

F R O S T & S U L L I V A N



Market
Engineering

Optical Interconnection and Optical Computing Market

Date : 20 April 2026

For and on behalf of
Frost & Sullivan (Beijing) Inc., Shanghai Branch Co.

Name: Terry Tse

Title: Consulting Director

A handwritten signature in dark ink, appearing to be 'Terry Tse', written over a horizontal line.

Overall Assumptions and Methodology

Methodology:

In preparing the report, Frost & Sullivan has relied on the statistics and information obtained through primary and secondary research.

- Primary research includes interviewing industry insiders, competitors, downstream customers and recognized third-party industry associations.
- Secondary research includes reviewing corporate annual reports, databases of relevant official authorities, as well as the exclusive database established by Frost & Sullivan over the past decades.

Assumptions:

The market size and forecasts were modeled by Frost & Sullivan based on the following assumptions.

- The social, economic and political conditions in optical interconnection and optical computing market in China discussed will remain stable during the forecast period;
- The optical interconnection and optical computing market in China will be driven by the factors which are stated in this report.

Research Scope

Market Study of China's Optical Interconnection and Optical Computing Industry

Research Period

- Base year: 2025
- Historical: 2021 to 2025
- Forecasting: 2026E to 2030E

Service Market Scope

- Optical Interconnection Market
- Optical Computing Market

Geographical Scope

- China

Content

Chapter	Section
1	Market Background for Optical Computing and Optical Interconnects in the AI Era
2	Analysis of Optical Interconnect Market
3	Analysis of Optical Computing Product Market

Market Background for Optical Computing and Optical Interconnects in the AI Era

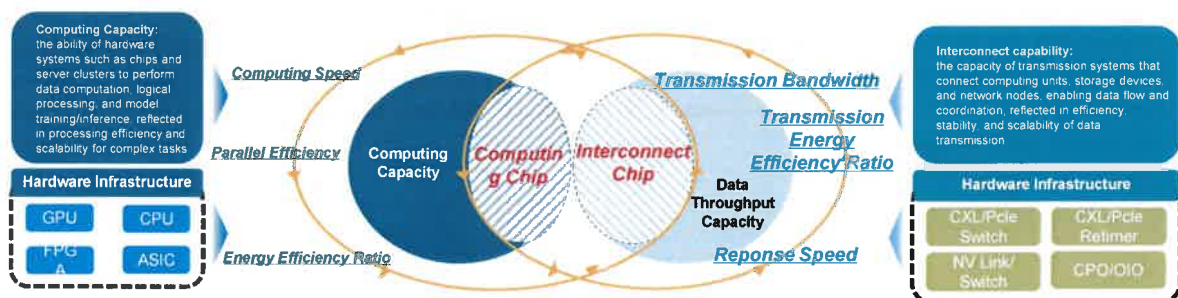
Market Background for Optical Computing and Optical Interconnects in the AI Era Analysis of the Evolution of Artificial Intelligence

- The development of artificial intelligence has gone through multiple rounds of technological iteration, evolving from simple rule-based systems to complex architectures. Throughout this process, demand for computing power has grown rapidly. As the scale of model parameters has expanded from tens of millions to hundreds of billions and even trillions, and training datasets have increased from gigabytes to petabytes, traditional electrical computing architectures are facing dual bottlenecks in energy consumption and latency. At present, the rise of large-scale model training, the pursuit of general intelligence across domains, and the integration of multimodal tasks all impose extremely high requirements on computing power, making stronger and more efficient computing capabilities essential or supporting these developments.
- Optical computing and optical interconnect technologies provide an effective solution to this challenge. Optical chips, as the core components, leverage the inherent advantages of optical parallel processing and the high speed, large capacity, and low interference of optical signal transmission. They can accommodate the massive computational demands of large-scale model training while alleviating bandwidth bottlenecks and transmission delays in data flow, thereby becoming a fundamental infrastructure supporting the steady advancement of artificial intelligence in the future.

Market Background for Optical Computing and Optical Interconnects in the AI Era Analysis of the Underlying Infrastructure of Artificial Intelligence

- The underlying infrastructure of artificial intelligence is structured around the synergy of computational power and interconnect capacity, which together form the twin pillars supporting the development of the AI industry. The efficiency and coordination between these two elements directly define the boundaries of industrial advancement.
- The computing layer generates processing power, defining the scale of tasks that artificial intelligence can execute. The interconnect layer facilitates the transmission of processing power, determining the efficiency with which computational resources operate in unison.

Analysis of the Underlying Infrastructure of Artificial Intelligence



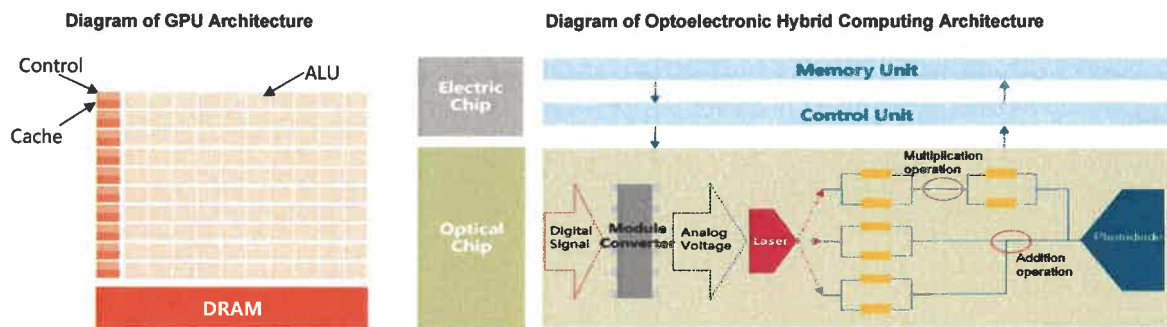
Source: Frost & Sullivan

Market Background for Optical Computing and Optical Interconnects in the AI Era Pathways for Enhancing AI Computational Power (1/4)

Path 1: Increasing Single-Chip Performance

i. Emerging Computing Paradigms

- Emerging computing paradigms are crucial for overcoming the bandwidth and energy consumption bottlenecks inherent in traditional electrical architectures. Optical computing stands out by leveraging photon propagation to achieve superior bandwidth and lower transmission latency without electrical resistance. By adopting a hybrid optoelectronic architecture, it utilizes optical signals for high-speed transmission and parallel multiply-accumulate operations, while electronic circuits handle logic and control. This innovative synergy effectively eliminates traditional data movement delays, delivering computational performance that significantly surpasses conventional electrical models.
- From an architectural perspective, GPUs are built on a centralized computing model where processing units are separated from memory, requiring frequent data movement between the two. This process generates significant delays and energy consumption, and the bottleneck becomes especially pronounced in large-scale parallel AI workloads. Optical computing typically adopts a hybrid optoelectronic architecture that combines the flexibility of electrical computation with the bandwidth and speed advantages of photonics. In this model, optical signals handle high-speed data transmission and parallel processing, while electronic circuits perform control, logic operations, and signal conversion. Specifically, during computation, electronic signals first encode data onto optical carriers, which are transmitted through optical waveguides to optical processing units. These units exploit the principles of interference and diffraction to execute large-scale parallel multiply-accumulate operations. The results are then converted back into electronic signals for subsequent processing and output. This architecture enables a level of performance far beyond that of traditional electrical computation.



Source: Frost & Sullivan

Market Background for Optical Computing and Optical Interconnects in the AI Era Pathways for Enhancing AI Computational Power (2/4)

Path 1: Increasing Single-Chip Performance

ii. Advanced Packaging as an Enabler:

- Advanced packaging technologies have emerged as a critical solution to bypass the physical limitations of traditional process scaling and enhance overall system efficiency. Rather than relying on large monolithic dies, the industry is increasingly adopting chiplet integration to connect smaller functional modules via high-bandwidth, low-latency interfaces like silicon interposers. This modular approach not only improves manufacturing yields and reduces costs but also enables the seamless integration of heterogeneous units such as CPUs, GPUs, and NPUs. Consequently, it fosters highly collaborative computing environments within a single package, substantially boosting both computational power and application flexibility.

iii. Advancement of Chip Fabrication Processing

- Moore's Law states that the number of transistors on an integrated circuit doubles approximately every 18 to 24 months, leading to exponential improvements in computing performance. By continuously shrinking transistor dimensions, chip manufacturers have achieved simultaneous gains in frequency, power efficiency, and cost over the past decades. However, once nodes entered the 7-nanometer and below range, scaling encountered physical limits such as quantum tunneling, electromigration, and heat dissipation. Pure geometric shrinkage no longer delivered meaningful performance gains. Since 2015, the rate of performance improvement with each new node has slowed significantly, falling short of the rising computing demand in the AI era. As a result, new innovation pathways are urgently required to supplement node scaling, while optical computing is not subject to similar limitations.

