Aries PCIe® Signal Conditioners

Family Brief

Aries Smart Retimers | Redrivers | Cable Modules | Optical Drivers | Optical TIAs | PCIe 7 Signal Conditioning from Chip-to-Chip | Box-to-Box | Rack-to-Rack

Astera Labs (NASDAQ: ALAB) provides rack-scale AI infrastructure through purpose-built connectivity solutions. By collaborating with hyperscalers and ecosystem partners, Astera Labs enables organizations to unlock the full potential of modern AI. Astera Labs' Intelligent Connectivity Platform integrates CXL®, Ethernet, NVLink Fusion, PCIe®, and UALink™ semiconductor-based technologies with the company's COSMOS software suite to unify diverse components into cohesive, flexible systems that deliver end-to-end scale-up, and scale-out connectivity. The company's custom connectivity solutions business complements its standards-based portfolio, enabling customers to deploy tailored architectures to meet their unique infrastructure requirements. Discover more at **www.asteralabs.com**

Benefits and Features

Copper Signal Conditioning

Smart Retimers

- Full signal regeneration for the toughest PCIe 7 channels
- FEC monitoring and FLIT-level error intelligence
- Reach extension of 40+ dB at 128 GT/s

Smart Redrivers

- Power-optimized for lower-loss channels
- Reach extension of 18+ dB at 128 GT/s
- Adaptive equalization and temperature compensation
- Integrated eye monitoring and loss of linearity detection

Smart Cable Modules

- Active Electrical Cable, Active Copper Cable, and Internal Cable Module options
- Redriver for ACC up to 3 meters at 128 GT/s
- Retimer for AEC up to 6 meters at 128 GT/s

Optical Signal Conditioning

Smart Optical Drivers

- Low power for high-density PCIe 7 optical transceivers
- High-channel-count for dense optical engines
- Optical Link Intelligence for LPO and NPO architectures

Smart Optical TIAs

- Low power for high-density PCIe 7 optical receivers
- Convert incoming optical signals into electrical data when paired with high-speed photodiodes
- Differential inputs and high channel isolation for optical-engine integration

Family-Wide Advantages

- **Scalable Connectivity:** From chip-to-chip, box-to-box, to rack-to-rack across copper and optics
- **Smart Swap:** Pin-compatible Retimer and Redriver options prevent board redesign
- **Cable flexibility:** Compatible cable form factors for ACC and AEC for different rack scale architectures
- **COSMOS Intelligence:** Fast I2C host management and diagnostics with dynamic tuning, temperature compensation, cable detection, and unified monitoring across copper and optical signal paths

Applications

- GPU/AI Accelerator data ingest and clustering
- General purpose server, CPU connectivity for network, storage (SSD), accelerator, CXL memory, etc.
- PCIe riser and add-in cards for disaggregated compute, network, memory, and storage connectivity
- Internal cable and modular motherboard architectures
- AI Backplane connectivity
- NVMe JBOFs, GPU/Deep-Learning Accelerators

Description

The Aries 7 family gives architects a comprehensive signal conditioning portfolio for high-performance AI infrastructure. It supports PCIe 7 links across board-level designs, active copper, active electrical cabling, and rack-to-rack optical connectivity.

As AI systems scale, the right connectivity approach depends on the application, channel, and physical architecture. Aries 7 gives designers a way to use copper where it is most efficient, extending reach with Smart Redrivers or Retimers, Smart Cable Modules for active cabling, and move to optical connectivity where rack-scale distance, density, or architecture demands it. COSMOS provides a common path for configuration, bring-up, diagnostics, validation, and fleet operations across the portfolio.

Chip-to-Chip

Chip-to-chip and within the box board-level designs of CPUs, GPUs, accelerators, switches, NICs, and storage devices span across server headnodes, accelerator baseboards, and other AI compute platforms. Smart Retimers address the most demanding channels where maximum reach extension is needed or open system where different end points can be attached. Smart Redrivers provide a lower-power, lower-latency option for medium-reach extension within a closed system, scale up backplane connections, or space constraint designs. With Smart Swap pin compatibility, architects can match the right reach to each interconnect without overdesigning across platforms.

Box-to-Box

Box-to-box topology extends PCIe 7 connectivity beyond the system of backplanes, add-in cards, motherboards, and internal cable assemblies. Aries Smart Cable Modules support active copper signal conditioning for cabling solutions, enabling disaggregated system designs where links must route between one chassis to another. Internal Cable Modules also provides flexible optionality for within the box connectivity where a signal conditioner is integrated on a module, allowing

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passive or active internal cable connectivity seamlessly interchangeable as system requirement evolves.

Rack-to-Rack

Rack-to-rack and multi-rack connectivity supports accelerator trays, high-radix switches, and disaggregated AI systems that extend PCIe fabrics beyond the one rack. Aries Smart Optical Drivers and Smart Optical TIAs form the transmit and receive sides of high-density optical engines for LPO and NPO architectures, enabling the transition from copper within a singular rack to optical links across multiple racks and into pod-scale infrastructure. COSMOS optical link intelligence helps tune and monitor optical signal conditioners, accelerate time to market and achieve robust deployment at scale.

