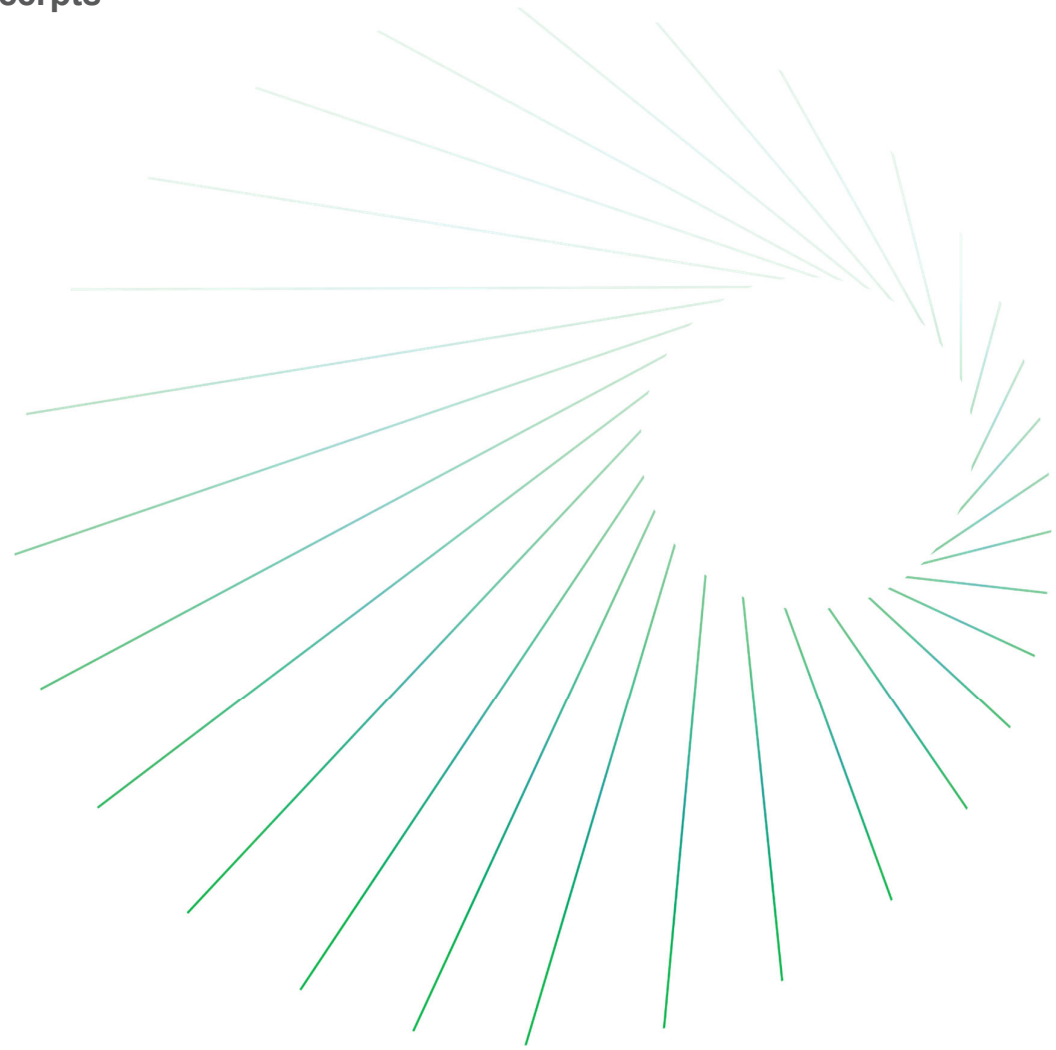
# Optical Network Hardware

**Vendor Scorecard Excerpts**

19 July 2019



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IHS Markit Technology | **Vendor Scorecard**

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# Exhibits

## Top takeaways

The only report of its kind, this *Scorecard* evaluates the top optical network equipment vendors on criteria using concrete data and metrics, including direct feedback from buyers, vendor market share, market share momentum, financials, brand recognition, reputation for innovation, and other benchmarks. This approach eliminates subjectivity and ensures vendors are assessed accurately and fairly.