Market Background for Optical Computing and Optical Interconnects in the AI Era Pathways for Enhancing AI Computational Power (3/4)

Path 2: High-Speed Interconnects for Scaling Computing Clusters

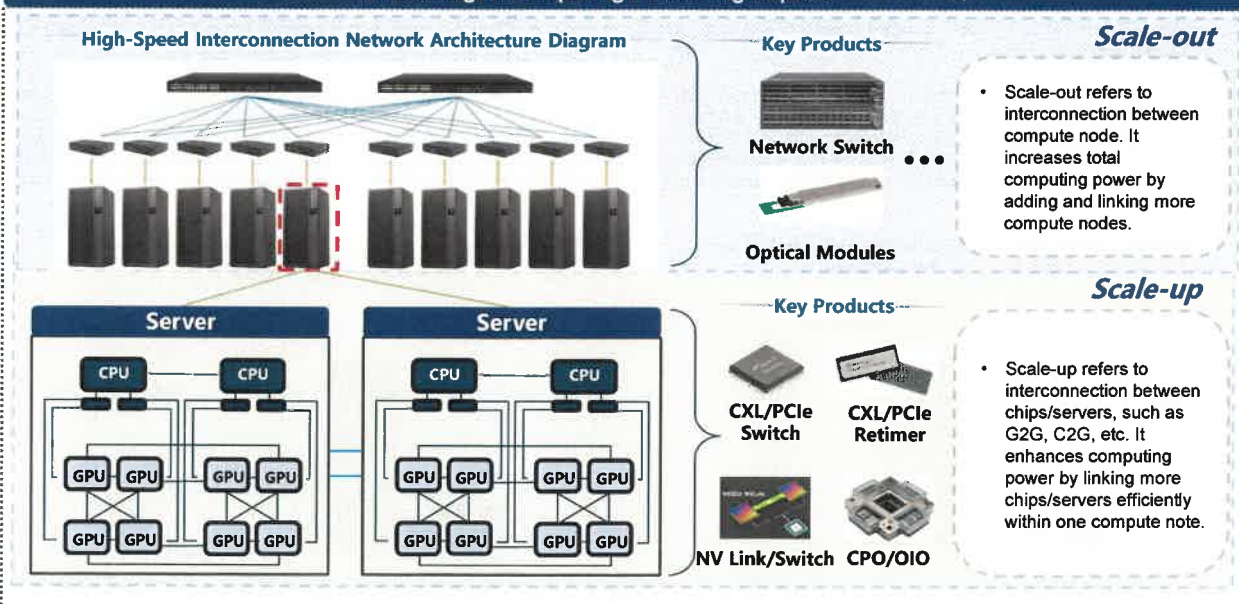
- High-speed interconnects act as the foundational infrastructure for expanding AI computing capacity through dual dimensions: scale-up and scale-out.
- Scale-up architectures rely on key technologies like CXL, NVLink, and CPO to maximize data transfer efficiency and resource synergy within a single computing node.
- Conversely, scale-out utilizes network switches and optical modules to link multiple independent nodes, unifying them into a massive, centralized computing resource pool.
- Together, these interconnected dimensions enable the seamless formation of massive GPU clusters comprising thousands of devices, fundamentally sustaining continuous AI capacity growth.

Source: Frost & Sullivan

Market Background for Optical Computing and Optical Interconnects in the AI Era Pathways for Enhancing AI Computational Power (4/4)

High-Speed Interconnect Technology Driving AI Computing Power Expansion

Path to Enhancing AI Computing Power: High-Speed Interconnect

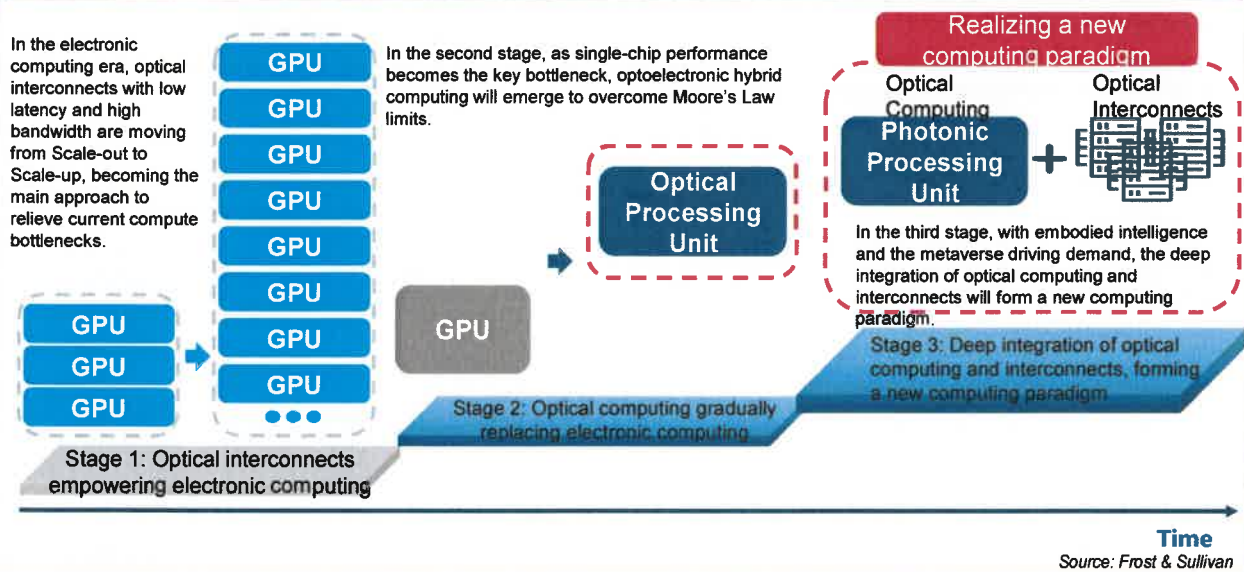


Source: Frost & Sullivan

Market Background for Optical Computing and Optical Interconnects in the AI Era Pathways to Optoelectronic Accelerated Computing

- The realization of all-optical computing follows a staged evolution. At the current stage, optical interconnects used in high-speed data transmission within data centers represent the first step toward large-scale commercialization, addressing the bandwidth bottlenecks of electrical interconnects. In the medium term, integration with optical switching will enable an all-optical data center that completes the "transmission-switching" loop. In the long term, the convergence of optical computing and optical interconnects will give rise to a fully optical architecture, marking a transition from "electrical computing plus optical transmission" to a paradigm of all-optical computing.

Ecosystem Architecture and Synergies of All-Optical Computing



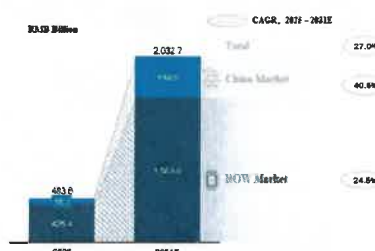
Market Background for Optical Computing and Optical Interconnects in the AI Era Market Potential of AI Computing and Interconnect Products

- As artificial intelligence advances rapidly, the parameter scale of large models is rising exponentially, driving a surge in global demand for computing power. This demand is fueling the expansion of AI computing platforms, including AI computing chips for model training and inference, and interconnect systems enabling high-speed communication between chips. Together, they form the core infrastructure supporting the intelligent economy, with a market of vast size and strong growth momentum. In the AI computing product market, global growth is primarily driven by the accelerating expansion of AI application scenarios, which amplifies demand for computing products. This expansion is supported not only by China's rapid advances in AI but also by policy incentives and local substitution demand. While overseas markets remain larger in absolute scale, their growth lags behind China.
- In the AI interconnect product market, growth is driven mainly by the need for high-speed, low-latency interconnects in ultra-large-scale AI clusters. The global market is projected to expand from RMB483.6 billion in 2025 to RMB2,032.7 billion in 2031, with a CAGR of 27.0%. China is expected to grow faster, at a CAGR of 40.6%, compared with 24.5% in overseas markets. Similar to AI computing products, demand for AI interconnects in China is rising more quickly than in other regions, reflecting the country's strong momentum in AI development. This rapid expansion of China's AI computing and interconnect markets provides broad commercialization opportunities for next-generation technologies such as optical interconnects and optical computing.

Market Size of Global AI Computing Products (by Revenue), China & ROW, 2025 & 2031E



Market Size of Global AI Interconnect Products (by Revenue), China & ROW, 2025 & 2031E



Note:

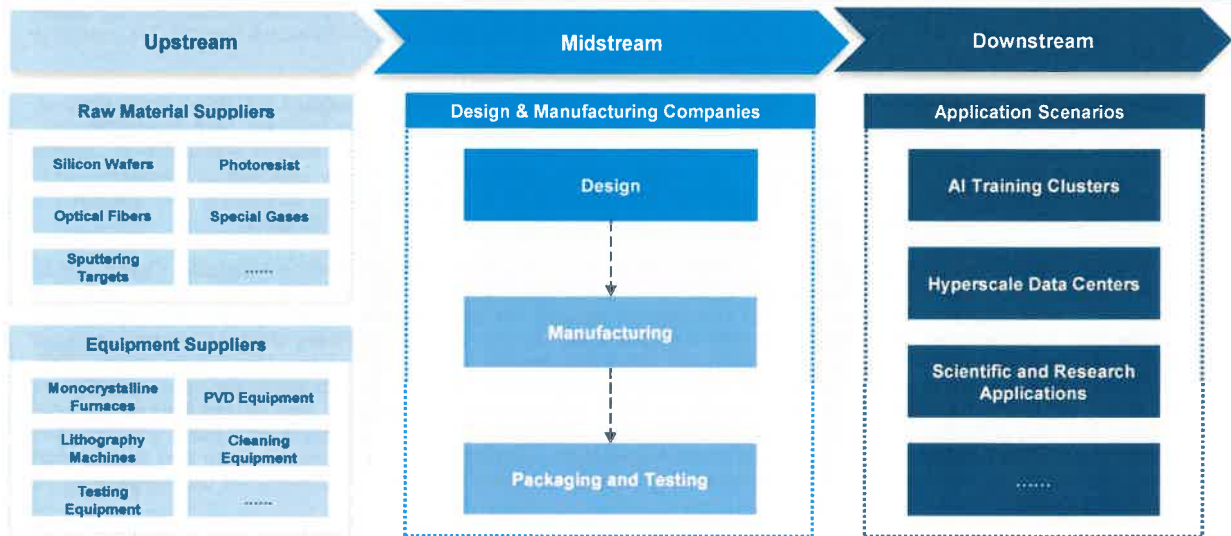
(1) The market scope includes interconnect products that are self-developed by AI computing chip companies. When calculating the revenue generated from such self-developed products, only the value attributable to the interconnect products is included.

