

Article Overview

The cost of 800G optical modules is influenced by acquisition price, power consumption, infrastructure, maintenance, and vendor support, with variations depending on module type and deployment scale.

Acquisition Costs

The initial purchase price of 800G modules varies by type and vendor. Premium OSFP-DR8 modules typically cost more than third-party compatible QSFP-DD-DR8 modules, while short-distance LPO modules are cheaper, often \$500-\$800 less per module compared to standard modules . Factors affecting acquisition costs include the complexity of the optical design, modulation format (PAM4), channel count, and whether the module uses advanced technologies like silicon photonics .

Power Consumption

Power usage is a significant contributor to total cost, especially in large-scale deployments. 800G modules generally consume less power per bit than 400G modules, with 200G Lambda technology reducing power by 20-30% due to fewer lasers and simplified circuitry . For example, in a 10,000-module deployment at 18W each, power costs can differ by over \$1.6M over five years depending on local electricity rates .

Infrastructure and Operational Costs

Deployment requires compatible switches, cabling, and monitoring systems. Third-party modules may incur additional engineering costs for qualification and interoperability testing, typically 40-80 hours per vendor (\$3,000-\$6,000) and \$10,000-\$25,000 for multi-vendor qualification . Maintenance, monitoring, and management also contribute to operational expenses, including downtime costs, which can be substantial in AI training clusters.

Technology and Integration

800G modules leverage advanced technologies such as PAM4 modulation, multi-channel parallelism, and silicon photonics integration, which affect both performance and cost . Modules with higher single-channel rates (200G) require more sophisticated optical devices and gearbox conversion, increasing complexity and cost compared to 100G single-channel modules . Co-packaged optics and breakout technologies (e.g., DR8 to octal 100G) can reduce system-level costs by improving density and reducing fiber usage .

Total Cost of Ownership (TCO)

TCO includes acquisition, power, maintenance, and replacement cycles. For example, LPO modules may save



800g optical module purchase price

\$745 per module over five years due to lower upfront cost and power savings, despite shorter reach . Bulk purchasing and multi-year agreements can further reduce costs, while premium modules may offer lower failure rates and faster replacement, reducing downtime risk .

Summary

The cost of 800G optical modules is multi-faceted:

- o Acquisition: \$800-\$1,300 per module depending on type and vendor .
- o Power: Significant over large deployments; 200G Lambda and silicon photonics reduce consumption .
- o Infrastructure: Switch compatibility, cabling, and monitoring add to cost.
- o Maintenance & Support: Vendor support, qualification, and downtime risk.
- o TCO Optimization: Bulk purchasing, multi-vendor strategies, and energy-efficient modules can reduce overall costs . Understanding these factors helps data center operators optimize deployment strategies while balancing performance, reliability, and cost efficiency.

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