

# S1 EP23 - 100G Coherent for Aggregation Networks

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Samuel Liu, Senior Director, Product Line Management, and podcast host Chris Banuelos take a deep dive into the transition of 10G to 100G coherent solutions for aggregation networks. Samuel and Chris discuss the factors and trends driving the transition, the challenges faced by operators as they upgrade their fiber infrastructure and how Marvell is working with the ecosystem to enable the advancement of disaggregated optical architectures. Stay tuned to hear more on use cases and new applications for 100G coherent and how Marvell's 7nm Deneb coherent DSP is driving the largest open CDSP ecosystem in the world.

## Speakers

### Samuel Liu

Senior Director, Product Line Marketing

## 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. On today's episode, Samuel Liu and I discussed the 10G to 100G transition for coherent aggregation networks. On this episode Samuel answers what's driving the transition of 10G to 100G, the unique challenges and upgrading operators fibre infrastructure, Marvell solutions, use cases, as well as the difference between PAM4 and coherent technologies. To keep up to date on future episodes, please be sure to subscribe to the Marvell Essential Technology Podcast. Hey Samuel, thanks for joining our podcast today. Wanted to start a discussion with, talking about the transition from 10G to 100G. What is driving the transition?

#### **S** Samuel Liu 00:55

For the whole industry, the access bandwidth demand really continuously [has] grow[n] in last several years. The major driving force, one is 5G, right. So there is a lot of deployment start from mainly, China, Korea, Japan and the servers are the word. And the other one is the passive optical networks change the speed from one 1G to 10G is pretty much everywhere now. And then a high speed data surveys to small businesses. So all these front end access will need a better bandwidth aggregation for the backhaul or to send to the closest metro system. Currently, that piece of the network is based on 10G WDM they use a tunable SFP+. So to accommodate all these aggregation bandwidth increases, there are few options. One is keep adding another tunable SFP+ 10 Gig wavelengths. So it's a cost more money. And eventually, the fiber run out of channel to accommodate the speed, the total bandwidth, they are the one we rebuild that aggregation network. Instead of use 10G we use 100G coherent pluggable module. So with that one, it'll make clear business sense because each of them obviously bandwidth, 100G, right so equals 10 times over 10G. Secondly, they only occupy one wavelength of one channel. So they can dramatically increase the total capacity of this backhaul or this aggregation network. The important part is now it's available for the current 100G small form factor QSFP-DD module.

**C Christopher Banuelos 02:43**

And what are some of the unique challenges in upgrading operators fibre infrastructure, and how do Marvell solutions help?

**S Samuel Liu 02:50**

The Carrier's challenge for the aggregation network is [that] the fibre infrastructure is fixed, but they need to keep accommodating the ever growing boundaries with lower cost. From that perspective Marvell Deneb Coherent DSP enables this 100G QSFP-DD pluggable module for lower cost, lower power, good performance and a much bigger fiber capacity compared to the current available 10G pluggable module based WPM system. On top of that, Deneb work[s] with some partners, they actually can build the 100G QSFP-DD module with a higher output power so carrier[s] can leverage the existing optical line system in the field directly plugging in versus new 100G QDD module.

**C Christopher Banuelos 03:43**

Samuel let's talk about emerging markets, what are some of the use cases and new applications in the space?

**S Samuel Liu 03:50**

So traditionally, for aggregation network carrier have a collocate packet processing box a switch or router, collocate with a WPM transport box. So they use a short reach client optics module handed over and then the transport box converted to a WDM and most of the time is the 10G pluggable and they can also use like a CFP or bulky based 100G WDM. So, going forward one market trend is they want to collab is to boxes the router switch and optical transport we got a packet and optical integration or IPoDWDM. So with this solution, a small form factor pluggable module such as QSFP-DD coherent transceiver is a must have. They can be directly plugged in to the aggregation router switch with these AP and optical integration solution. It will significantly reduce the space and the power, which means the CAPEX and OPEX savings for carriers.

**C Christopher Banuelos 05:01**

Could you help me understand optics a little better particularly the difference between PAM4 and coherent technologies, what are each of these used in the network and why?

**S Samuel Liu 05:12**

So, the PAM4 technology is a direct detection and typically used for solid reach client optics and the distance is typically less than 10 kilometer and for vast majority of the use cases, one fiber, [carries] only one channel based on the PAM4 based optical transceiver. On the other hand, coherent technology has been deployed for long haul for major WPM from several hundred kilometer to several thousand kilometers. So, you enabled optical wavelengths channel like can opt 100 channels per fiber. Coherent technology, the major benefit is they can compensate the optical impairments such as chromatic dispersion and the polarization mode dispersion which is strongly related to transmission distance and the other route. So, PAM4 technology obviously has this distance limitation, but it can work well for lower cost with lower cost optics to enable very large volume short distance pluggable optical transceiver for the aggregation network. The typical fibre distance goes from few tens of kilometers to few hundred kilometers coherent pluggable module is the best solution for that application.

**C Christopher Banuelos 06:44**

Samuel my last question for you today is what is Marvell's unique value as it relates to establishing the next generation of coherent DSP solutions?

**S Samuel Liu 06:53**

So Marvell's seven nanometer coherent DSP Deneb includes a optimized design part number called the D200. This is especially designed optimized for 10G to 100G upgrade market. We also use this product to offer the industry's first a I-temp ready coherent DSP. So within Deneb, we are building the largest ecosystem globally to drive the aggregation 100 Gig upgrade, including both curates with QSFP-DD and the CFP2 pluggable module. Deneb enables low power, good performance, and importantly, also interoperable 100G working modes. With this coherent technology, we enable access aggregation to upgrade from the traditional 10G to 100G or even 200G. We are very excited to see after 10 plus years multiple generation coherent DSP development this coherent technology, [has] finally started to penetrate for a large volume access aggregation market with a small form factor pluggable module using Deneb.

**C Christopher Banelos 08:11**  
Samuel, thanks for joining today's podcast and of course, as always enjoyed our conversation. And I look forward to discussing more with you in the future.

**S Samuel Liu 08:19**  
Thank you, Chris. Very glad to have this opportunity to offer some more detail about Marvell Coherent DSP.

**C Christopher Banelos 08:28**  
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.



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