Source: Frost & Sullivan

Market Background for Optical Computing and Optical Interconnects in the AI Era Industry Chain of optical Computing and Optical Interconnects

- The industry chain of optical computing and optical interconnects is a technology-intensive system, consisting of upstream core material and equipments supply, midstream integration and manufacturing, and downstream application-driven segments. Its development is strongly propelled by the surging demand for high-bandwidth, low-latency, and low-power consumption solutions in AI and data centers.

Industrial Chain of Optical Computing and Optical Interconnect Market



Source: Frost & Sullivan

Analysis of Optical Interconnect Market

Analysis of Optical Interconnect Market

Introduction to Optical Interconnect Market

- Optical interconnects, as a key enabling technology in the era of artificial intelligence and high-performance computing, can be categorized into Scale-out and Scale-up optical interconnects according to application scenarios. Scale-out optical interconnects are primarily used for connections between computing nodes and have already been widely deployed in data centers and AI training clusters, where they have become an industry standard. By contrast, Scale-up optical interconnects focus on high-speed chip-to-chip connections within a computing node. In the current market, this function is mainly fulfilled by Scale-up electrical interconnects that use copper as the transmission medium. As AI models continue to scale and single-chip bandwidth requirements rise, the performance and power consumption of conventional Scale-up electrical interconnects can no longer meet the demands of chip-to-chip communication. Consequently, Scale-up optical interconnects are expected to gradually replace traditional electrical interconnects and become the inevitable direction for the evolution of Scale-up interconnect solutions.
- Scale-up optical interconnect refers to high-speed data transmission technology designed for chip-to-chip scale-up connections. It uses photons as information carriers and optical media to establish low-loss, high-bandwidth links between computing chips. Unlike traditional electrical interconnects that rely on copper transmission, optical interconnects offer significant advantages in bandwidth density, transmission distance, and energy efficiency. They overcome the performance bottlenecks of electrical interconnects in large-scale parallel computing and support the demanding requirements of ultra-large-scale AI clusters and high-performance computing systems.
- In terms of product forms, Scale-up optical interconnect products mainly include Linear-drive Pluggable Optics (LPO), Near-Packaged Optics (NPO), Co-Packaged Optics (CPO), and Optical Circuit Switches (OCS). LPO adopts a simplified linear-drive architecture and is currently the mainstream solution for long-distance board-to-board and rack-to-rack connections in supernodes. NPO places the optical engine closer to computing or switching chips, shortening electrical traces and improving signal integrity and transmission efficiency, serving as an important transitional form toward CPO. CPO integrates the optical engine tightly with the switching ASIC or AI accelerator chip within the same package or substrate, achieving the highest bandwidth density and the lowest energy consumption, and is regarded as the core solution for next-generation ultra-large-scale clusters. OCS provides large-scale switching and traffic management between computing nodes through all-optical cross-connections, offering lower power consumption and greater port scalability compared with traditional electrical switching, thereby enabling network interconnects for ultra-large-scale AI computing clusters.

Source: Frost & Sullivan

Analysis of Optical Interconnect Market

Performance Analysis of Scale-up Optical Interconnect Products

- The performance of Scale-up optical interconnect products can be assessed across three core dimensions: transmission capacity, efficiency, and stability. Closely aligned with the needs of computing power, these technical features form the key enabler for overcoming performance bottlenecks.
- **Supporting large-scale computing with high density and high bandwidth**
- Scale-up optical interconnects leverage the inherent parallelism and low-loss characteristics of light, enabling single-channel data rates to advance from 100G to 200G, 400G, and beyond, far surpassing the physical limits of electrical interconnects in bandwidth density and distance. As product forms evolve from LPO to NPO and eventually to CPO, optical engines are placed closer to or even co-packaged with computing chips, further reducing transmission paths and boosting interconnect bandwidth density. This allows interconnect capacities of tens of terabytes per second within a single package, providing non-blocking data exchange for AI clusters and high-performance computing systems, and directly supporting the scaling of computing power.
- **Reducing computing losses with low power consumption and low latency**
- In terms of efficiency, Scale-up optical interconnects demonstrate clear advantages in both energy use and latency. The energy loss of optical signals is only a fraction of that of electrical signals. When combined with the shortened optical-electrical conversion paths in CPO architectures, overall system power consumption is significantly reduced, easing the energy burden of data centers. At the same time, with transmission speeds close to the speed of light and inherent advantages in short-range high-speed communication, optical interconnects can compress link latency to the nanosecond level. This provides efficient support for large-scale parallel computing and AI model training, improving the utilization of computing resources.
- **Ensuring sustained output with high reliability**
- In terms of stability, Scale-up optical interconnects offer far greater resistance to electromagnetic interference compared with electrical interconnects. They maintain extremely low error rates even in complex electromagnetic environments, avoiding costly rollbacks and retries. Meanwhile, the long-term operating stability of optical devices under high temperatures and heavy loads has been steadily improving. The high integration of CPO designs further enhances environmental adaptability and system reliability. These features ensure that computing clusters maintain stable and efficient output during long periods of continuous operation, enabling peak performance to translate into sustainable effective computing power.

Source: Frost & Sullivan

Analysis of Optical Interconnect Market

Comparative Analysis of Scale-up Optical and Electrical Interconnects

- From an architectural perspective, Scale-up optical interconnects use photons as information carriers and rely on optical transmission paths that support multi-wavelength parallelism. Electrical interconnects, by contrast, depend on electrons moving through conductive media, constrained to serial or limited parallel transmission.
- In terms of technical performance, optical interconnects achieve single-link bandwidth scaling without being restricted by electron migration limits, while also offering lower energy consumption, lower latency, and stronger resistance to electromagnetic interference. Electrical interconnects are more susceptible to interference and face bottlenecks in bandwidth, energy consumption, and latency.
- Regarding cost structure, optical interconnects involve higher initial R&D and manufacturing expenses. However, as the technology matures and scales, costs are expected to decline, and total lifecycle energy costs remain low. Electrical interconnects have lower upfront hardware costs, but in high-bandwidth and long-distance applications, they require frequent upgrades, leading to a long-term total cost of ownership disadvantage.
- In application scenarios, Scale-up optical interconnects are suited to ultra-large-scale data centers and AI computing clusters that demand high bandwidth and low latency. Electrical interconnects, due to lower costs, are currently used in short-distance connections. Yet as optical interconnect costs continue to fall and AI computing demand grows rapidly, electrical interconnects are expected to be gradually replaced by Scale-up optical interconnects.

Source: Frost & Sullivan

Analysis of Optical Interconnect Market

Evolution of Scale-up Optical Interconnect Product Forms

- The evolution of Scale-up optical interconnect product forms reflects two fundamental dimensions: switching architecture and packaging integration. As AI clusters and high-performance data centers demand ever higher bandwidth, lower latency and greater energy efficiency, interconnect architectures must continuously break through performance bottlenecks. Switching architecture defines the limits of latency and power efficiency, while packaging form determines bandwidth density and transmission efficiency. It is precisely the escalating requirements of next-generation computing infrastructure that drive the industry toward deeper opticalization and higher levels of integration.
- On the switching side, the prevailing "optical transmission plus electronic switching" model still relies on electronic chips for routing, constraining scalability and power efficiency. To meet ultra-low-latency and high-bandwidth requirements, the industry is advancing toward all-optical switching, where optical signals complete path selection and routing directly within switching nodes, eliminating repeated optical-electrical conversions and significantly reducing latency and energy loss. On the packaging side, integration has progressed from LPO to NPO and ultimately to CPO, continuously shortening electrical transmission paths and improving bandwidth density and energy efficiency. The shift toward all-optical interconnect and CPO packaging is therefore not incidental, but a structural response to the performance demands of large-scale AI computing systems.

