

NVIDIA and Cisco Introduce New Pluggable Optics Form Factor to Scale AI Factories

New Transceivers Enable AI Builders to Scale Compute Within the Same Network Footprint While Reducing Networking's Share of the Power Budget

News Summary:

- Ultra-Dense Small Form Factor Pluggable (USFP) is designed to be the first module to support 400Gb/s-per-lane electrical signals, enabling capacity up to 12.8Tb/s so AI factory builders can scale Ethernet AI fabrics, while extending a proven deployment model across multiple generations of data center networks.
- USFP delivers 4x the bandwidth density and 1.3x the power efficiency of 200Gb/s-per-lane optics so AI factories can connect more computing systems without adding network tiers, while using less power to move each bit of data.
- NVIDIA and Cisco are working with TE Connectivity and Amphenol to build a multi-source hardware ecosystem around USFP.

NVIDIA and Cisco today announced plans for Ultra-Dense Small Form Factor Pluggable (USFP), a new high-density 400Gb/s-per-lane optical module designed to equip the hardware ecosystem for the next generation of AI factories using pluggable transceivers.

As AI models grow and inference demand expands, AI factories must connect more computing systems while managing network complexity, power and costs. Moving more data per watt and per switch helps operators make better use of their infrastructure investments.

Scaling AI factories requires more bandwidth per connection and more connections per switch. When a switch reaches its capacity, further network expansion can require additional switch layers and optical links, increasing latency, power consumption and costs.

USFP is designed to enable AI factory builders to scale from 200 Gb/s per lane to 400Gb/s-per-lane Ethernet AI fabrics, while extending a deployment model proven at scale across multiple generations of data center networks. With USFP, customers can embrace next-generation optical technology and meet the performance demand of AI workloads without overhauling their data center infrastructure.

The first planned USFP-based transceivers will pack 16 full-duplex lanes in an octal small form factor (OSFP)-sized footprint supporting both switches and SuperNICs, with the ability to expand to 32 and more lanes in the future. By doubling both the lane count and bandwidth per lane, USFP enables AI fabrics to connect more 1.6Tb/s endpoints without adding network tiers. Customers will be able to achieve 12.8Tb/s of overall capacity with USFP.

Comparable with an OSFP-sized module, it delivers 4x the bandwidth and front-panel bandwidth density, with approximately 1.3x the power efficiency, versus 200Gb/s-per-lane pluggable modules. This means AI builders can increase their compute scale within the same network footprint, while decreasing networking's share of the overall AI factory power budget.

"Building the world's largest AI factories starts with rethinking the smallest of connections," said Gilad Shainer, senior vice president NVIDIA. "With USFP, NVIDIA and Cisco are building an ecosystem to reinvent pluggable optics -- connecting more computing with greater efficiency to power the next generation of AI factories."

"AI builders need an interconnect architecture that can scale performance without locking them into a more complex operating model," said Bill Gartner, senior vice president and general manager of optical systems and optics at Cisco. "Cisco and NVIDIA recognized that scaling pluggable optics to 400Gb/s per lane would require more than another incremental extension of today's module designs. Through our collaboration, USFP is designed to deliver a new level of bandwidth density while preserving the serviceability, deployment flexibility and operational simplicity of pluggable optics. By taking a full-stack approach -- from silicon and systems to optics and the network operating system -- we can optimize every layer to deliver the performance and scale the next generation of AI networks will require."

More AI Infrastructure From Every Switch

Designed for electrical signals of 400Gb/s per lane, USFP uses a new two-dimensional array connector with a two-step insertion design that engages high-speed contacts after the module is inserted, reducing contact wear, improving signal integrity and making insertion force more predictable. The connector technology allows for further scaling of lane count to 32 full duplex lanes and more in the future. Because the connector is designed for 400Gb/s performance, it also offers improved performance at 200Gb/s per lane.