There are well over a dozen of vendors around the globe that make and sell optical network equipment. The 10 vendors profiled in this *Scorecard*—ADVA, Ciena, Cisco, ECI, FiberHome, Fujitsu, Huawei, Infinera, Nokia, and ZTE—were selected because they are the top revenue producers for optical network equipment. The purpose of this *Scorecard* is to analyze the relative strengths among these vendors.

The "Leadership Landscape Graph" (Exhibit 1) shows at a glance where each vendor fits in among the top players in the overall optical network equipment market.

*This document is an excerpt; please contact IHS Markit for the full report.*

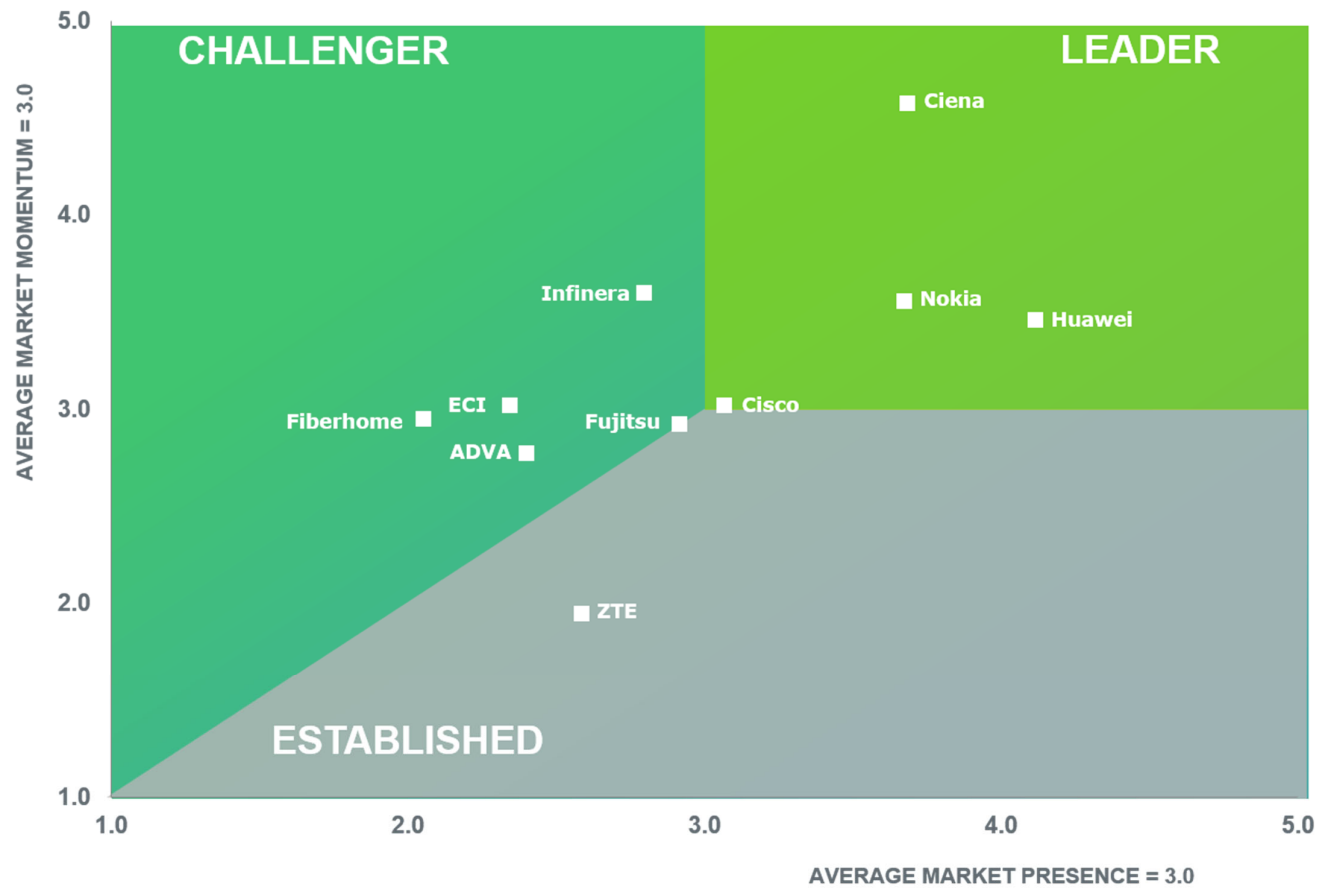
In this *Scorecard*, we classify vendors as leader, established, or challenger depending on their overall score; the 10 profiled vendors are grouped as follows:

- **Leaders:** Ciena, Cisco, Huawei, Nokia
- **Established:** ZTE
- **Challengers:** ADVA, ECI, FiberHome, Fujitsu, Infinera

**Bottom line:**

The optical equipment vendor landscape is diverse and continually evolving. There is a definite stratification between the top vendors and the small to mid-sized players. Regionalization of the industry will continue to provide opportunity, as will applications including DCI, mobile transport, (modern) private line services, cable distributed access architectures, and metro optical. In-house coherent DSP design continues to be a strategy for driving competitive advantage for the larger players. Vendors of all sizes are exploring vertical integration as yet another path forward to solution differentiation and competitive advantage. Further consolidation is possible for this market, but the natural diversity in regional requirements, technologies, and target applications will continue to provide opportunity for a range of optical equipment vendors.

**Exhibit 1 Service provider optical leadership landscape graph**




Source: IHS Markit

## Scoring system

This *Scorecard* addresses the need in the market for vendor evaluation based on objective data and metrics. Our methodology produces scores that tell a nuanced story of the vendor landscape, one that conveys each player's strengths and challenges. Based on actual data and metrics, the scores consist of two overall categories:

- **Market presence**, which we define as a vendor's position in the market, including size, brand recognition, reputation, and financials. For scores in this category, we consider each vendor's market share, financials, and buyer feedback, including buyer ratings of vendors' product reliability and service and support.

- **Market momentum,** which we define as a vendor's potential, including growth, reputation for innovation, and development of next generation technologies. For scores in this category, we consider each vendor's market share momentum, growth intensity, and buyer feedback, including buyer ratings of vendors' technology innovation.

Please see "Methodology" (last chapter) for a full explanation of the scoring system, and category definitions considered for this *Scorecard*.

## Portfolio and market segments covered

The optical portfolio and market segments analyzed for this *Scorecard* include:

- **Optical network systems**: hardware and associated software used to build WDM- and SONET/SDH-based optical transport networks

- **Packet-optical transport systems (P-OTS)**: subset of the optical equipment market; systems that are designed and used for hybrid circuit and packet-based optical transport

- **Optical data center interconnect (DCI) equipmen**t: subset of the optical equipment market used to connect data centers over WDM transport