Source: Frost & Sullivan

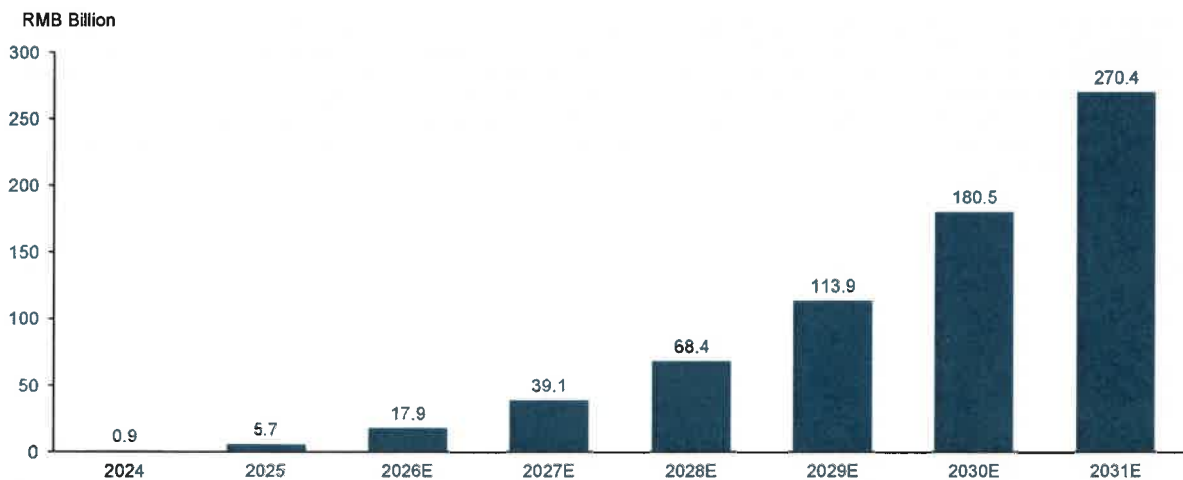
Analysis of Optical Interconnect Market Market Size of Scale-up Optical Interconnects (1/2)

- China's scale-up optical interconnect market remains at an early stage and is currently focused on supernode computing scenarios. The rapid expansion of the scale-up optical interconnect market is driven by three factors.
- First, AI cluster architectures are shifting from single-node to supernode configurations, sharply increasing intra- and inter-rack interconnect requirements and exceeding the physical limits of electrical interconnects.
- Second, continued growth in chip interconnect bandwidth is exposing constraints in electrical solutions across bandwidth density, power consumption and latency, accelerating the shift toward optical technologies.
- Third, the maturation of silicon photonics and advanced integration forms such as CPO, together with cost reductions from scale effects, is improving economic viability and enabling broader deployment beyond supernode scenarios.

Source: Frost & Sullivan

Analysis of Optical Interconnect Market Market Size of Scale-up Optical Interconnects (2/2)

Market Size of Scale-up Optical Interconnects (by Revenue), China, 2024–2031E



Note:

(1) The market scope includes scale-up optical interconnects that are self-developed by AI computing chip companies. When calculating the revenue generated from such self-developed solutions, only the value attributable to the scale-up optical interconnect portion within AI compute cluster revenue is included.

Source: Frost & Sullivan

Analysis of Optical Interconnect Market

Drivers and Development Trends of the Scale-up Optical Interconnect Market

Drivers and Development Trends of the Scale-up Optical Interconnect Market

Paradigm shifts in technical architecture

- The physical limits of electrical interconnects and the advantages of optical technologies are driving Scale-up optical interconnects toward a central role in computing infrastructure. As bandwidth, power and latency constraints intensify, the industry is advancing silicon photonics integration, CPO and linear-drive architectures to shorten transmission paths and improve efficiency. By combining tighter chip-level integration with wavelength multiplexing and optimized network design, Scale-up optical interconnects are evolving from component solutions to system-level architectures.

Exponential expansion of computing demand

- At the same time, surging AI training demand is pushing Scale-up optical interconnects into the core of data centers. Rapid growth in rack-level port density has exposed the scalability limits of electrical interconnects, making optical solutions essential for ultra-large clusters and trillion-parameter models. This is accelerating adoption of ultra-high-speed modules such as 1.6T and driving the shift toward more flexible and scalable computing networks.

Source: Frost & Sullivan

Analysis of Optical Interconnect Market

Competitive Landscape of China's Scale-up Optical Interconnect Market

- At present, while the optical interconnect market particularly for scale-up interconnect is still in its early stage, the Company is observing a clear market inflection driven by the rapid adoption of large language models and the increasing demand for supernode architectures, which create sustained demand for high-performance optical interconnect solutions. As supernodes gain wider adoption, GPU interconnect bandwidth continues to increase, optical interconnect solution providers with system design and integration capabilities will be the first to benefit, securing differentiated competitive advantages and driving the broader market toward commercialization and expansion.

Source: Frost & Sullivan

Analysis of Optical Interconnect Market

Market Rankings of China's Scale-up Optical Interconnect Sector

Ranking of Scale-up Optical Interconnect Companies (by Revenue), China, 2025

Rank	Company Name	Revenue (RMB mn)	Market Share (%)
1.	Company A	5,636.2	98.4
2.	The Company	79.2	1.4
	Others	10.5	0.2

Source: Frost & Sullivan

Ranking of Third-party Scale-up Optical Interconnect Solution Companies (by Revenue), China, 2025

Rank	Company Name	Revenue (RMB mn)	Market Share (%)
1.	The Company	79.2	88.3
	Others	10.5	11.7

Source: Frost & Sullivan

- In 2025, only two companies in China's scale-up optical interconnect market had achieved large-scale commercialization, resulting in a highly concentrated competitive landscape in which the top two players together accounted for approximately 99.8% of total market share. Among them, the Company is the only independent scale-up optical interconnect solution provider in China that has achieved large-scale commercialization. Among independent optical interconnect solution providers, the Company ranked first by revenue in 2025, generating RMB79.2 million and accounting for approximately 88.3% of the market share.
- The Company is also the only independent supplier in the market capable of providing end-to-end integrated, large-scale optical interconnect solutions. The Company's solutions cover hardware and component-level delivery, software and intelligent management, simulation and system design, as well as end-to-end link design and turnkey deployment, and it has established commercial partnerships with multiple AI computing chip manufacturers and system integrators. Although certain components are manufactured by third-party suppliers, such activities are essentially contract manufacturing services. The value generated from this manufacturing is recorded as a cost item for that company; therefore, to avoid double counting, the value attributable to such activities has been excluded from the market size calculation.

Note:

(1) The market scope includes scale-up optical interconnects that are self-developed by AI computing chip companies. When calculating the revenue generated from such self-developed solutions, only the value attributable to the scale-up optical interconnect portion within AI compute cluster revenue is included.

Source: Frost & Sullivan

Analysis of Optical Interconnect Market

Comparisons of Global Scale-up Optical Interconnect Leaders

Comparisons of Global Scale-up Optical Interconnect Leaders

	The Company	Company A ⁽¹⁾
Founded Time	Founded in 2017	Founded in 1987
Business Model	A third-party provider offering holistic and integrated optical interconnect system architecture that includes hardware and component-level delivery, software and intelligent management, simulation and system design, end-to-end link and turnkey solutions	A large ICT, consumer electronics and AI computing infrastructure provider that develops in-house scale-up optical interconnect solutions as part of its proprietary AI computing system architecture
Product Coverage	Comprehensive and advanced product portfolio from LPO products of Scale-up EPS and Scale-up OCS, to next-generation NPO and CPO prototypes, all of which include our self-developed optoelectronic chips.	Self-developed scale-up optical interconnect architecture integrated within its AI computing cluster systems, supported by high-speed optical interconnect technologies and optical transceivers.
Commercialization Degree	Achieved initial commercialization for Scale-up products	
Customer Coverage	Our customers primarily consist of research institutions, internet companies, GPU and server manufacturers, system integrators and AI infrastructure builders and operators	Only deployed within its own AI computing infrastructure ecosystem and AI computing cluster systems.

Source: Frost & Sullivan

Notes:

(1) Company A is a private company founded in 1987 and headquartered in Shenzhen, China. It provides a broad range of products and solutions across ICT infrastructure, AI infrastructure and consumer electronics.

Source: Frost & Sullivan

Analysis of Optical Interconnect Market Comparisons of Interconnects

Comparison of Interconnects

Comparison Dimension	Scale-up Electrical Interconnect	Scale-up Optical Interconnect
Key Performance Indicators		
Transmission rate	The rate is limited by electron migration (Gbps level, with high-end reaching tens of Gbps)	Ultra-high transmission rates (tens of Gbps to Tbps level)
Bandwidth	Bandwidth is relatively limited, and multi-channel integration is highly challenging	High bandwidth capacity, supporting multi-channel parallel processing
Power Consumption	High power consumption, with significant joule-heating losses	Low power consumption, high energy efficiency ratio
Latency	Relatively high	Extremely low
Interference Resistance	Susceptible to electromagnetic interference	High resistance to electromagnetic interference
Technology Maturity	<p>Multiple products and technology iterations have been achieved</p> <p>Functionality: Evolved from early point-to-point data transfer to address core requirements such as multi-socket computing power aggregation for high-performance computing clusters and AI training clusters, as well as high-speed interaction of massive data, enabling broader application scenarios</p> <p>Performance: Transmission rates and bandwidth have significantly increased (PCIe 6.0 reaches 64GT/s, NVLink 6.0 achieves 100GB/s per link), offering microsecond-level low latency and high reliability while supporting seamless scaling to hundreds of compute nodes</p> <p>Architecture: Evolving from single direct-connect architectures to composite systems through PCIe-Switch-Router and NVLink core solutions; PCIe general customer optimization enables 100-pair switching. Router enhances signal compression, and NVLink upgrades to multi-GPU mesh interconnects.</p>	<p>Initial generation of products has been developed, deployed and commercialized with ongoing R&D to form more mature versions for widespread mass commercialization</p>

Degree of Commercialization

Highly commercialized, with many major companies such as NVIDIA and Mellanox (Mellanox Technology) already involved

Initial commercialization has been achieved

INDUSTRY OVERVIEW

Comparison Dimension

Scale-up Electrical Interconnect

Scale-up Optical Interconnect

Market Size

In 2024, the scale-up electrical interconnect market reached 16.69 billion yuan, projected to grow to 56.57 billion yuan by 2030, accounting for approximately 11.6% of the global AI interconnect product market.

In 2024, the scale-up optical interconnect market reached 110 million yuan, projected to grow to 17.65 billion yuan by 2030, accounting for approximately 3.6% of the global AI interconnect product market.