Product Family Information

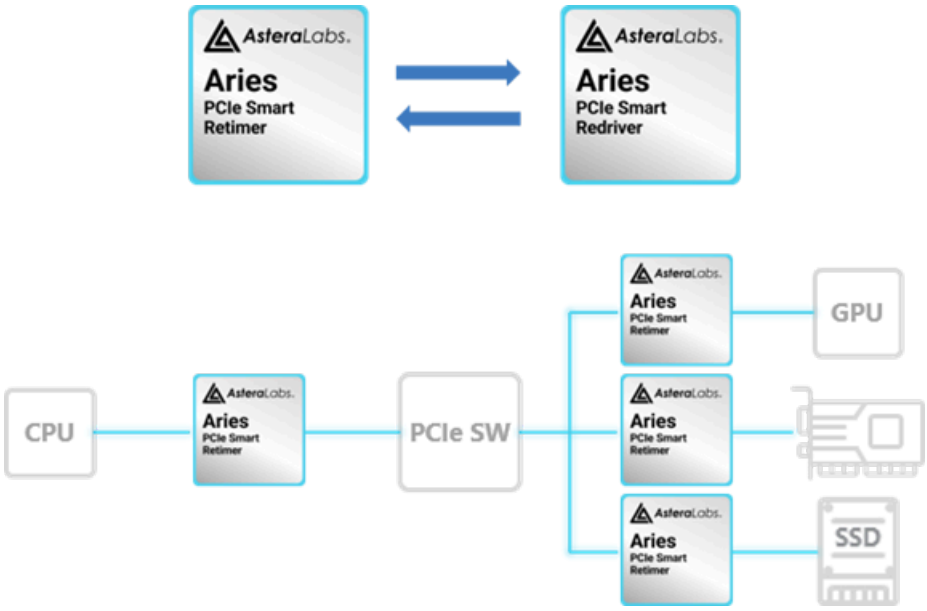
Part #	Product	Configuration
PT708xx	Smart Retimer	8 L
PT716xx	Smart Retimer	16 L
PD708xx	Smart Redriver	8 ch
PD716xx	Smart Redriver	16 L
PM40xx	Smart Cable Module (AEC)	16 L
PC40xx	Smart Cable Module (ACC)	16 L
PL70xx	Smart Optical Driver	8 ch
PA70xx	Smart Optical TIA	4 ch

Example Topologies

Aries signal conditioners can be combined across a platform as channel conditions change from board-level copper to rack-scale cabling and multi-rack optics.

HPC Server

Pin Compatibility Between Smart Retimer and Redrivers for Architecture Flexibility



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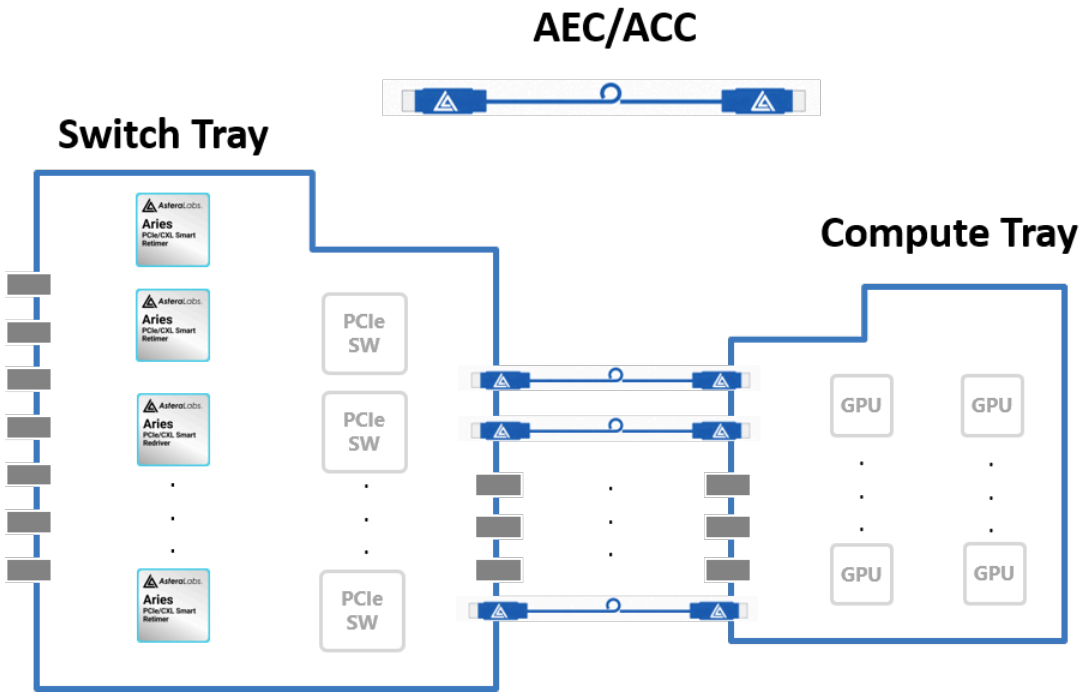
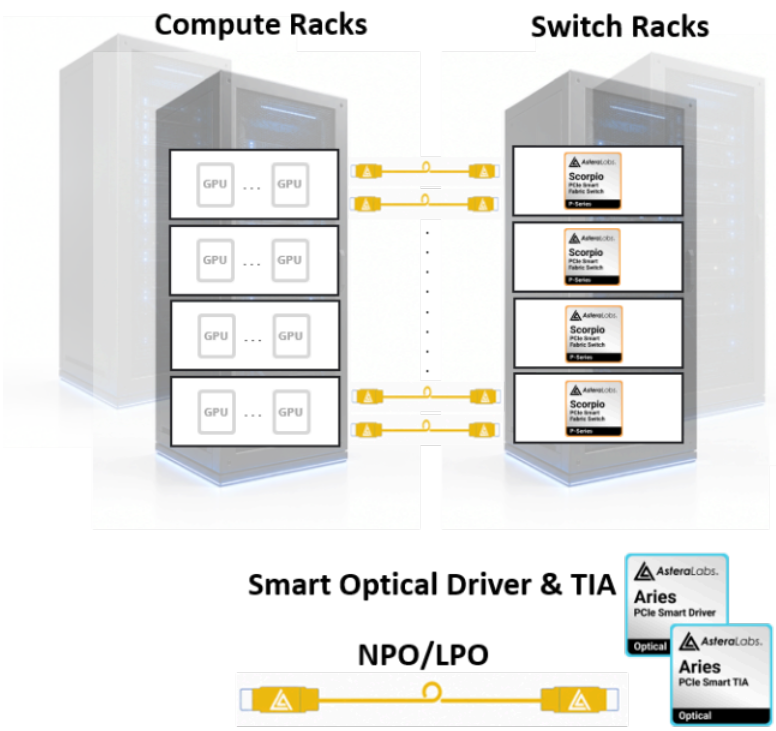
AI Scale Up

