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AI expert call 74: OCS, CPO, and optical transceivers update

Quick Note

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We hosted AI Expert Call #74 on 29 September, featuring an expert from a leading optical communication company. The expert mainly discussed the OCS (optical circuit switch) market outlook and comparisons between different OCS technologies, the BOM cost breakdown of OCS, the market demand and price trend of optical transceivers, and the market trend for CPO (co-packaged optics) and NPO (near-field packaged optics). Key takeaways from the call are below:

OCS switch market outlook

- Google (GOOGL US, Not rated) currently uses OCS primarily for scale-out at the spine layer and for scale-up interconnection between racks (3D Torus architecture). Other CSPs also use OCS to in the rack-to-rack connection. OCS can also be extended to the scale-across network. For large AI clusters, OCS represents a future trend, owing to its superior performance in terms of TCO (total cost of ownership), latency, and failure rate, according to the expert.
- NVIDIA (NVDA US, Not rated) may use MEMS (Micro-Electro-Mechanical Systems) or liquid crystal-based OCS for scale-up interconnection, together with CPO/NPO solutions in the future, according to the expert.
- In 2025, Google's OCS demand was about 12-15k units. For 2026E, Google's demand for OCS is about 18-20k units, and other CSPs are still at the sample stage. In 2027F, Google's OCS demand is ~35-40k units, while other major CSPs may each have demand of 1-2k units, respectively, so total demand is ~40-50k units in 2027E, according to the expert.
- MEMS-based OCS may account for 80-85% of the market share in 2026F, and may decline to 60-70% in 2027E, followed by liquid crystal and piezoelectric beam steering solutions, according to the expert. In the long term, the expert believes, MEMS solutions should account for 40-50%, liquid crystal 20-30%, and piezoelectric beam steering and silicon photonics-based OCS the rest.

OCS technology paths trend

- Google and Lumentum (LITE US, Not rated) are developing MEMS-based OCS, while Accelink (002281 CH, Buy), Eoptolink (300502 CH, Not rated), Innolight (300308 CH, Buy), O-Net (unlisted), and Huawei (unlisted) are mostly working on this technology, according to the expert.
- The advantages of MEMS solutions include short switching times, fast assembly, which may lead to mass production. However, due to the mechanical movement of the MEMS array and the use of 220V high-voltages, the lifespan is likely lower than other solution, according to the expert.
- Google designs its own MEMS chips and uses Silex (SILEX ST, Not rated) for foundry services. Other domestic manufacturers mainly buy commercial MEMS chips from a Canadian company Preciseley (unlisted). Other components, such as fiber arrays and lens arrays, can be made by domestic companies, such as Advanced Fiber Resources (300620 CH, Not rated), Focuslight Technologies (688167 CH, Not rated), and Optowide Technology (688195 CH, Not rated).
- Liquid crystal solutions operate at low voltage and have longer lifespans vs MEMS OCS, but reliability is a current issue that needs to be addressed. The core component

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See Appendix A-1 for analyst certification, important disclosures and the status of non-US analysts.

is the liquid crystal panel, and Coherent (COHR US, Not rated) is the leading player that can produce it.

- The piezoelectric solution is mainly developed by Huber+Suhner (HUBN SW) and is expected to do small-batch shipment (for validation) in 4Q26, according to the expert.
- Silicon Photonics solutions have relatively high insertion losses and require more time to achieve commercial use, according to the expert.

OCS BOM cost breakdown

- Taking the MEMS OCS (384-port) model as an example, input and output require two collimator arrays in total. One collimator array includes a fiber array and a lens array. A fiber array costs USD2,500-3,000, and a lens array costs USD1,700-1,800. An OCS needs two MEMS chips, each costing about USD17,000-18,000. Mirror costs USD200, the calibration system costs USD5,000, and assembly costs about USD15,000. The total price of an MEMS OCS is about USD100-120k, according to the expert.
- The liquid crystal-based (384-port) OCS is currently made up of two 192-port modules on each side (input and output). Two liquid crystal panels are used, each costing USD6,000-8,000. There are total four collimator arrays, each costing USD3,000. The OCS needs four deflection splitters with each costing USD2,500, and four crystal wedges, each costing USD800-1,000, totaling USD14,000 (splitter + crystal wedge), according to the expert.

800G/1.6T optical transceiver demand outlook

- Considering only the North American market, shipments of 800G transceiver in 2026 may reach 45mn to 50mn units, with DR-based transceivers accounting for about 70% and FR-based transceivers for 30%. DR contains 50% silicon photonics (SiPh) solution vs 50% EML solutions, and FR is basically all EML solution, according to the expert.
- The expert estimated that 1.6T transceiver demand to be over 30mn units in 2026, but actual shipments may be 10-15mn units due to material shortages.
- Due to 3nm DSP (FR version) shortage, DR may account for 70% of 1.6T transceiver in 2026, according to the expert. 1.6T DR contains 70% SiPh and 30% EML.

Price of 800G/1.6T optical transceiver

- For 2027, 800G DR EML transceiver price is about USD350 per unit, SiPh-based price is about USD300, and FR price is about USD400, according to the expert.
- 1.6T EML DR is priced at USD900-950, FR USD1000+, and SiPh-based USD800-850 for 2027, with annual decline of less than 10%, according to the expert.

400G/lane speed upgrade trend

- The 400G InP laser chip has been released already, but Serdes is still stuck at 200G, which becomes a key bottleneck. The silicon modulators were capped at 200G, so the upgrade of modulator must use TFLN (Thin Film Lithium Niobate) solution, according to the expert.

NPO/CPO application trends

- NPO products may have a small volume shipment in 2027F with mass production in 2028F, according to the expert. CPO shipment is expected to be 80-100k units in 2027F, mainly in scale-out network, according to the expert.

VCSEL chip application trends

- VCSELs use GaAs materials and emit light from a vertical plane, suitable for transmission distances of 30-40m and VCSEL is not sensitive to temperature, making them a good solution for scale-up network. However, the challenge with VCSELs is that they need wavelengths of 850nm or 1060nm (as the current laser is mainly on 1310nm) and therefore require custom optical fibers.