Downstream Application Scenarios

Inference computing and training across all scenarios

Initial applications have been implemented in the supernode computing system

Source: Frost & Sullivan

Source: Frost & Sullivan

Analysis of Optical Computing Product Market

Optical Computing Product and Market Analysis

Definition and Classification of Optical Computing Product

- An optical computing product is a new type of integrated circuit that leverages optical signals for information transmission and computation. Relying on the high-speed and low-power characteristics of optical devices, it breaks through the bottlenecks in computing power and energy efficiency faced by traditional electrical chips, holding core application value in fields such as AI and high-performance computing.
- From a technical architecture perspective, optical computing products can be categorized into pure optical computing chips and optoelectronic computing chips. From an application scenario standpoint, they include AI acceleration chips and chips tailored for scientific computing, addressing the intensive computing demands in these domains.

Optical Computing Product and Market Analysis

Performance Analysis of Optical Computing Product

Performance Analysis of Optical Computing Product

1

Computational Power and Energy Efficiency

- Optical computing business rely on the naturally parallel nature of photons, breaking through the physical limitations of traditional electrical chips in terms of computing power density. Photons can carry information through multiple dimensions such as wavelength and phase, enabling large-scale parallel computation that is particularly suited to intensive workloads. Unlike electron transport, which relies on charge flow, photons propagate through waveguides with minimal energy loss and negligible Joule heating, reducing system power consumption from the underlying mechanism. This "low-power parallel" feature makes optical computing far more energy-efficient than traditional architecture under high-load computational scenarios, positioning it as a key direction for breaking the efficiency bottleneck.

2

Compatibility and Scalability

- Optical computing business are designed to balance technological innovation with industrial adaptability. Optoelectronic hybrid architectures combine the high-speed computing capability of photons with the flexible control of electronics, ensuring compatibility with existing ecosystems while exploiting photonic advantages. On the process side, the maturity of silicon photonic integration provides the foundation for large-scale expansion, where computational power can be scaled linearly by integrating more photonic components. This approach ensures smooth integration with current hardware and software systems while leaving room for future scaling needs, facilitating the transition from lab prototypes to practical applications.

Source: Frost & Sullivan

Optical Computing Product and Market Analysis

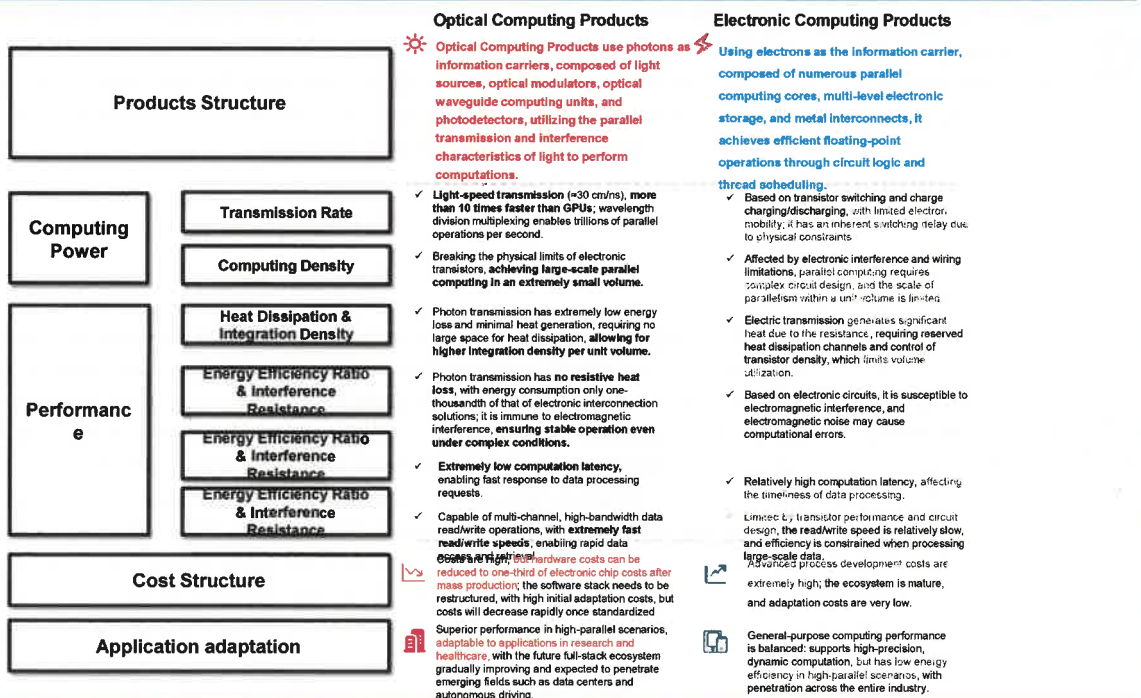
Comparative Advantage Analysis of Optical Computing Product over Electrical Computing Products (1/2)

- Optical computing business hold significant advantages in both performance and efficiency compared with electrical computing products. In terms of computational power, photons serve as carriers of information, leveraging light-speed transmission and wavelength multiplexing to achieve trillions of parallel operations per second, surpassing the physical limits of electronic transistors. They can achieve extremely high computational density within a compact footprint. On the performance side, optical computing enables ultra-low latency through the inherent speed and parallelism of photons. It also supports multi-channel, high-bandwidth data read/write operations at very high speeds. Furthermore, photon transmission avoids resistive heating and generates minimal thermal load, eliminating the need for excessive cooling space. This allows for higher integration density and ensures resilience to electromagnetic interference, delivering stable computation under complex conditions. By contrast, electrical computing suffers from heat dissipation issues and electromagnetic interference. Overall, optical computing product provide stronger competitiveness in energy efficiency and reliability.

Optical Computing Product and Market Analysis

Comparative Advantage Analysis of Optical Computing Product over Electrical Computing Products (2/2)

Comparative Advantage Analysis of Optical Computing Product over Electrical Computing Products

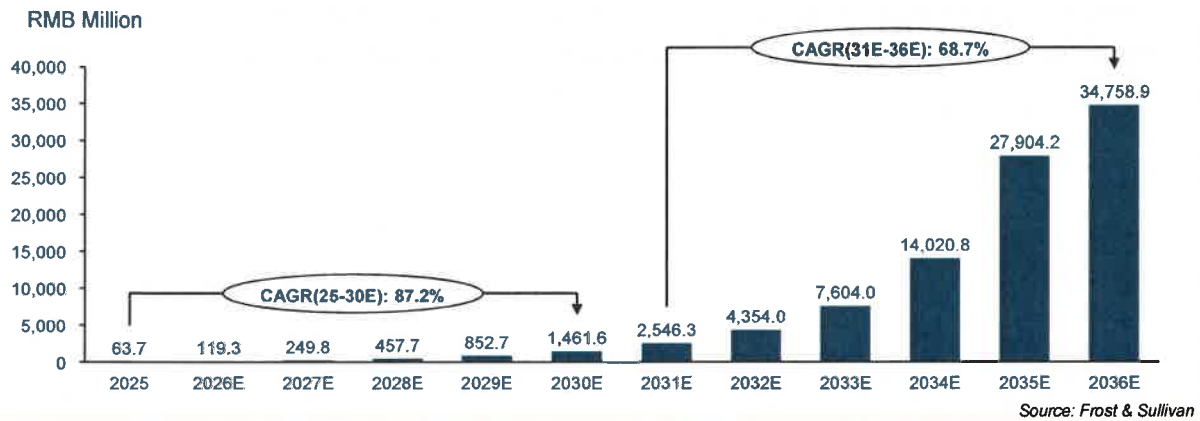


Optical Computing Product and Market Analysis

Market Size of Optical Computing

- In terms of market size, China's optical computing products are still in the early stage of industrial development. From 2025–2030, as the optical computing ecosystem gradually takes shape, the market is projected to grow steadily. Between 2031 and 2036, driven by the surging computational demands of rapidly iterating AI large models and the maturity of chip design and manufacturing, optical computing chips are expected to transition from validation to mature commercial adoption. They will gradually penetrate AI inference chip leasing markets at scale, and from around 2030, begin entering non-leasing applications.

Market Size of Optical Computing (By Revenue), China, 2025–2036E



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Optical Computing Product and Market Analysis

Future Growth Stages of the Optical Computing Market (1/2)

1 Stage 1: Technology Breakthrough and R&D Phase (Current Stage)

- At this stage, optical computing chips face challenges in materials science, process engineering, and system integration. Key R&D focuses include minimizing photon transmission losses and improving modulator response speeds. Progress has been made in validating architectural feasibility, laying the groundwork for future development. Features of this stage include high R&D costs and low market awareness. The market remains small and is concentrated in lab verification and prototype development, with only leading research groups and pioneering firms participating.

2 Stage 2: Ecosystem Formation and Market Penetration (2025–2029)

- Optical computing chips have entered the stage of ecosystem construction and market penetration with breakthroughs in core technical bottlenecks. Technically, higher chip integration, lower computing power cost and industrial-grade reliability have created conditions for large-scale applications. Market-wise, the global market keeps steady growth, with rising procurement demand in professional fields and expanded scenarios from labs to professional sectors. Driven by policy support, industry-university-research collaboration and enterprise layout, its initial ecosystem has formed, featured by unified technical standards, established mainstream technical routes and the leap from technical verification to commercial trials.

