S1 EP5 - Why the 100G Optical Module Transformation is Full Steam Ahead

Wednesday, November 10, 2021 · 21:10

"Rohan Gandhi, Product Marketing Manager, Optical and Copper Connectivity discusses his latest blog post "Why the 100G Optical Module Transformation is Full Steam Ahead" with podcast host Chris Banuelos. Hear Rohan discuss trends in surging data demands and how modern data centers require solutions to cost effectively and efficiently move more bandwidth at higher speeds. Tune in and check out the link below to learn more about Marvell's Porrima™ 100G PAM4 DSP and the Alcor™ PAM4 DSP platforms.

Speaker
Rohan Gandhi
Product Marketing Manager,
Optical and Copper Connectivity

Host
Christopher Banuelos
Senior Manager of
Global Social Media Marketing

C **Christopher Banuelos 00:04**
Welcome to the Marvell essential technology podcast. I'm your host Chris Banuelos and today I'm with Rohan Gandhi Product Marketing Manager of the Optical and Copper Connectivity at Marvell, discussing Rohan's latest blog "Why the 100G optical module transformation is full steam ahead." Rohan, it's great to have you on our podcast today. I wanted to give our audience a chance to get to know you a little bit. And you know, before we started recording this, it sounds like you're very passionate about the type of work that you're doing here today at Marvell. Where does that passion come from?

R **Rohan Gandhi 00:37**
Yeah, thanks. Chris, you know, I consider myself really fortunate to be able to work in the field that I studied for. This is what I wanted to do since I was an undergrad. During my studies, I was really drawn to tech that can be used to connect people. And since my senior year, I was fascinated by how the Internet was built, and how people could share ideas. I was very frustrated by the ways we used to connect to the internet, you know, those slow 28 kilobits per second DSL modems, really made me want to tear my hair out because it would take an hour, maybe two to download a song and forget about games, you know, really like to play the Prince of Persia. And I just couldn't. I use to get really frustrated trying to play that game online. And so, since then, I realized, we always will need a faster internet, and phones and computers have brought us together. But the engine that is really driving so much innovation around us is internet connectivity, So, you know, that we really need faster internet. We, need to figure a way out to have a better way to compute, we need to have an efficient way to store data, and a really fast way to move it. I feel incredibly lucky to be a part of Marvell because that's exactly what we do. At Marvell, we use PAM for technology to break through the existing barriers and improve internet speeds by orders of magnitude. So as a product marketing manager at Marvell, I'm always looking for tech, that lowers the barriers to the way we connect with people. So I feel really fortunate to be part of Marvell.

Christopher Banuelos 02:51
How long have you been at Marvell? And what's your current role?

Rohan Gandhi 02:54
I have been with Marvell actually, pretty recently, we I was a part of the Inphi team when we got acquired, but I've been in this space for quite some time since 2015. I've been a techie my whole life.

Christopher Banuelos 03:12
It's great to have you here at Marvell and I appreciate you sharing some insights from your career. I think it ties directly into our topic today. And then we're discussing your recent blog post. There's an interesting theme of how to make better use of existing infrastructure, how does that tie into the type of work that you and your team are doing here at Marvell?

Rohan Gandhi 03:31
So okay, I've got an example in my talk. So, think about the railway systems, have been installed in London. And actually, the railway systems in India, have been installed in the 1860s. 1860 was when they built the first railroad, and they put a steam engine on it. And they've built a lot of rail networks since then. To increase capacity. But now we're at a place where, let's say you're in London, and you just can't build more tracks. There's just no more space. But the population is increasing. You got to increase the capacity of your system. You're not going to you can't build more tracks cheaply. So, what we do is we improve the technology that we have, the internet is the same way. We got to build tech where you've already laid down all those copper cables, all those phone lines, all that fiber that exists out there. We've got to be able to better utilize it. What we do at Marvell is improve technologies in orders of magnitude. So, what we've done is if the train was running at 100 kilometers an hour today, we are working on figuring out how we can make it run at 1000 kilometers an hour. So that kind of that's the scale of the improvement in technology that we're working on. So, what we do is, hey, don't change the tracks, we will improve the speeds of our train. That way you can carry more people.

Christopher Banuelos 05:19
In writing this blog post, what were some of the thoughts that occurred to you and what are some of the main themes that you discussed?