## Detailed scorecard analysis

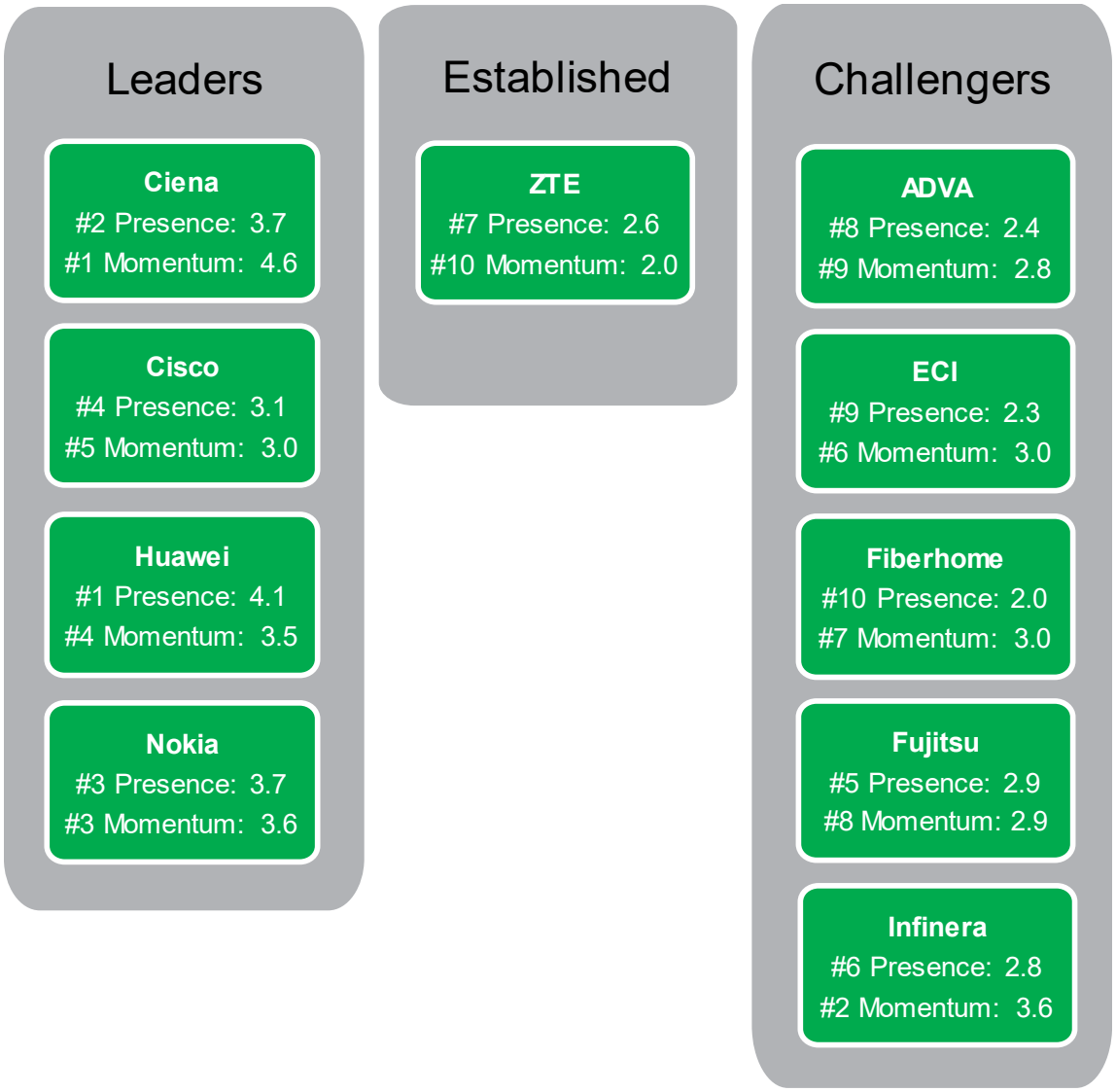
The next chart summarizes the 10 vendors' scores in market presence and market momentum and places them into one of 3 categories: leaders, established players, and challengers. The presence and momentum scores range between a minimum of 1.0 and maximum of 5.0; the average score is 3.0.

- **Leaders** perform strongly across all evaluation criteria and vectors. Leaders have established a significant presence in the market and have positive momentum, which means they are likely to cement and expand their leadership positions in the future.

- **Established** players perform strongly in the market presence vector. Though established players have lower market momentum than leaders, their significant presence indicates strong adoption of their solutions.

- **Challengers** perform strongly in the market momentum vector. Though challengers have lower market presence than leaders, their positive momentum indicates they are in a good position to grow their market presence in the future.

