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S1 EP33 - Zonal architecture for the software-defined vehicle

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Amir Bar-Niv, VP of Marketing, Automotive Business Unit, and podcast host Chris Banuelos discuss some of the latest automotive trends, including zonal architectures and end-to-end Ethernet in-vehicle networks. Be sure to listen in to learn how automotive OEM needs are evolving and how Marvell's Brightlane™ family of products will enable software-defined vehicles.

Speakers
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Ⓒ Christopher Banuelos 00:04
Welcome to the Marvell Essential Technology Podcast. I'm your host, Chris Banuelos. On today's episode, listen in to a conversation between me and Amir Bar-Niv, Vice President of Marketing in Marvell's automotive business unit. Today we talk about some of the latest trends for the next generation in automotive, including zonal architecture, the software defined vehicle and how OEMs fit into the big picture. Also, take a listen into some of the live demos shown at CES 2023. Earlier this year, learn more about how automotive customer needs are evolving. And how Marvell's Brightlane™ family of products will enable the next generation in automotive. Amir, hey, it's great to have you on today's episode, really looking forward to our conversation. It's a it's been a while since you've been on the podcast, and I'm really looking forward to talking with you more about this next generation in automotive. What I'd like to start today with is, talking about some of the demos that were shown at CES 2023, earlier this year.

Ⓐ Amir Bar-Niv 01:11
So, we had the five demos that we demonstrated in this show. First one where we showed our compute capabilities for automotive, we showed our latest, the 96th generation of OCTEON Running autoware. In a very nice fashion, we showed that there was a illustration of how we're using the different cores inside the processor for the software. Very nice demo overall. Second demo, we showed a our Ethernet camera. So this is our second generation of demos. This year, we showed stereo camera running over a single bridge with single cable connected to Zonal switch and from there to another zone that like central switch. So and on the same zone. We also had LIDAR that connected to the same switch and then a single 10G Ethernet that aggregate all the traffic from the cameras. And the LIDAR. Third demo was for a new application that we developed for automotive for central storage base on a chip that we have here in Marvell called Fabrico. And we demonstrated cameras that are connected to a switch in storage that connect to the same switch and the application that we showed there was event driven recorder, we also called the black box, where we we recorded a video from the camera, uncompressed the into the storage device in a loop of a few seconds. And then when we had an event like an accident, we copied all the data into the flash. And we could save it on the flash like a black box and then demonstrate also transmitted this video to a PC. And that's a very interesting application that combined the

Ethernet based camera with central storage that can aggregate the traffic from all the cameras and all the sensor eventually in the car, and can be a low cost storage that can be used by all domains. The first demo that we showed is based on learn the new technology that we develop in Marvell have chiplets that can run at 100G for a chip to chip connectivity. And we can use it for many applications, including automotive when we need to connect like processor, very high end processor that need to a very high speed link between them. So this is an IP that was developed by Marvell and we demonstrated this for the first time. And in the fifth demo, we showed one of our ecosystem partners, Sonatus that demonstrated their software running on our switch, which is four plus, and demonstrated different activities and capabilities that Sonatus has developed for the future of a software defined vehicle.

C Christopher Banuelos 04:09

Let's transition our conversation over to some of the trends in automotive, can you share?

A Amir Bar-Niv 04:15

I think what we notice in place in the last year is three major trends that related to what we are doing. The first one is really the transition to zonal architecture from the main architecture. So that's the third transitions of the software of the automotive industry. We started with the architecture, then it moved to the main architecture, and now it's moving to Zonal architecture. And the main reason for that is to reduce the cable harness in the car, the cost and the weight of the cable harness, but Zonal architecture also bring a lot of other benefits since it's all based on Ethernet backbone. It has all the other capabilities of Ethernet that now can be shared between all the different domains. In the different zones in the car. We had a, an interesting survey that we received last year that was done with about 20 to 25, the OEMs around the world. And it turned out that by 2026, about 80% of the OEM is moving to Zonal architecture by 2029, it will be 96% of the OEM moving in some way or shape into Zonal architecture. And that's very important trend that affects everything we are doing, we are building the switches and the PHYs that are going to support this transition. The other trend that is now you know, discussed by everyone is the software defined vehicle that you mentioned, this is the capability or the the network and system in the car that enable a download the downloading new application into the car, long time after you already purchased the car and you drive it. So when your application show up, you can download to the car or use the existing hardware and software that exists in the car to bring new capabilities to the owner of the car. And that's of course a new stream of revenues for the OEM. So very interesting trend that we are supporting. And it's all based on Ethernet backbone. The last round is really has to do more with how the industry is shifting on who is doing the design, it seems that OEM now are taking more and more responsibilities in the design of the hardware and the software of the vehicle. And by that they're driving a more innovative solution for the future vehicles. And this is very exciting trend that we see right now with major OEMs.

