possible capacity, as well as max possible speed. So, you can pick between whatever memory configuration really works best for you.

Looking at the next configuration, if you look at basically on the Memory Down is another configuration we support. Under the Memory Down, we support 2933, if you're looking for some of your IoT usage and other usages, and in addition to supporting some of these standard DIMMs, we support very low-profile RDIMM, we support Mini-DIMM also as a part of the SoW

Now, Vikas talked about Ethernet configuration, talked about PCIe and High-Speed I/O, we went over memory configuration. Now what we cover on this slide is our Platform Reference Designs, what we offer. So, Xeon D-2700 SoC, as well as Xeon D-1700 SoC, we have two unique reference designs. In those reference designs we showcase the unique capabilities offered by both the SoCs. We are doing both of these reference designs available in Micro-ATX form factor. Both of the SoCs have a different set of memory capabilities, different PCIe capabilities, Ethernet. The key difference you will see is it supports a different number of memory channels. Your Xeon D-2700 Series supports four memory channel, eight RDIMMs, and Xeon D-1700 supports six DIMMs, using again RDIMM. The PCIe configuration on Xeon D-2700 Series supports 2x 16 PCIe Gen 4 slots, and 1x 16 Gen 4 slot. Majority of the other capabilities, the number of PCIe Gen 3 lanes, our Ethernet configuration, supporting onboard BMC, so putting SATA ports, M.2, and USB, those capabilities are supported on both reference platforms. Both of these reference platforms also basically are supported in a closed chassis so that you can use that as a reference design to develop your products. Pompey?

Pompey Nagra

Thanks, Vikas. So, as we've seen, we have a flexible, highly robust solution that provides a variety of Ethernet interconnects, has a number of flexible High-Speed I/O interconnects, has various different memory profiles to suit all the different markets and needs that would profile indoor, outdoor and ruggedized environments, a very robust solution that we've touched at the surface. For the 1700 Series, we have achieved our PRQ status. That means these products are shipping and are available for ordering. We have two different types of main SKUs, and the majority of the HCC SKUs are released and are orderable. Our higher end NX SKUs will be available towards the end of this quarter for ordering, so we have released and we have productized these solutions for you to drive to market. We are ready to take any questions.

Craig Carter

And just chiming in, too, on this is that, as we've mentioned a few times, these are ruggedized applications and things, my eyes are being open to the wild places people are putting these products, and so you do not have to do this alone, but do dream big. We can potentially help you or connect you with different suppliers who've been working on the packaging, basically, whether it be the glue, or even the BGA changes or things like that. Whether they've been in environments that have high humidity, fungus, saltwater, extreme

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vibrations, even more extreme temperature ranges, we can help you, but do dream big. We see customers doing amazing things with this product.

Shawn Li

Great, great, thanks, yes. Let's get into the Q&A session. We've got the first question. Is the product available in COM Express, Computer-on-Module, with designs?

Craig Carter

Sure, I can respond to that, and then if others can. So, in the IoT space, we see it happening a lot, especially on the COM-HPC. So, the Computer-on-Module-High Performance Computing boards. A lot of the customers like these because they can maybe originally install a four-core, a six-core, an eight-core, then later they realize, no, they need the higher performance 16-core or 20-core processors, and they can just swap the boards out. So, we see a lot of applications in this space.

Shawn Li

Great, thank you. Next question: Are these products used in aviation and aerospace?

Craig Carter

Well, I have to say I love all these rugged, rugged environment IoT questions, so thank you for asking them, and the answer is yes. Our last product was used extensively with all the major airlines around the world, airline manufacturers, and again, all different sizes of jets here, and right now it's in qualifications and looking to be certified again in these different applications. The certification process for aviation is quite strict, no surprise, and so it's a pretty long process, where in many of these applications, it requires the real-time functionality, and so we have that in this product with some software development kits for time-coordinated computing, and then in other aspects that you can utilize. We built that in and validated and tested it.

Shawn Li

Great. Thank you, Craig. The next question: what are the unique features on the IoT SKUs?