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Optical Computing Product and Market Analysis

Future Growth Stages of the Optical Computing Market (2/2)

3 Stage 3: Large-Scale Adoption and Ecosystem Maturity (Post-2030)

- At this stage, the optical computing ecosystem becomes established. Hardware costs fall further, performance indicators reach higher levels, and software ecosystems mature with standardized tools enabling mainstream AI frameworks to run on photonic hardware. Optical computing chips achieve widespread adoption across AI inference, scientific computing, and data centers. Applications expand to automotive computing, quantum computing, and beyond, reshaping the semiconductor industry. The mature ecosystem integrates chips, software, and services into a coordinated system, supported by regional alliances and industry programs. Optical chips become mainstream alternatives to electrical chips in training, supercomputing, and communication. In the evolution process from technology breakthrough to ecosystem maturity, the growth logic of optical computing chips has always revolved around the progressive relationship of “performance breakthroughs — cost reduction — ecological improvement”. Each stage of technological milestone corresponds to a leap in market size, ultimately translating this technology from the laboratory into ready-to-use products and solutions.

Optical Computing Product and Market Analysis

Drivers and Development Trends of Optical Computing Market

Drivers and Development Trends of Optical Computing Market

1

Ecosystem Synergy

- The divergence between traditional computing architectures and the physical properties of optical drives the need for deep hardware — software co-optimization. To solve compatibility challenges, the industry is building a full-stack ecosystem from device-level to application-level, with unified standards and interfaces. This enables seamless integration with electronic systems and boosts resource efficiency. Over time, open-source communities and standardized frameworks will further reduce barriers, transforming optical computing from isolated hardware modules into scalable system-level solutions.

2

Paradigm Shift in AI Training

- Traditional optical architectures excel in low-precision inference but fall short in high-precision training tasks required for large AI models. To address this, researchers are reconstructing the underlying logic of optical computing, mapping gradient calculations into physical optical propagation. This breakthrough enhances training efficiency and enables dynamic weight adjustment and network optimization. As optical training architectures mature, optical computing will extend beyond inference into full AI lifecycle tasks, including multimodal training and reinforcement learning.

Optical Computing Product and Market Analysis Global Competitive Landscape of Optical Computing

- The global optical computing market is still in its exploratory and early commercialization stage. Only two companies have achieved commercial deployments; most players remain focused on R&D, with shipments concentrated in research use cases (e.g., labs and supercomputing centers). Market concentration is high, with the two leaders dominating, while other players remain in trial phases. As AI demand surges and optical performance improves, companies with comprehensive integration capabilities will lead the transition from testing to commercialization, reshaping the AI computing chip landscape.

Optical Computing Product and Market Analysis Comparative Analysis of Global Optical Computing Leaders

- The global optical computing industry is still in an emerging stage, and most players in the overall competitive landscape are still in the early stage of scientific research and exploration. Large scale commercialization has not yet become a common phenomenon in the industry.
- From the perspectives of technology, products, commercialization level, and customer coverage, in terms of technology, we have been recognized by top global journals for our pioneering optoelectronic computing architecture. Our products have demonstrated remarkable advantages over commercial GPUs in key technical indicators such as integration density and computing performance — where its systems show improvements of more than two orders of magnitude in latency and computing time for specific workloads compared to high-performance GPUs like the A10; In terms of products, we have achieved a fast pace of product iteration and synchronous promotion of optical interconnect products and optical computing products, which has obvious advantages in commercialization and diversified customer coverage. In 2024, the Company's cumulative shipment of optical computing chips ranked first in the world.
- Overseas representative enterprise Company B also has certain advantages in technological architecture innovation and product iteration, but commercialization is still mainly focused on the research and development stage, with cooperation focusing on strategic research and development. Domestic representative enterprises Company C focuses on characteristic technology routes, but the progress of product release and commercialization is relatively lagging behind, and only a few strategic partnerships have been reached.

Comparisons of Global Optical Computing Leaders

	The Company	Company B ⁽¹⁾	Company C ⁽²⁾
Founded Time	Founded in 2017	Founded in 2017	Founded in 2022
Announced Products⁽³⁾	Yes	No	No
Commercialization Degree	Revenue generated	Revenue generated	R&D phase
Customer Coverage	Has collaborated with research institutions, internet companies, GPU and server manufacturers, system integrators and AI infrastructure builders and operators.	Has established strategic R&D cooperation with some cloud service providers.	Has signed strategic cooperation agreements with some domestic enterprises.

Notes:

(1) Company B, established in 2017, headquartered in Mountain View, USA, is a company that develops specialized chips and chip communication technology, called interconnects, using photonics.

(2) Company C, established in 2022, headquartered in Shanghai, China, is a manufacturer specializing in the research, development, and production of optical communication components and optical computing chips.

(3) "Announced Products" refer to products formally released to the public via channels like official websites, press conferences, or industry publications, etc.

Source: Frost & Sullivan

Optical Computing Product and Market Analysis Comparison of Computing Chips

Comparison of Computing Chips

Comparison Dimensions		GPU	Optical Computing Chips
Key Performance Indicators	Calculation Speed / Computing Power	Friendly to highly parallel problems	Friendly to serial problems
	Converge rate	Average	Low latency, very fast
	Latency	Microsecond level	Nanosecond level
	Power Consumption	Power consumption rises with computing power; thermal bottlenecks exist	Photons have naturally low power consumption; high energy efficiency ratio
	Calculation Precision	Stable precision, mature technology	Weaker precision, strong anti-interference
Technology Maturity		Multiple product series have been continuously iterated: Function Level: Products upgraded through multiple rounds, expanding from traditional image rendering to AI computing. Performance Level: Iterated from early models with weak power/slow speed to current products with extreme computing power. Architecture Level: Evolved from early simple designs relying on basic stream processors to advanced architectures integrating CUDA cores, Tensor cores, and Ray Tracing cores.	Only a few products released; still in R&D stage; no product iteration yet
Degree of Commercialization	Commercial Product Availability	Large-scale commercialization achieved	Initial commercialization; a small number of products deployed
	Major Manufacturers' Layout	Currently many high-market-cap, high-revenue companies, e.g., NVIDIA, AMD, Intel, etc.	No high-market-cap public companies yet; mainly some enterprises (including the Company) engaging in initial commercial deployment (Lightmatter, Lightstandard, etc.)
Market Size		In 2024, global GPU market size is RMB 921.65 billion; estimated to reach RMB 3,167.95 billion by 2029, accounting for ~85.4% of AI chips	In 2024, global optical computing product market size is RMB 0.05 billion; estimated to reach RMB 0.88 billion by 2029, and RMB 29.12 billion by 2035
Downstream Application Scenarios		Cloud side: Except for a few ASICs, almost all use GPU solutions. Emerging Edge AI: Commercial penetration gradually realized; currently, computing cores like robots are generally dominated by GPUs.	Initial penetration and shipments in operator and academic research fields, but not yet penetrated cloud, data centers, training/inference, or edge AI fields

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Optical Computing Product and Market Analysis Wafer Price Analysis

- Wafer pricing dynamics, both globally and in China, are inherently aligned with the broader semiconductor industry cycle — driven primarily by supply-demand balances, capacity utilization levels, and technological advancements. Unlike standalone market cycles, wafer prices fluctuate in tandem with shifts in downstream demand and the pace of industry capacity expansion.
- The 2020–2022 period witnessed a sustained uptrend in wafer foundry pricing, fueled by robust global semiconductor demand and constrained production capacity. This momentum reversed in 2023, as sluggish demand for consumer electronics and smart phones led to underutilized wafer capacity, exerting downward pressure on prices across select segments.
- Since 2024, however, pricing has stabilized amid a gradual recovery in the consumer electronics sector, paired with sustained demand growth from AI training, automotive-grade chips, and computing applications. A divergence has emerged between process nodes: advanced nodes have seen modest price gains due to their deepening penetration in high-performance computing and automotive electronics, while mature nodes face downward pricing pressure — attributed to rapid capacity expansion by domestic manufacturers that has intensified market competition.
- Looking ahead, wafer prices are poised to maintain overall stability over the medium to long term. Fundamentally, they will continue to mirror the semiconductor industry's cyclical nature, shaped by the interplay of fluctuating downstream demand and the trajectory of capacity development across the sector.

Source: Frost & Sullivan

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- The Company is a global leader and technology pioneer in optoelectronic accelerated computing, an innovative paradigm that combines the advantages of photonics and electronics.
- The Company is the first companies globally to achieve mass deployment of optoelectronic accelerated computing.
- The Company is the first company achieved mass production of an optoelectronic hybrid computing platform globally.
- The Company is the largest supplier of scale-up optical interconnect solutions in China.
- The Company is the largest company which distributed optical switching GPU supernode solution oNOC based optoelectronic hybrid computing card 3D TSV packaged optoelectronic hybrid computing card globally.
- The Company led or participated in the formulation of six industry standards.
- The era of artificial intelligence (AI) requires continuous breakthroughs in the performance and scale of computing power.
- Global computing infrastructure remains dominated by electrical computing and electrical interconnects.
- Constrained by Moore's Law and other physical limits, the bottlenecks in cost, scalability, performance, power consumption of traditional electrical systems are increasingly pronounced, exacerbating the shortage of computing power.
- Optoelectronic accelerated computing directly addresses this challenge by leveraging more efficient single-chip computing and optical interconnects to significantly reduce customers' computing costs.
- It has become a crucial direction for the evolution of computing infrastructure and is poised to drive a major leap in computing performance.
- Against this backdrop, optical interconnect solutions have seen early adoption in computing infrastructure, linking widely deployed electrical computing chips to create a faster and more energy-efficient interconnect paradigm.
- Meanwhile, to meet rapidly growing demand for computing power, optical computing chips are set for rapid adoption.
- Standing at the outset of a new era for global computing power industry, the Company's full-stack platform provides world-leading optical interconnect and optical computing solutions. These solutions work efficiently with traditional electrical chips to jointly power the next generation of computing infrastructure for the AI age.
- Leveraging these capabilities, the Company launched LightSphere X, the world's first distributed optical switching GPU supernode solution.