Rack-Scale Retimer and Redriver Based Cabling Solutions



Optical Multi-Rack Scale Up

Optical Solutions Purpose Built for High Density Optical Engines



Multi-rack optical connectivity

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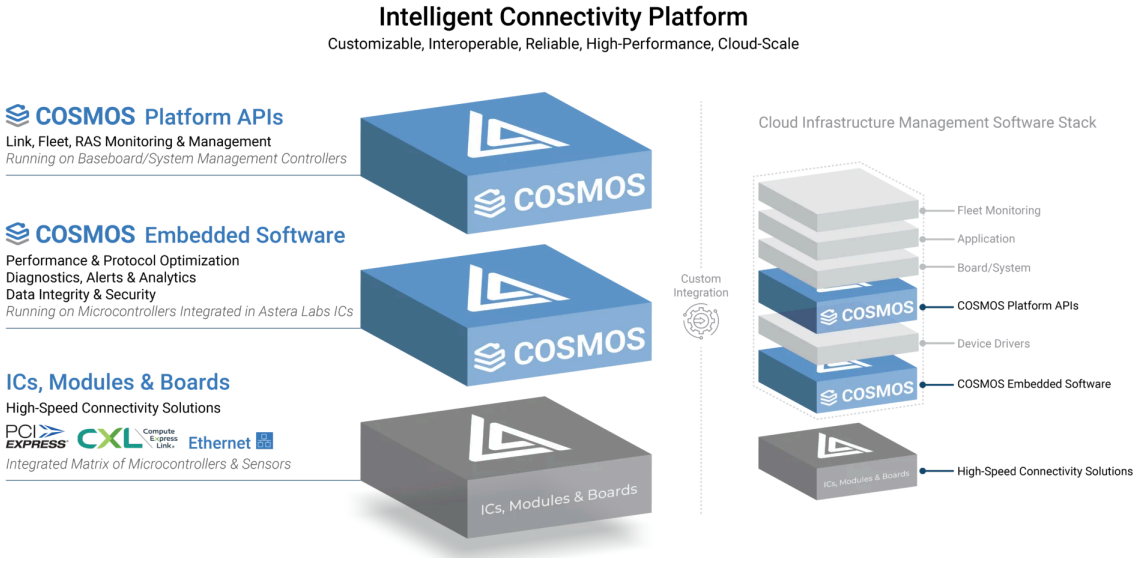
Astera Labs Intelligent Connectivity Platform

The Aries 7 Family is an integral part of Astera Labs' Intelligent Connectivity Platform. In addition to Aries 7, there are multiple PCIe, CXL and Ethernet ICs, Modules and Boards that are at the foundation of the platform. Astera Labs' COnnectivity System Management and Optimization Software (COSMOS) suite provides extensive Link, Fleet and RAS Management features and diagnostics. Through the combination of software and hardware, the Intelligent Connectivity Platform enables a smart connectivity backbone that is both scalable and customizable for AI and cloud infrastructure.



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