S1 EP15 - The Future of Software Defined Vehicles

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Amir Bar-Niv, VP of Marketing, Automotive Business Unit and podcast host Chris Banuelos discuss the Future of Software Defined Vehicles, including industry trends, why the Ethernet Camera Bridge is an important component in the software defined vehicle as well as who are the key stakeholders that benefit from this evolution. As car manufacturers increase capabilities for aftermarket services and applications, learn about use cases, the software defined network needed to support applications, and what it will take to enable the next generation of vehicles as a data center on wheels. Read Amir's recent blog post "Ethernet Camera Bridge for Software-Defined Vehicles" to learn more: https://bit.ly/3OnMfsc

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C **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, VP of Marketing and the Automotive Business unit. Today we're discussing the future of software defined vehicles. Here industry trends, why the Ethernet camera bridge is an important component of the software defined vehicle, as well as key stakeholders that benefit from this evolution. You can also check out Amir's most recent blog by clicking the link in the description. And as always, please feel free to subscribe to this podcast to stay up to date on future episodes. Hi, Amir, it's great to have you on today's episode. I'm really looking forward to our discussion today. Why don't we go ahead and get started? Why don't you tell our audience a little bit about yourself? And what is your role here at Marvell?

A **Amir Bar-Niv 01:00**
Okay, great. So first of all, thanks for the opportunity to discuss this important megatrend of software defined vehicle. I'm the VP marketing of automotive managing the product line management team and the application engineering team of the automotive BU here in Marvell.

C **Christopher Banuelos 01:17**
So of course, today, we're talking about the future of software defined vehicles. Can you tell our audience give you a little insight and let us know exactly what is a software defined vehicle.

A **Amir Bar-Niv 01:27**
So Software Defined vehicle, it's really a new trend that supports other new megatrends of the connected car and the autonomous cars where the amount of compute networking and storage in the car is going up exponentially. And this is by the way, the reason that people call the future cars data center on wheels. Software define vehicle means that the car become a platform that enables software applications that are running on

different compute devices to be updated, added or modified, usually with over the air connection. The reason that this will be a successful trend is that everyone that [is] involved in in this industry enjoyed this trend.

C **Christopher Banuelos 02:19**
Who would you say are the key stakeholders here?

A **Amir Bar-Niv 02:22**
These are the OEMs the car manufacturers, the owner of the car, and then the carriers for the automotive OEMs that enables a new business model with the software centric architecture, the car makers will have a platform to generate new stream of revenues okay from the aftermarket services and new applications. For owners the capability to receive over the air software updates for vehicle that are already on the road in a simple way like they are downloading application into a smartphone or automotive utility will no longer decline over time user can now add a new application when they need to or want to and upgrade their vehicle capabilities and driving experience. And this model also serve well the carriers that will benefit from the amount of traffic that will be downloaded and uploaded from the connected vehicle with this new applications. The net net in other words is that this is a win win win situation for all stakeholders which is why this business model is so promising.

C **Christopher Banuelos 03:29**
Wanted to touch on Ethernet, what does Ethernet have to do with the software defined vehicle and how does it further enable the software defined vehicle.

A **Amir Bar-Niv 03:39**
Ethernet is a networking technology that has the capability to reprogram the in vehicle network in this case and adapt it to the main characteristic of the new advanced application that can be downloaded into the car, the vehicle of the future are moving from domain architecture to Zonal architecture by leveraging the Ethernet backbone to connect between the zones in the car. Now while the original zonal architecture motivation was to reduce the complexity, the cost and the weight of the cables harness in the car, it is also bringing along a really a new set of capabilities that [did] not exist before in the automotive network related to flexibility and security. Ethernet switches can be easily programmed to reshape the traffic in the network, increase the bandwidth, reduce latency, improve overall quality of service that are needed to serve better new application and software that are downloaded into the different compute devices in the car. And now turn by the way for for this capability that was taken from the data center world is software defined network that enables the separation of control and data planes and brings network programmability to the arena of advanced data forwarding mechanism in automotive networks.

C **Christopher Banuelos 05:04**
And Amir, what would you say are the four key attributes that Ethernet brings to the software defined vehicle?

A **Amir Bar-Niv 05:10**
So number one is the flexibility, okay to provide the ability to change data from the network and share devices like cameras and sensors. Number two is scalability of both software and hardware and the ability to modify them over time. Third one is redundancy, which is not only for mission critical processors, but also for the data passes between the devices, meaning that it safeguards the network. And the last one is controllability. And the diagnostic of real time debugging that is enabled with Ethernet to all the nodes that are Ethernet based in the car.