Verification Statements

- The Company's highly adaptable and scalable optical computing solutions have yielded landmark products, including Hummingbird, the world's first oNOC-based optoelectronic accelerated computing card, and PACE 2, the world's first 3D TSV-packaged optoelectronic accelerated computing card.
- The rapid development and adoption of generative AI are reshaping demand for computing power.
- Existing computing infrastructure, however, faces mounting performance bottlenecks driven by massive data growth, rising transmission rate requirements and expanding application scenarios, particularly with the rise of large language models.
- A new transition in computing power is underway.
- Electrical computing, long aligned with Moore's Law, now faces significant physical limits that constrain single-chip performance growth.
- As single-chip manufacturing processes have rapidly advanced, transistor scaling is approaching its physical boundary, and Moore's Law is showing signs of slowing down, which limits the growth of single-chip computing capabilities.
- Bandwidth and power constraints further restrict the computational efficiency of a single chip, with challenges like the "Memory Wall" (the widening gap between processor speed and memory bandwidth) and "Power Wall" (thermal and energy limits on processor) becoming increasingly prominent.
- Copper Interconnects and Conventional Optical Modules Cannot Fully Overcome Industry Pain Points: To mitigate these constraints, the industry has turned to interconnecting multiple electrical computing chips using copper wires. However, the physical properties of the copper-based interconnects impose inherent limits on reach and bandwidth, resulting in "short-distance, low-bandwidth" transmission. As a result, MFU do not improve materially, driving higher computing costs. Conventional optical modules, another widely adopted alternative, primarily extend transmission distances between transmitters and receivers. While they address the reach issue, they struggle to overcome bandwidth bottlenecks, leading to "long-distance, low-bandwidth" transmission. In cluster computing and supernode environments, where communication latency between chips is critical, optical modules fail to effectively reduce latency or increase chip utilization. Moreover, the relatively high cost of optical modules makes them an even less ideal solution. As a result, conventional optical modules alone cannot fully resolve the industry's challenges or meet the demands of next-generation computing systems. Leading companies, such as Broadcom and NVIDIA, are already moving beyond conventional optical modules and exploring advanced optical interconnect technologies, including co-packaged optics, to break through these limitations and enhance computing power.

Verification Statements

- As of 2024, market penetration of optical computing chips in AI inference chips reached 0.3% in China, and is projected to reach 20% by 2040.
- The Chinese market has emerged rapidly, setting a benchmark for the development of global computing power.
- The Company holds one of the largest patent portfolios among startups in the global optoelectronic accelerated computing field.
- Compared with traditional electronic computing, optical computing offers inherently low latency and high throughput, enabling substantial gains in single-chip performance.
- Based on the Company's 2024 revenue, the Company ranked first in China's scale-up optical interconnect market and their cumulative shipment of optical computing chips also ranked first in the world.
- For example, the Company's PACE optical computing processor, released in 2021, integrated approximately 16,000 photonic devices, while the core processor of the Company's PACE 2 optoelectronic accelerated computing card integrated over 40,000 photonic devices, approximately 1,000 times more than a typical optical module chip.
- Unlike most industry players that specialize in only one domain, the Company possesses the ability to design and co-package both PICs and EICs.
- As of the Latest Practicable Date, the Company was among the few providers globally and the first provider in China with an optical interconnect supernode solution for accumulated more than 5,000-card cluster.
- The Company holds one of the largest patent portfolios among startups in the global optoelectronic accelerated computing field.

Verification Statements

- The rapid growth of artificial intelligence, particularly large language models and generative AI, has created unprecedented demand for computing infrastructure. Traditional server designs can no longer efficiently handle these workloads, as the bottleneck has shifted from individual processors to the interconnects that link them together. To address this challenge, the industry relies on two complementary approaches:
- Scale-up (a/k/a vertical scaling): Scale-up increases the computing power of a single node by tightly coupling multiple CPUs or GPUs so that they function as one larger processor. The core requirement of scale-up is a memory-coherent interconnect, which ensures that all processors share a consistent view of memory. Maintaining this coherence requires frequent CPU/GPU communication, and therefore the interconnect must provide very high bandwidth, low latency, and support for specialized hardware protocols. Scale-up architectures are critical for training large language models, where thousands of GPUs must exchange parameters rapidly and operate as a tightly synchronized unit.
- Scale-out (a/k/a horizontal scaling): Scale-out expands computing capacity by linking many servers into large, distributed computing clusters. In this model, workloads are executed in parallel across thousands of nodes, forming the basis of modern distributed computing. Unlike scale-up, scale-out does not require strict memory coherence across the entire computing cluster, which reduces interconnect complexity but emphasizes scalability and coordination across clusters. Scale-out is widely used in AI inference and hyperscale cloud environments, where massive numbers of tasks must be processed efficiently in parallel.
- Existing electronic interconnects, though widely used, face inherent physical constraints: bandwidth degrades sharply over longer reaches, and power consumption rises significantly at higher speeds. These limitations create bottlenecks that restrict scalability, efficiency, and the cost-effectiveness of modern data centers.
- Optical interconnect technology provides the pathway to overcome these barriers by transmitting data as light, delivering higher bandwidth over longer distances with lower energy consumption per bit.
- Super-nodes are critical for training and inference for large language models, as they allow hundreds and thousands of processors to work together efficiently, with performance determined not only by compute capacity but also by the interconnect fabric that links them.

Verification Statements

- Unlike conventional pluggable optics, which depend on digital signal processors (DSP) to improve signal integrity, LPO employs a streamlined linear-drive architecture that shifts signal processing functions to the host system. Such architecture reduces latency, minimizes power consumption, and achieves cost efficiency within the widely adopted pluggable form factor.
- Supermodes built on centralized electrical switch application-specific integrated circuits (Switch ASICs) are costly, power-intensive, and constrained by power and scaling limits.
- Meanwhile, legacy OCS systems have seen limited adoption due to structural flaws: centralized architectures create broad failure domains, and per-port costs remain high.
- The advantages of Scale-up OCS include:
 - Cost-effectiveness and Efficiency: By eliminating expensive electrical switch chips and reducing the number of optical modules required per connection, the architecture targets lower interconnect costs compared with comparable systems. It also enables dynamic resource allocation, with theoretical improvement on effective per-GPU utilization, supporting higher throughput for AI training and inference workloads.
 - Resilience and Availability: The distributed design shrinks failure domains and enables millisecond-level failover. In the event of a GPU failure, the system can automatically substitute a hot-standby unit without manual intervention.
 - Protocol Agnostic: Scale-up OCS is not tied to proprietary interconnect protocols, giving customers flexibility. Moreover, its core silicon photonics components can be fabricated using mature and widely available semiconductor processes, lessening reliance on advanced process nodes.
- The Company is a pioneer in the field of optical computing, optical computing is a new type of computer built with photonics instead of electronics to address the fundamental limitations of traditional electronic computing as Moore's Law approaches its physical and economic barriers.
- The Company has developed OptiHummingbird, the world's first optical Network-on-Chip (oNOC) processor designed to address the critical data movement bottlenecks in modern computing infrastructure.
- Such customer concentration is not uncommon in the optical interconnect and optical computing industry.
- In the optical computing industry, critical materials, equipment and processes are often concentrated among a limited number of suppliers with leading technology and production capacity.

Verification Statements

- The Company's Specialist Technology Products fall within the acceptable sector under the Listing Rules, and that all revenues generated during the Track Record Period were generated by the Specialist Technology Products.
- The rapid rise of generative AI and large language models has created explosive demand for computing power. These AI models involve massive data processing, high transmission rates, and increasingly complex applications, pushing existing electronic computing infrastructure to its limits. Moore's Law is slowing as transistor scaling nears physical boundaries, and fundamental bottlenecks — including the "Memory Wall" (the widening gap between processor speed and memory bandwidth) and the "Power Wall" (thermal and energy limits on processor) — have become increasingly prominent. Efforts to interconnect multiple chips through copper wiring only partially mitigate these issues, as copper's physical limits constrain reach and bandwidth, resulting in "short-distance, low-bandwidth" transmission that fails to meaningfully improve chip utilization. Conventional optical modules, another commonly adopted alternative, extend transmission distances but cannot overcome bandwidth limits. They deliver "long-distance, low-bandwidth" outcomes that do not meet the requirements of cluster computing or supernode environments, leaving MFU largely unchanged.
- Optical interconnect enhances the efficiency of large-scale distributed computing, while optical computing improves single-chip performance beyond the limits of Moore's Law.
- As one of the first companies globally to achieve mass production of optical computing products, we are widely regarded by customers as both a pioneer and a standard-setter in this field.
- At present, China's scale-up optical interconnect market remains in its infancy. In 2024, market revenues and shipments were concentrated in internal testing and validation for supermode computing, without meaningful commercial deployment in servers. In this phase, the number of companies capable of delivering both solutions and products is extremely limited, resulting in a highly concentrated market. As super nodes gain wider adoption, GPU interconnect bandwidth continues to increase, and optical interconnect costs gradually decline, suppliers with system design and integration capabilities will be the first to benefit, securing differentiated competitive advantages and driving the broader market toward commercialization and expansion.
- In 2024, only three companies in China's scale-up optical interconnect industry achieved commercial shipments, creating a relatively concentrated competitive landscape in which the top three together accounted for 100 percent of market share. Among them, we were the only solution provider in the Chinese market and ranked first by revenue.