C Christopher Banuelos 06:53

And speaking of OEMs and customers, how are their needs evolving over time?

A Amir Bar-Niv 07:00

Okay, so I think that the number one need that we identify over, you know, the last, the last I would say a year or two and even in CES is the need for high end switches that include multi gig ports, the latest TSN features and advanced security capabilities. Like you know, for example, for authentication and encryption that can be done with macsec whitelisting and blacklisting filtering HSM and many other features that are required in these high end switches. The other needs that is pretty obvious and we see it across the board is the need for higher speed links. As you know, the the current network in the car are mainly based on 100mb and 1G speeds many of the OEM and tier one are moving now to multi gig speeds 2.5G, 5G and 10G. And there is now also we see the need also for speeds that are higher than 10G like 25G in the future backbones. So the other need that we see right now from customer is related to the in vehicle network that is based on what we call Ethernet end to end. All the components inside the vehicle are based on Ethernet including cameras and sensors or cameras it bring new values and new added value for OEM. When the camera is Ethernet based it can be connected directly to Zonal switches. It can enjoy all the benefits of Ethernet which is a standard like security virtualization switching power over cable, sometimes sampling these are already exist and then an OEM can use it now all the way to the camera when the output of the camera is Ethernet. It saves the need for the D max trip

or deserializer trip that is on the other side today in today's technologies, it helped to saves pins on the SoC. Today in order to connect the cameras to the SoCs you need many 10s of pins something in the range of 50 to 90 pins. This can be replaced by two or three ports of Ethernet at high speed that have enough bandwidth to drive all the uncompressed video from the cameras. It also helped to reduce potentially the cable costs because Ethernet PHYs as much better performance and SNR can deal with much higher insertion loss. So there is many advantages and OEMs are moving in this direction to replace the future cameras with Ethernet based cameras.

C **Christopher Banuelos 09:50**

Amir thought we could have time for one more question. I did want to talk about Brightlane™. How is Marvell enabling customers with the Brightlane™ family of products?

A **Amir Bar-Niv 09:58**

Oh there are three type of products that we are now sampling to customer under the Brightlane™ family. The first one is files that are at speed of 100mg, to a 10G. So we have today 100Mg, the 1G, the 2.5G, the 5G and the 10G per second files that are all based on IEEE T1 standard. In addition, we have a family of automotive Ethernet switches from low to mid to high port count at speeds of 10mg all the way to 10G per port, including PCIe ports on these switches. And then, the last family of products that we introduced last year are the camera sensor bridges that convert the sensor data or video to Ethernet at the edge and enable connectivity to zonal, and central switches. So all these all these products already been sampled and are used by our customers. And this is the Brightlane™ family of our automotive products.

C **Christopher Banuelos 11:04**

Amir, it's been great having you on today's episode wanted to say thank you for your participation. And we'll look forward to seeing you on the next podcast.

A **Amir Bar-Niv 11:11**

Absolutely. And I have to say, you know, this is the place to be right now. Automotive is probably the most exciting area for semiconductor, the growth, the innovation that we see there. It's all coming together and we all very happy at Marvell to be part of this trend.

C **Christopher Banuelos 11:31**

Thank you for listening to the Marvell Essential Technology Podcast. As always, please feel free to visit our website to learn more. And we'll see you on the next episode.