C **Christopher Banuelos 05:49**
In your recent blog you write about the Ethernet camera bridge, why is the Ethernet camera bridge an important component for the future of the software defined vehicle?

A **Amir Bar-Niv 05:58**

So in order to realize the full potential of the Ethernet base in vehicle network, most of the nodes and the components in the car need to talk Ethernet, the Ethernet backbone in the existing and future car is a done deal. Okay, the number of Ethernet ports in automotive continued to grow in a staggering average rate of more than 30% year to year in the next four to five years. This is five to six times faster than Ethernet growth in any other sectors like data center, or enterprise. However, the cameras in the car, which you know their number is growing up very fast it can be over 16 cameras per vehicle or not using Ethernet link. The reason for that is that in the past the automotive Ethernet speed that was mainly 100Mg and gigabit was not enough in order to support the speed requirements or the video from the surrounding cameras, which was a few gigabits per second. This created a gap that was filled in quickly by proprietary technologies like lbds that are being used today in the cars. However, today with the new IEEE Standard, specifically a two to three that defined a automotive file that can run a 10 gigabit and later even 25 Gigabit Ethernet has now enough bandwidth to support the needs of a uncompressed video from the cameras to the central processor.

C **Christopher Banuelos 07:33**

What would you say are the important features that the Ethernet standard brings to the automotive industry?

A **Amir Bar-Niv 07:38**

There are many advantages for Ethernet over the existing point two point proprietary technologies, including the unparalleled ecosystem of both hardware and software that can be leveraged for the camera links. In addition, the camera interface when the camera interface is Ethernet, there are many other important features that are part of the Ethernet standard and automatically available for the OEMs okay, like security with MacSec virtualization with VLAN a power over cable with the standard called PODL audio video bridging were started called AV B and TSN and many others. So this way Ethernet camera bridges [are] going to be cost effective solution that will provide all these benefits. Once the interface of the camera is Ethernet, then we can now realize the full potential of Ethernet end to end in the vehicle by utilizing its profound programmability and scalability capabilities for the future software defined vehicles.

C **Christopher Banuelos 08:43**

How is Marvell enabling the software defined vehicle?

A **Amir Bar-Niv 08:46**

Marvell is today the fastest growing semiconductor vendor for automotive in vehicle in vehicle network. We were the first to introduce security switches for automotive the first two introduced PHYs at speed of 1g, 2.5g, 5g, 10g and now we are the first one to introduce the technology of Ethernet camera bridge. Marvell provides today already a complete roadmap of the automotive switches with low mid and high port count with external integrated Firewall with Advanced security features and as well as time sensitive network features that are essential for the future of the automotive in vehicle network. In addition, Marvell also provide software for audit products that meet ASPICE level two, and soon going to be level three, which is really a[n] automotive mark for highest quality software that is so essential for this industry. In short, Marvell is now a one stop shop for all the Ethernet products that are needed for the existing domain architecture and the emerging Future Zona architecture of the automotive network and Marvell does not stop here. We are also working on other products beyond Ethernet that serve the other components in the future vehicles including compute, security and storage, which are going to disk which we are going to discuss in more details in future podcasts.

C **Christopher Banuelos 10:21**

And then my last question today is what's ahead for the software defined vehicle?

A **Amir Bar-Niv 10:26**

Okay, that's an excellent question. So Software Defined vehicle is not going to be just an OEM play. Once the software defined vehicle cars will be on the road, we should expect an emergence of new companies that will develop for the OEMs a whole new world of car applications that will be aligned with other megatrends like a smart city mobility as a service, also called mass ride hailing, and many others. An important part of this trend is going to be security and safety of the cars, and Marvell is the powerhouse today for many of these technologies that are required to ensure product that will help to keep the car secured, and safe 5g cell network are also important part of the future of the connected and software defined vehicle, and Marvell is a big player in this market. Overall, I think we are we're standing on on the brink of technological revolution that will fundamentally alter the way we live, work and transport. We are excited to be part of this and really wonder what the future will bring with this revolution.

C **Christopher Banuelos 11:42**

Amir they wanted to say thank you so much for your participation on today's podcast. I'm looking forward to continuing our discussion on another episode.

A **Amir Bar-Niv 11:50**

Thanks, Chris. It was a pleasure. And I'm really looking forward for a future podcast that will talk on the other aspects of products and technologies that we are developing for the software defined vehicle.

C **Christopher Banuelos 12:06**

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.