Product Brief

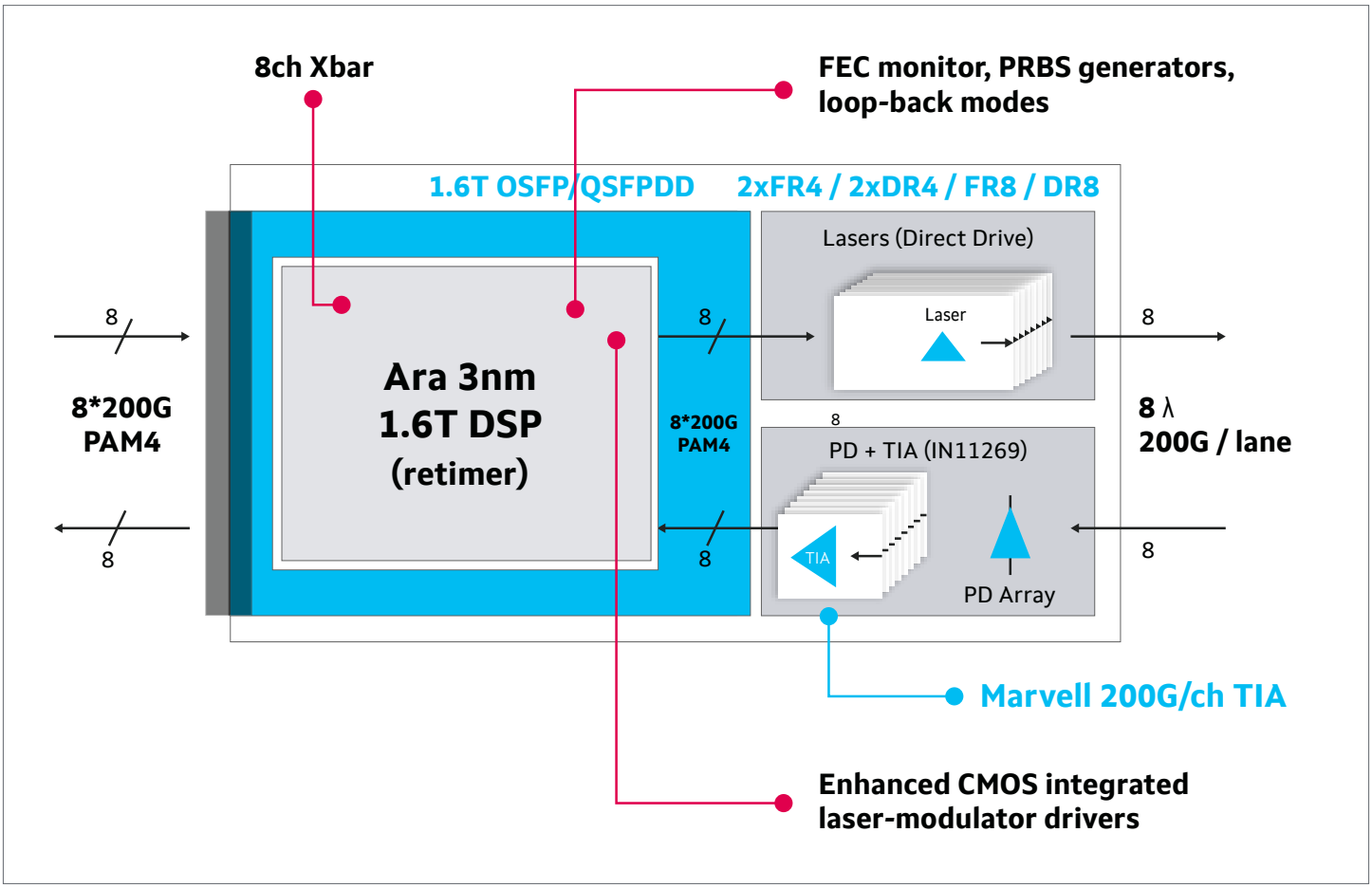
Marvell® Ara

1.6T (8x 200Gbps) PAM4 retimer DSP for pluggable optical transceiver applications

Overview

The Marvell Ara PAM4 DSP is a next generation solution for GenAI and cloud datacenter interconnects utilizing pluggable transceivers. Ara features eight 200Gbps/channel PAM4 host electrical interfaces, and an octal 200Gbps/lane PAM4 optical interface with integrated high-swing laser-modulator drivers, and standard drivers. Ara is manufactured with advanced 3nm process technology that delivers improved power efficiency while doubling the total bandwidth of the module to 1.6Tbps utilizing established OSFP/QSFP-DD form factor. The direct drive capabilities of the DSP further simplify manufacturing complexity while saving additional power and cost making Ara ideal for 1.6T DR8/DR4.2/2xFR4/FR8/LR8 modules. The DSP also integrates advanced diagnostic features including performance monitoring of SNR, histogram, and FFE-taps. The DSP also adds PRBS generators and supports loopback for both the line and host interfaces. Ara supports multiple industry standard protocols up to 200Gbps per channel on the electrical host and incorporates Concatenated Forward Error Correction (FEC) to provide additional pre-FEC bit error rate (BER) margin for high volume deployment within the data center.

Block Diagram



Key Features

Features	Benefits
1.6TbE, 2x800GbE, 4x400GbE, 8x200GbE, & Infiniband XDR operating modes	• Support for multiple operating modes with 1.6Tbps aggregate band-width per transceiver
800GbE, 400GbE, 200GbE half-rate, quarter-rate, and 1/8th-rate gearbox operating modes	• Enables support of 25G NRZ, 50G PAM4 and 100G PAM4 electrical I/O for legacy infrastructure
Integrated high swing laser-modulator drivers	• Reduces transceiver design complexity while delivering cost and power savings
CEI-224G-MR, IEEE802.3dj, IB-XDR compliant host electrical interface	• Enables 102.4T switch architectures using traditional PCB trace-out to “face-plate” pluggable transceiver ports
IEEE 802.3dj and IB-XDR compliant optical line-side specifications	• Enables multi-vendor transceiver interoperability
IEEE 802.3dj & IB-XDR compliant FECo (KP-FEC @ 212.5Gbps per channel)	• Assures link performance with BER coding gain
IEEE 802.3dj compliant FECi (@ 226.875Gbps per channel)	• Concatenated inner-FEC added to FECo data to accommodate additional optical link impairments to recover higher BER transmission channels
IEEE Auto Negotiation and Training protocol ready	• Optimizes transceiver performance based on interconnect impairments
8x8 any-to-any crossbar	• Enables board routing flexibility for the high speed I/Os
Ethernet packet and PRBS generation capabilities, host and line side loopback support, and deep eye monitoring capability on all high-speed interfaces	• Comprehensive test and debug capabilities for transceivers and system hardware

Target Applications

Pluggable optical transceiver modules and Active Optical Cables (AOC) in compliant MSA form-factors; OSFP and QSFPDD.

- 1.6T/800G optical interconnect for GenAI compute-node (Infiniband & RoCE)
- 1.6T/800G data-center networking fabric interconnects.
- 1.6T/800G Transmit Retimed only (TRO/LRO) optical interconnects

MARVELL™

To deliver the data infrastructure technology that connects the world, we’re building solutions on the most powerful foundation: our partnerships with our customers. Trusted by the world’s leading technology companies over 25 years, we move, store, process and secure the world’s data with semiconductor solutions designed for our customers’ current needs and future ambitions. Through a process of deep collaboration and transparency, we’re ultimately changing the way tomorrow’s enterprise, cloud, automotive, and carrier architectures transform—for the better.

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