USFP supports power dissipation of up to 100 watts without needing a separate, dedicated embedded cooling circuit within the transceiver, reducing switch design complexity and improving reliability. Together, these capabilities enable higher-bandwidth fabrics while preserving the mature deployment, serviceability and manufacturability of existing pluggable transceivers.

All USFP configurations support optical designs that reduce latency and power consumption by simplifying signal processing. Support for a broad range of optical technologies and connection distances gives system designers the flexibility to meet unique AI factory deployment needs.

A Hardware Ecosystem for Next-Generation AI Factories

NVIDIA and Cisco are collaborating with TE Connectivity and Amphenol to build USFP cages, connectors and modules, with additional partners expected to join. The shared form factor gives suppliers a common foundation for developing high-density pluggable infrastructure for 400Gb/s-per-lane fabrics to build a robust ecosystem for AI factory builders.

The collaboration builds on [NVIDIA and Cisco's existing work](#) to ensure NVIDIA Spectrum-X™ Ethernet networking and Cisco Silicon One-based Ethernet networks work together seamlessly, simplifying AI infrastructure deployment for enterprises, neoclouds and sovereign clouds.

NVIDIA and Cisco plan to create an open industry specification for USFP through an upcoming community-led multi-source project.

About Cisco

Cisco (NASDAQ: CSCO) is the worldwide technology leader that is revolutionizing the way organizations connect and protect in the AI era. For more than 40 years, Cisco has securely connected the world. With its industry leading AI-powered solutions and services, Cisco enables its customers, partners and communities to unlock innovation, enhance productivity and strengthen digital resilience. With purpose at its core, Cisco remains committed to creating a more connected and inclusive future for all. Discover more on [The Newsroom](#) and follow us on [X](#) at @Cisco.

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About NVIDIA

[NVIDIA](#) (NASDAQ: NVDA) is the world leader in AI and accelerated computing.

Cisco Forward-Looking Statements

This press release may be deemed to contain forward-looking statements, which are subject to the safe harbor provisions of the Private Securities Litigation Reform Act of 1995. These forward-looking statements include, among other things, statements regarding establishment of a USFP MSA and expected benefits thereof.

Readers are cautioned that these forward-looking statements are only predictions and may differ materially from actual future events or results due to a variety of factors, including: business and economic conditions and growth trends in the networking industry, our customer markets and various geographic regions; global economic conditions and uncertainties in the geopolitical environment; overall information technology spending; the growth and evolution of the Internet and levels of capital spending on Internet-based systems; reliance on new product introductions and acceptable market acceptance of those new products; and other factors listed in Cisco's most recent reports on Form 10-K and Form 10-Q filed with the SEC. Any forward-looking statements in this release are based on limited information currently available to Cisco, which is subject to change, and Cisco will not necessarily update the information.

NVIDIA Forward-Looking Statements

Certain statements in this press release including, but not limited to, statements as to: the benefits, performance and capabilities of USFP and NVIDIA Spectrum-X Ethernet networking; NVIDIA's collaborations with Cisco, TE Connectivity and Amphenol; plans for a community-led multi-source project and additional partners; and the impact of AI on data center demand are forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended, which are subject to the "safe harbor" created by those sections based on management's beliefs and assumptions and on information currently available to management and are subject to risks and uncertainties that could cause results to be materially different than expectations. Important factors that could cause actual results to differ materially include: global economic and political conditions; NVIDIA's reliance on third parties to manufacture, assemble, package and test NVIDIA's products; the impact of technological development and competition; development of new products and technologies or enhancements to NVIDIA's existing product and technologies; market acceptance of NVIDIA's products or NVIDIA's partners' products; design, manufacturing or software defects; changes in consumer preferences or demands; changes in industry standards and interfaces; unexpected loss of performance of NVIDIA's products or technologies when integrated into systems; and changes in applicable laws and regulations, as well as other factors detailed from time to time in the most recent reports NVIDIA files with the Securities and Exchange Commission, or SEC, including, but not limited to, its annual report on Form 10-K and quarterly reports on Form

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