**Exhibit 2 Optical equipment leadership scores**




Source: IHS Markit



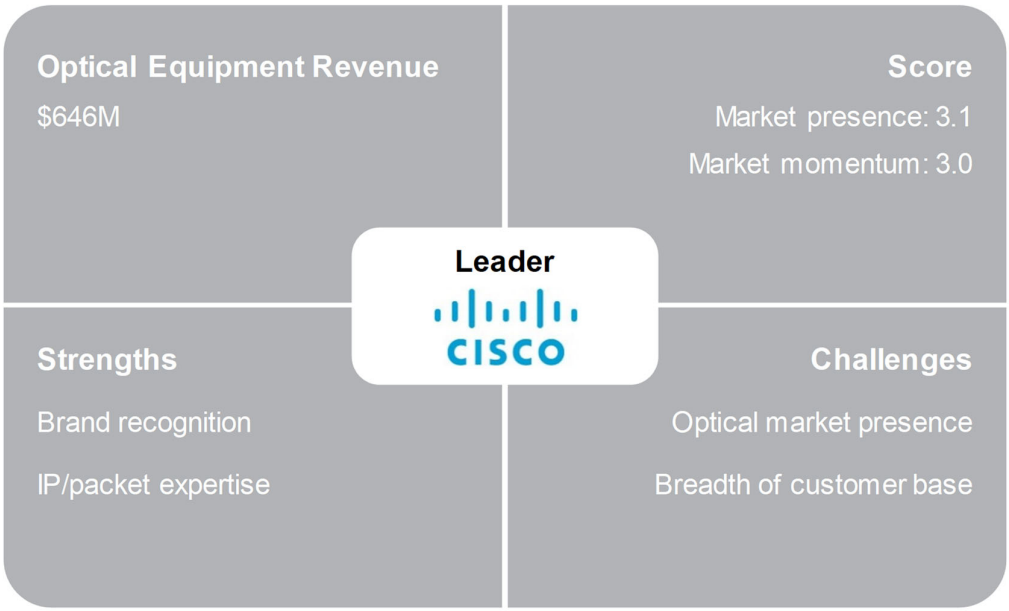
*This excerpt profiles Cisco only—contact IHS Markit to obtain the full report.*

# Vendor profile: Cisco

## Cisco

Cisco Systems is a global networking hardware, software, and solutions vendor based out of San Jose, California. While the majority of its business comes from the enterprise segment, Cisco is also a key player in service provider networks and is a market leader in the development and deployment of service provider routing and switching network infrastructure. Cisco's optical business is divided into two main segments: optical systems and optics. The optical systems business was built through acquisitions including Cerent, Pirelli's DWDM transport equipment division, and optical DSP designer CoreOptics. The optics division is focused on optical transceivers for use across service provider, enterprise, and data center networking systems. This business was also built through acquisitions including silicon photonics developers Lightwire (2012) and Luxtera (2019). In 2018, Cisco was the #7 optical equipment vendor worldwide by revenue with just over 4% market share.

**Exhibit 3 Cisco optical profile summary**




Note: The market presence and market momentum scores are described fully in "Methodology."

Source: IHS Markit

## Portfolio

Cisco's main focus is on the metro optical market with its Network Convergence Series (NCS) portfolio. The NCS is split into three main product lines: the NCS 4000 converged packet-optical switching platform with an agnostic (Ethernet or OTN) switching fabric, support for IP/MPLS, and a full suite of coherent DWDM interfaces; the NCS 2000, which is primarily a ROADM system with support for amplifiers, transponder, and muxponder blades; and the NCS 1000, which includes open and disaggregated transponder and line system shelves designed primarily for DCI applications and DC operational environments.

Over the past two years, Cisco has seen strong traction with its NCS 1K portfolio. The NCS 1002 transponder platform was announced in 2015 with support for up to 2T of line-side capacity in a 2RU platform. The next-generation version of this platform, the NCS 1004, was brought to market in 1Q19 with support for 4.8T of line-side capacity in a 2RU platform with up to eight 600G line-side ports and 48 100GbE client ports. Cisco terms the 1004 a "multi-haul" product as the same platform can be used for multiple applications including metro, long haul, and subsea transport. Cisco anticipates that the NCS 1004 will be deployed in service provider applications—not just as a DCI platform for the ICPs.

Verizon's selection of Cisco as one of two vendors for its 100G metro-packet optical project was a key win for Cisco's optical systems business. It also provides a marquee opportunity to showcase a key strength of Cisco's—its dominance and understanding of IP networking. One result of the project is the introduction of the 4200 family of platforms for TDM to packet transformation, bringing legacy TDM services into the new metro network using circuit emulation over MPLS. Though this is a different approach as compared to other optical vendors proposing TDM service migration via OTN, success at Verizon will lead to interest from other operators and a potentially new lucrative IP router revenue stream for Cisco.

Cisco has also had good success in the North American market serving smaller rural carriers and larger competitive providers that have turned to Cisco for solutions not specifically designed for larger service providers. The company has also brought new thinking to how layer 2 networks are constructed for cable/MSOs and has leveraged its presence in these accounts to introduce new opportunities for its optical portfolio.