Rohan Gandhi 05:25
Yeah. So the main topics that we would want to talk about is what we do at Marvell. Within our own DSP team is an optical DSP group. How are we tackling the challenges that are thrown by the New Age internet. So the internet what I would call 1.0 was the internet from the 2000s to 2010. These are my years at university. And that internet was really started with the widespread use of this tech called NRZ back in the day, which is based on 10G internet connections. So, all the switches that you had in the network would be connected by these 10G modules. And 10 G modules are even used today are very ubiquitous, very, easily available. The 10G module really powered the internet from 2000 to 2010. But now we are close to 2020. Internet 3.0, between 2010 to 2020. You had the internet 2.0 which is what we're seeing a transition from which is what we see as being powered by 100G connection. So from 2010 onwards, the 100G connection really started to take off. But it still uses the older NRZ-based technology. It was doing the same thing, but a little bit faster. But using the same old tech, The future network from 2020 onwards. For the internet 3.0 we've seen network speeds that need to go to 400G and 800G and 1.6 terabits per second. And what we've seen is that the NRZ tech is running out of steam. At Marvell, we've built a lot of products for the internet 1.0, for the Internet, 2.0 and we are building products for the need for internet 3.0 and beyond. So why do we build this new tech? We want to make sure that it works with the older already deployed infrastructure. So, think of the internet connectivity, like the railway system that we were talking about. Every time you increase capacity to carry more people, you cannot always build more tracks. We've got to figure out ways in which we can use the ones efficiently. So, using the Marvell PAM technology, we are increasing the speeds on the back of the internet by an order of magnitude greater. To once again to keep this in perspective, if the train on the tracks were running at 100 kilometers an hour, an order of magnitude is we run those trains with the same tracks at 1000 kilometers an hour or faster. So, the Marvell 100G Alcor™ DSP follows this philosophy. It takes 10s of millions of dollars if not hundreds of millions

of dollars to deploy a big network. And we must fully utilize this resource for as long as we can. The Alcor 100G DSP is the bridge that connects the old NRZ tech to PAM 400G optical modules that are powered by Alcor. Allow the network administrators to keep their old 3.2 T switches. The old switches that were based on NRZ and make them work with the next generation 12.8T and 25.6. All the other switches that use 400G ethernet or 800G ethernet, all of the new switches can talk to the older switches using the Alcor enabled modules that are powered by the 400G DSP. So that's a real innovation that we that we've done at Marvell.

Christopher Banuelos 10:04
It's interesting when you say 2010, it seems like that was ages ago. But really, it was not that long ago.

Rohan Gandhi 10:11
Yeah, that's correct. We are, we are moving really fast in the telecommunication industry has really innovated at breakneck speeds. I remember back in the early 2000s, when they released high-speed internet in the form of DSL, and I remember logging on to the computer, and it was just so much faster than just a few years prior to that having a dial-up modem. And it's really interesting how fast moving with current technology in light of being still in an environment where a lot of people and technology are working from home, what I would call this time is the post COVID world. You know, we're seeing more and more people working from home, we will see a significant demand for improved connectivity, there is a need for a reliable connection. Nobody wants to have audio or video issues when they're in their online meetings using Zoom or WebEx or whatever tool you use. And we're also seeing a lot of increased use of AI. AI is using Zoom to make your background virtual AI to detect that you're speaking even though you're on mute. So, all of these workloads have actually surpassed human-to-machine traffic. So, the AI workloads, you can think of AI workload as machine-to-machine traffic. And we've seen that the machine-to-machine traffic has surpassed human-to-machine traffic. And the industry needs solutions. Where we can meet these bandwidth requirements, improve the quality of service, and reduce network latency to enable all of these technologies that we are building.

Christopher Banuelos 12:01
So how is Marvell designing solutions to keep up with surging data demands?