Verification Statements

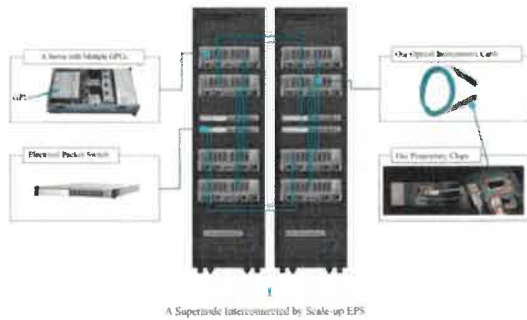
- The Company's Specialist Technology Products fall within the acceptable sector under the Listing Rules, and that all revenues generated during the Track Record Period were generated by the Specialist Technology Products.
- The global optical computing market is still in its exploratory and early commercialization stage. Only two companies, including us, have achieved commercial deployments; most players remain focused on R&D, with shipments concentrated in research use cases (e.g., labs and supercomputing centers). Market concentration is high, with the two leaders dominating, while other players remain in trial phases. As AI demand surges and optical performance improves, companies with full-stack integration capabilities will lead the transition from testing to commercialization, reshaping the AI computing chip landscape.
- Ms. Xu Lili (徐黎黎), is now the chief financial officer of ClouDr Group, China's largest SaaS-based digital chronic condition management solution provider.
- The Company has secured multiple design-wins with leading GPU and server manufacturers, positioning us among the few companies in the industry capable of bringing cutting-edge solutions into commercial deployment. Because the end-to-end customization process with chip manufacturers requires significant time and effort and is difficult to replicate, the Company's solutions create strong customer lock-in and long-term defensibility, establishing them as one of the fastest-moving companies in the field.

Verification Statements

- **Decoding-Focused Product Positioning:** the group are concentrating on the decoding phase of large language model inference, a segment undergoing rapid growth. Recent industry developments show major industry participants launching separate prefill- and decoding-optimised accelerators targeting availability around 2026, which validates decoding-optimised architectures as a clear market direction. The decoding phase is highly latency-sensitive and throughput-intensive, making it an ideal use case for PACE 3.
- With respect to the downstream applications of each commercialization products, for the Group's optical interconnect products: "scale-up" and "scale-out" are terminologies used within the data-centre (IDC) context and are principally applied to the computing domain. Accordingly, the downstream applications of the Group's Scale-up products are substantially similar. Unlike certain chip companies whose products may be deployed across multiple end-use sectors (e.g., automotive and consumer electronics), the Company's products are primarily used in AI infrastructure. Nevertheless, the range of end-users and use cases that rely on data-centre and AI infrastructure is broad, particularly in light of the rapid growth of AI infrastructure and the widespread adoption of large language model applications.
- The term "optical module" is a industry-standard term in the optical interconnect and data-centre infrastructure sector.
- Supernodes are designed to address the specific challenges presented by the training and inference of frontier AI models, including computational demands that scale with model size, memory requirements that exceed the capacity of any single device, and communication patterns that require near-perfect synchronization across thousands of devices. For supernodes whose performance is constrained by the interconnect, optical technology is becoming a fundamental requirement for scaling beyond the limits of electrical transmission, rather than merely an incremental improvement.

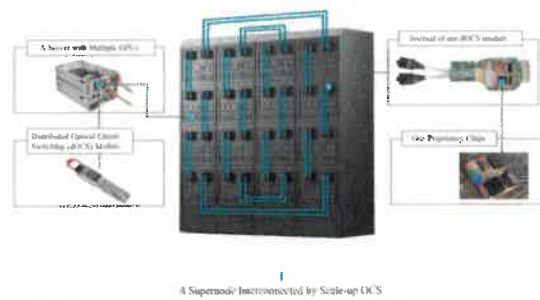
Verification Statements

Scale-up EPS: Optical Interconnect with Electrical Packet Switch



A Supernode Interconnected by Scale-up EPS

Scale-up OCS: Optical Interconnect with Optical Circuit Switch



A Supernode Interconnected by Scale-up OCS

- Scale-up EPS is deployed in AI infrastructure using optical fiber cable and modules to transmit data in optical form, replacing copper wires that transmit data in electrical form and connect computing units especially GPUs within or across racks.
- Scale-up OCS is deployed in AI infrastructure using optical fiber cable and modules with optical circuit switch function integrated, to replace copper wires and electrical packet switches that transmit data through electronic signal and convert electrical signals to optical signals for transmission and back to electrical signals. With the Scale-up OCS solution, data traffic remains in the optical domain from port to port through the optical circuit switch, reducing the number of optical-to-electrical and electrical-to-optical conversions therefore reducing latency and power consumption and enhancing connection density. A diagram of how Scale-up OCS is deployed in AI infrastructure is set forth above.
- Within AI infrastructure, the group's scale-out products connect switch units across multiple computing nodes or servers in a data center network to form a larger cluster, unlike scale-up products, which connect computing units within supernodes in a data center network. The scale-out interconnect market is relatively mature, and its mainstream products are optical transceivers used to connect switch units. Optical transceiver modules are standardized products with established technical specifications.

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- Optical computing remains at an early stage of commercialization, and its downstream applications are still evolving. Currently, the group's optical computing products are primarily used by early adopters, including educational and research institutions, in scientific research, technology validation and pilot projects. The core advantage of optical computing lies in performing matrix multiplication and other linear algebra operations, which are key calculations used in large language models, neural networks and scientific computing, in the optical domain at high speed.
- Similar to conventional GPUs, however, optical computing products generally require technical validation, software and system adaptation and customer testing before their large-scale commercial deployment. The application in AI infrastructure is also expected to be gradual, and the group's optical computing products are therefore expected to be rolled out in stages as part of an evolving hybrid computing architecture.
- Because the group's optical-computing chips generally feature more sophisticated architectures, higher integration density and greater manufacturing complexity, they can be used as process validation vehicles for customers, particularly fabrication partners, to improve silicon-photonics chip fabrication processes and validate manufacturing process flows. In providing such services, we work closely with customers to assess and optimize manufacturing process flows against the technical requirements of our chip designs, identify process bottlenecks and improve the maturity and production capability of silicon-photonics manufacturing lines. Due to their higher technical requirements and more advanced design characteristics, our optical-computing chips generally provide greater reference value for improving advanced silicon-photonics fabrication capabilities than conventional or less advanced products available in the market.
- There are various alternative products available in the market for EDA tools.

Verification Statements

Customers	Customers
A publicly listed precision intelligent manufacturing solution provider in China ⁽¹⁾	A private intelligent computing infrastructure company in China ⁽⁶⁾
A publicly listed, leading AI chip company in China ⁽²⁾	A private AI infrastructure company ⁽⁷⁾
A publicly listed, leading AI chip company in China ⁽³⁾	Customers
A publicly listed, leading AI chip company in China ⁽⁴⁾	A publicly listed globally leading communications and information technology company in China ⁽⁸⁾
A publicly listed data center and power device company in China ⁽⁵⁾	A publicly listed smart device ODM company in China ⁽⁹⁾

- **Note:** Each of the counterparties described above is an independent and highly reputable company. Set out below is summary background information for each:
- (1) Luxshare Precision (立讯精密工业股份有限公司 Industry Co., Ltd.) a company listed on the Shenzhen Stock Exchange, ranked among the top solution providers in the global modules PIMS and consumer electronics components market, generated more than RMB200 billion revenue in 2024 and has a public market capitalization of more than RMB300 billion;
- (2) MetaX Integrated Circuit (Shanghai) Co., Ltd. (沐曦集成电路(上海)股份有限公司) has a public market capitalization of more than RMB100 billion;
- (3) Technology Co., Ltd. (上海壁仞科技股份有限公司) (Shanghai Biren) has a public market capitalization of more than HKD40 billion;
- (4) 导体股份有限公司) (Shanghai Iluvar CoreX Co., Ltd. (上海天数智芯半) has a public market capitalization of more than HKD40 billion;

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- (5) (Kehua Data Co., Ltd. (科华数据股份有限公司)), a company listed on the Shenzhen Stock Exchange, ranked among the top global vendors in the micro-module data center market in 2024, generated more than RMB5 billion revenue in 2024 and has a public market capitalization of more than RMB20 billion;
- (6) (广州)科技集团有限公司 (Turing WFM Hub (图灵新智算)) is a full-stack intelligent computing services provider focusing on AI computing infrastructure with announced strategic cooperation with major telecom operators in China; and
- (7) (Shanghai Technology Co., Ltd. (Infinigence 上海无问芯穹智能科技有限公司) AI Intelligent) was certified among Shanghai's top algorithm enterprises in 2025. The second table reflects the framework agreements and letters of intent we entered into based on purchase volume,
- (8) (ZTE Corporation (中兴通讯股份有限公司)), a company dual-listed on the Shenzhen Stock Exchange and the Hong Kong Stock Exchange, ranked among the top global suppliers in both the global radio access network market and the global optical transport equipment market in 2024, generated more than RMB100 billion revenue in 2024 and has a public market capitalization of more than RMB100 billion; and
- (9) (Huaqin Ltd. (华勤技术股份有限公司) Technology Co.,), a company listed on the Shanghai Stock Exchange, is a leading smartphone ODM company globally, generated more than RMB100 billion revenue in 2024 and has a public market capitalization of more than RMB80 billion. All market capitalizations mentioned in this paragraph are as of January 30, 2026. Rankings are based on our market research.

Thank You

Partner with you on the Road to Growth



Your Strategic Growth Partner

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