## Market presence and market momentum highlights

While Cisco is a small to mid-sized player in optical networking, its customers benefit from the company's broader presence in the networking and communications market. This presence brings along a well-established service and support organization and overall financial stability, both factors in Cisco receiving an above-average score in market presence. Cisco leans heavily on its IP routing and switching background to deliver packet-optical solutions, which gives it an edge in our growth intensity evaluation factor. This, combined with its presence in the DCI application space, kept Cisco just over the average score for market momentum. Overall Cisco lands in our leader category in this edition of our *Scorecard.*

## Bottom line

Cisco's optical business benefits from being part of a large company that is a key player in service provider, data center, and enterprise networking overall. Its successes in Verizon's metro network and with its NCS 1K family in the ICPs have helped it regain momentum after several years of declining sales. Moving forward, to maintain its position in our leader category, Cisco needs to leverage these wins into securing a broader presence in North America and beyond.

# Methodology

## Portfolio and market segments covered

The optical portfolio and market segments analyzed for this *Scorecard* include:

- **Optical network systems:** Hardware and associated software used to build WDM- and SONET/SDH-based optical transport networks
- **Packet-optical transport systems (P-OTS):** Subset of the optical equipment market; systems that are designed and used for hybrid circuit and packet-based optical transport
- **Optical data center interconnect (DCI) equipment:** Subset of the optical equipment market used to connect data centers over WDM transport

## Scorecard criteria

This *Scorecard* includes the 10 top optical vendors, each with $290B or more in 2018 optical networking equipment revenue. We did not include the next tier of players, such as NEC and Ekinops. The methods used to address mergers and acquisitions over the year are outlined at the end of this section.

Our criteria are based on actual data and metrics. Specifically, we evaluate vendors on market presence and market momentum.

**Market presence:** A vendor's current position in the market, including size, brand recognition, reputation, and financials. The market presence score is calculated using these criteria:

- **Market share:** A vendor's percentage share of the optical network equipment revenue
- **Financials:** An analysis of a vendor's financials; a strong financial position improves long-term viability and allows a company to stay ahead of the competition by investing in R&D and/or acquiring other companies/technologies; this score is based on the Altman Z-score non-manufacturing model
- **Buyer feedback:** An assessment of a vendor's performance by optical network equipment purchase decision-makers, based on interviews we conduct with global service providers every year
    - **Product reliability:** Buyers' assessments of a vendor's product reliability
    - **Service and support:** Buyers' assessments of a vendor's service and support

**Market momentum:** A vendor's potential, including growth, reputation for innovation, and development of next generation technologies. The market momentum score is calculated using these criteria:

- **Market share momentum:** A vendor's growth in the optical network equipment market (revenue)
- **Growth intensity:** Measures the percentage of a vendor's product portfolio designed to meet the evolving requirements of customers and whether the vendor is capitalizing on new, high-growth market segments; for 2018, the target applications include packet-optical transport, optical DCI, and 200G+ port shipments
- **Buyer feedback on technology innovation:** An assessment of a vendor's performance by purchase decision-makers, based on interviews we conduct with global service providers every year

Based on the scores for each of the 7 criteria, we created 2 composite vendor scores, one for market presence and the other for market momentum, using the same 5-point scale, and weight the individual criterion based on its importance in the buying process.

We plot the market presence and market momentum scores on the "Leadership Landscape Graph" (Exhibit 1). The presence and momentum scores on each axis range between a theoretical minimum of 1.0 and maximum of 5.0. Vendors are categorized as:

- **Leaders** perform strongly across all evaluation criteria and vectors. Leaders have established a significant presence in the market and have positive momentum, which means they are likely to cement and expand their leadership positions in the future.
- **Established** players perform strongly in the market presence vector. Though established players have lower market momentum than leaders, their significant presence indicates strong adoption of their solutions.
- **Challengers** perform strongly in the market momentum vector. Though challengers have lower market presence than leaders, their positive momentum indicates they are in a good position to grow their market presence in the future.

## Reports used

The information in this *Scorecard* is based on findings from multiple IHS Markit services, including:

- Market trackers
  - *Optical Network Hardware*
  - *DCI, Packet-Optical and OTN Hardware*
  - *100G+ Coherent Optical Equipment Ports Database*
- Survey-based research
  - *Optical Equipment Vendor Leadership*

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