Rohan Gandhi 12:07
So we build these DSPs to alleviate the bandwidth demands for the next generation of internet. So up till now 400G modules. There was an alphabet soup of different types of 100G modules. There was a CWDM there was PAM4, there is LR4 SR4 for some modules would only work with some switches, some modules needed to turn on additional, something called as a forward error correction to work with a switch. It really made the life of a network administrator who is using 100G modules really difficult. And when these networks now transition to 400G and 800G connections, there needs to be a solution where your network administrators can upgrade the connectivity and not throw away the existing switches that they have. The Alcor product that we're working on at Marvell interfaces, the 400G and the 800G networks to the older 100G and lower networks. So, my team at Marvell is focused on building a smaller, lower power cost efficient PAM4 device that can handle the workload and solve the challenges that we were seeing the Alcor PAM4 DSP, we have unified within with one DSP, we no longer need so many different types of modules. With the single DSP, we've unified all the different 100G supply chains, and we've developed tech that will work with all the different 100G use cases. Now if you need to reconfigure your network, you don't need to send a person in the data center to keep track of which 100G module is used where network administrators can change the network configuration by flipping a software switch that Alcor provides and you can reconfigure to whichever mode whichever feature you want to use within Alcor and in addition, you know, we've got a big suite of debug tools like advanced diagnostics, something that the legacy NRZ tech could not support. So, this way, you know we eliminate the headache of product selection for the network administrators The diagnostics improve network downtimes. By, quickly allowing the administrators to quickly diagnose the problem. And overall, we improve the quality of service.

Christopher Banuelos 15:17
With our product, there's three things that are coming to mind, can you discuss what are some of the challenges that the market is experiencing? What is Marvell doing to help? And can you explain who benefits?

Rohan Gandhi 15:29
Yeah. So, you know, when we start to improve connectivity, so, this is, you know, basically, when we are figuring ways out to increase the speed of the train from 100 kilometers an hour to 1000 kilometers or an hour, there are a lot of challenges to be able to do that. For the network, as the speeds increase, there is a need for lower latency, there is a need for a more reliable connection. And there is also a need for greater security. So now, that you've increased the capacity of your network, you also need to make sure that it is more secure. We're also seeing the emergence of 5G networks, which require, low latency and a secure backbone. So, one way the industry's adapting to these challenges is by moving networks on the edge. So today, if you need a data center for your enterprise, you can simply order one and either a small suitcase or an 18-wheeler truck can come to your door. With a network, you can bring it up really quickly. You can set it up and you're good to go. at Marvell and in my team, we are building hardware and software that can help in making this happen. The 100G Alcor DSP operates with legacy machines that collocate in data centers and allows them to future proof their network. So this way, you know, if an enterprise wants to upgrade the network a few months or a few years down the line, they can do a rolling upgrade. They can continue with the legacy 100G switches and start plugging in the next generation 400G switches and still use Alcor that which allows them to use their older switches with the 400G switches, we solve the challenges of lower latency by making sure that our DSP has the lowest latency out there in the market. We improve security by encapsulating our data using the latest forward error correction codes. And we improve the reliability of a product by offering industrial temperatures for by offering to specify our parts to work even at industrial temperatures. So, till now, most of the commercial products that you see have a lower operating temperature have a temperature range that is much lower than what you would expect from an industrial temperature product. Alcor is a DSP works with industrial temperatures as well.

Christopher Banuelos 18:36
Rohan, why don't we wrap up our discussion with this last question. How ubiquitous is Marvell's technology?

Rohan Gandhi 18:42
Yeah, you know, I think of Marvell as one of the leaders in Silicon Valley. Marvell has been providing silicon for, the whole semiconductor industry. And Marvell has enabled so much innovation around the world. Not only in networking, but in the data center, and automotive industries. You know, basically, Marvell's leadership extends every single part of the industry that uses high tech. And our leadership in building products for data centers ensures that all the workloads that are processed in the data center today, so every time you do a Google search or every time you order something on Amazon you order you are going through our networks. You're going through components that have been deployed in these networks and these components belong, you know, have been designed and have been implemented by Marvell. So, in terms of the internet 3.0, I can, say that almost all the data that has been that that would be going through the network would be touched by a Marvell device.

Christopher Banuelos 20:28
Rohan, just want to say thank you so much for participating in today's podcast, really excited that we got to discuss your recent blog posts, and also to learn a little bit about you and your career.

Rohan Gandhi 20:37
Yeah, Thank you, Chris. It's been a pleasure talking to you as well. And I'm always excited to talk about ways in which we can improve those internet connectivity speeds. Every time we want to improve speeds. I'm always scratching my head, what can we do better?

Christopher Banuelos 20:57
Thank you for listening to the Marvel essential technology podcast. As always, please feel free to visit our website to learn more, and we'll see you on the next episode.