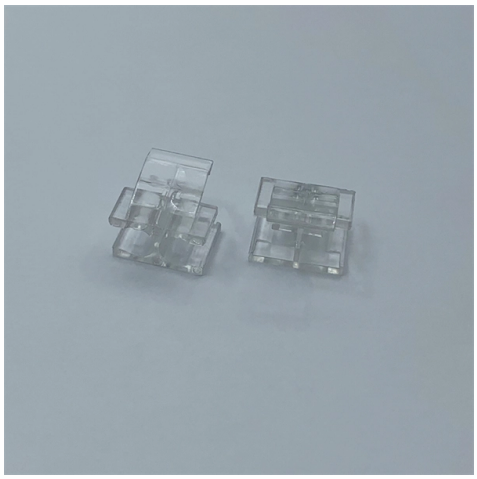
Selection Guide for Broadcast-Grade Co-packaged Photonics Upgrade



Overview

Keywords: co-packaged optics, optoelectronic integration, advanced packaging, silicon photonics integration 1.

Key Takeaways

Upgrading to broadcast-grade co-packaged photonics requires careful consideration of device integration, power efficiency, optical-electrical co-design, and supply chain factors.Key Considerations for Selection

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1. Integration Platform and Device Type Co-packaged optics (CPO) integrates photonic devices directly with high-performance ASICs to reduce SerDes distances, improving bandwidth density and energy efficiency . Silicon photonics is the most promising platform for large-scale integration, offering compatibility with advanced packaging and 3D integration . For broadcast-grade applications, consider whether the system requires external lasers or integrated laser sources, as this impacts power consumption and thermal management . 2. Power Efficiency and Thermal Management CPO reduces electrical link power consumption by shortening interconnect distances, but laser sources and thermal electric coolers (TECs) remain significant contributors to overall power . Evaluate solutions that minimize laser power and optimize heat dissipation, especially for high-bandwidth broadcast systems. 3. Modulation and Optical Performance Select modulators and filters that are energy- and area-efficient. On-Off Keying (OOK) modulation with low capacitance loads (e.g., 20 fF) is commonly used for high-speed optical links . Ensure the optical modulation amplitude (OMA) meets broadcast signal integrity requirements. 4. Configurability and Interoperability CPO systems often require uniform optics across all ports, which can limit flexibility . Assess whether your upgrade needs mix-and-match optics or if a standardized configuration is acceptable. Vendor interoperability and serviceability should be evaluated to avoid lock-in and maintenance challenges. 5. Supply Chain and Vendor Selection Identify critical components such as InP lasers, hybrid bonding solutions, silicon photonics chiplets, and switch ASICs . Map potential chokepoints and select vendors with proven reliability in broadcast or data center environments. Consider long-term availability and support for future upgrades. 6. Standardization and Future-Proofing Ensure the selected CPO solution aligns with emerging standards (e.g., IEEE 802.3 beyond 400G) to maintain compatibility with evolving broadcast and high-performance computing requirements . Factor in scalability for higher SerDes speeds and bandwidth growth.

Practical Steps for Upgrade

• Assess Current Infrastructure: Evaluate existing pluggable optics and electrical interconnects to determine compatibility with CPO.

• Define Bandwidth and Latency Requirements: Broadcast-grade systems often require low-latency, high-throughput links; select CPO devices that meet these specifications.

• Evaluate Thermal and Power Budgets: Model power consumption and cooling requirements for the integrated photonics solution.

• Select Vendors and Components: Use supply chain maps to identify reliable sources for lasers, photonic chiplets, and ASICs.

• Prototype and Test: Validate optical performance, signal integrity, and interoperability before full deployment.

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• Plan for Maintenance and Upgrades: Ensure serviceability and future scalability are considered in the design. By carefully considering these factors, broadcast-grade systems can achieve higher bandwidth, lower power consumption, and future-ready optical interconnects using co-packaged photonics technology .

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An equivalent switch with co-packaged optics would have 144 MPO8 connectors on the faceplate that directly

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