Craig Carter

Just keep the IoT questions coming. Thank you, Shawn. Actually, that's great. So, there's around 40 SKUs in total, but there's a subset of those that we've put some extra features on that we call these IoT features. One of them would be the Slim Bootloader, which is for quick boot of your system. Another is the extended product availability, which means if you want it 10 years from now, 15 years, or potentially more from now, these products will be offered for a very long life. Real-time I've mentioned is on some of the SKUs, and then this extended temperature, like Pompey had referred to, some of these are specked down to negative 40C, and depending upon the SKU, as high as 90 degrees Celsius. And there's and there's Yocto. Not a lot of people were using Yocto, but it's very helpful if you're actually in the real-time space, actually.

Shawn Li

So, you are saying we offer extremely long life support and—

Craig Carter

Extremely long life support, yeah.

Shawn Li

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And also cover the broad temperatures.

Craig Carter

Correct.

Shawn Li

Okay. Great, thank you. Next question: Are the 1700 Series and the 2700 Series products pin to pin compatible?

Pompey Nagra

That's a great question. So, the 1700 Series, and all SKUs within that 1700 Series are all pin compatible. The 2700 Series and all the SKUs within the 2700 Series are all pin compatible, but the 1700 due to its different size, and the 2700 due to its different size, are not compatible. So, within the family of the 1700 Series, yes, pin compatibility. Within the family of the 2700 Series, yes, pin compatibility. Across the two different families, they're not pin compatible. Great question. Thank you, Shawn.

Shawn Li

Oh, that's very good. Thank you, thank you. Next question: Is the same Ethernet network component used in the 1700 and 2700 Series?

Pompey Nagra

Yes, another great question. Thank you. The... it's the same Ethernet across the two products. This is the same Ethernet capability that's built within our Columbiaville NIC cards. So, this is a proven NIC with proven performance that's already out in the market, and we've taken those robust feature capabilities within the Columbiaville NIC and integrated them with the current set of drivers into the 2700 and 1700 Series of products.

Shawn Li

Great. The last question: Where can I find more information about the 1700 and 2700 products?

Pompey Nagra

Oh wow. I'll first talk about it from a generic perspective, and then I'll pass it on to Craig who could provide more color. But we have a vast amount of content on the Intel Xeon D page on the Intel public website. For more technical collateral and reference architectures within the Network Builders website, there's a number of different resources and experience kits for the 2700 and 1700 Series, covering topics such as reference architectures, the acceleration capabilities, AI, some automation and security. So, if the audience can attend or visit the Network Builders website, that would be a great resource for them to start working and start moving forward on these products. Craig, did you want to provide any color on the IoT side?

Craig Carter

Yes, thanks, Pompey. It's definitely not due to a lack of information. There's a lot of information out there, but we do realize sometimes getting connected can be a bit challenging. So, everything that Pompey said on the websites and things, also your sales and marketing rep, or your field application engineer, are excellent resources to ping, and to ask different questions on. You can see all of our emails here. And then obviously, there's the website, but don't hesitate. Obviously, designing these different boards with all the different products, there's a lot of complexity involved in this, and we're here to help you, and that's what we do, is we validate these, we work with these, and we give you tips and tricks to help make your design and what you're working on just a lot easier. So, don't hesitate to reach out.

Shawn Li

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Yeah, also, I want to add that the link to the Xeon page is in the Attachments tab. So, audience, if you need it, please click the Attachments tab. You can get more information there.

Okay, so that's all the question we have. And... Thank you, Pompey, Craig, Gopal, and Vikas for sharing such great information with us today. Thank you all for joining us today, and please do not forget giving us time and the rating for the live recordings so we may continuously improve the quality of our webinars. Please be sure to join us the next time, Wednesday, May 4th at eight o'clock Pacific Time for Cloud Native Packaging Processing on Kubernetes with the Cloud Native Data Plane (CNDP).

Thank you again. This concludes our webcast. Thank you.