

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

2024 COMPETITIVE STRATEGY LEADER

*IN THE NORTH
AMERICAN NETWORK
SERVICES INDUSTRY*

LUMEN®

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

2024
BEST
PRACTICES
AWARD

Best Practices Criteria for World-Class Performance

Frost & Sullivan applies a rigorous analytical process to evaluate multiple nominees for each Award category before determining the final Award recipient. The process involves a detailed evaluation of best practices criteria across two dimensions for each nominated company. Lumen excels in many of the criteria in the network services space.

AWARD CRITERIA	
Strategy Innovation	Customer Impact
Strategy Effectiveness	Price/Performance Value
Strategy Execution	Customer Purchase Experience
Competitive Differentiation	Customer Ownership Experience
Executive Team Alignment	Customer Service Experience
Stakeholder Integration	Brand Equity

Strategy Execution

“The hyperscalers are building out their generative AI (GenAI) capacities and capabilities, which will lead to a tremendous amount of traffic growth in the coming years. This expected traffic is forcing network service and cloud providers to strengthen partnerships. In that context, Lumen is executing a fiber-first strategy to win business with hyperscalers.”

- Stephen Thomas,
Sr. Director of Network Services

Lumen Technologies, a leading network solutions provider, is the culmination of decades of strategic acquisitions. As a result, the company has strong assets and expertise in the fiber, networking, and security spaces, while partnering to deliver data center and content distribution solutions.

Frost & Sullivan analysts observe how this rich history now takes shape as robust partnerships with Microsoft and other media and cloud providers, which the industry refers to as *hyperscalers*. While Lumen has exited markets and had challenges with top-line revenue in past years, it is showing promise with its new strong focus on supporting hyperscalers in their AI rollouts through its

Private Connectivity Fiber (PCF).

Per its August 5, 2024 announcement, Lumen has \$5 billion in order book activity and a strong conviction that it will realize \$7 billion in the pipeline soon. The hyperscalers are building out their generative AI (GenAI) capacities and capabilities, which will lead to a tremendous amount of traffic growth in the coming years. This expected traffic is forcing network service and cloud providers to strengthen partnerships. In

that context, Lumen is executing a fiber-first strategy to win business with hyperscalers.

Its extensive fiber footprint and partnerships with hyperscalers are the basis for Lumen's strategy to become the premier AI-ready network, with infrastructure designed to support the instantaneous demands of AI workloads.

Competitive Differentiation

Lumen's extensive fiber network and focus on building long haul and metro area networks position it well to serve hyperscalers with its PCF service, which combines underlying conduit, fiber, optical services, and digital services. These assets and services are then contracted with capital expenditure arrangements back to the hyperscalers as an indefeasible right of use (IRU). IRUs as a contracting mechanism are more common with wholesalers, which highlights the fact that hyperscalers are now more like wholesale partners than enterprise clients. IRUs come with upfront cash commitments, as Lumen builds the private optical network to the hyperscalers location. These IRUs, combined with the automated service layer, are the foundations of PCF, putting the company in a good position to add services and tightly integrate with the AI community. In addition, PCF and Lumen's ExaSwitch service nicely complement each other. ExaSwitch is an optical and digital exchange unique to the industry that supports cloud-to-cloud interconnects within the Lumen footprint. These services are uniquely geared toward the hyperscaler community to help tackle short- and long-term network strategies to cope with the heavy traffic that these hyperscalers generate.

Lumen has a solid position thanks to its 400G capable wave network (shown below), whereas most US operators are 100G. Lumen owns the key routes where the hyperscalers currently are and plan to build. Lumen's network is well-positioned to add capacity by upgrading its 400G routes to 800G and 1.6 Terabytes (T) when the traffic warrants it, another reason for Frost & Sullivan to praise Lumen's strategy for the AI community.

Lumen 400G Wavelength Network - North America



Stakeholder Integration

“Frost & Sullivan commends Lumen for overtaking the competition and partnering with Microsoft and the hyperscalers to strategically align PCF and IRU arrangements. PCF will allow Lumen to offer IP, waves, ethernet, and dark fiber, which can then be used as a mix of do-it-yourself (DIY) or Lumen-managed services.”

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GenAI services will grow through private rather than the public free models of today. Private LLMs and the growing trend of domain-specific knowledge datasets are the type of killer applications and databases that will test the ability of fiber, power, and cooling resources due to their instantaneous nature and location across private and public clouds. Hyperscalers and data centers will continue to spread — which is why it is smart for Lumen to stand out from competitors and build with hyperscalers toward their GenAI driven data center locations.

Hyperscalers have their own facilities, but they also use already-built data centers. In turn, GenAI will entail even more high-speed networks and drive demand for new fiber. In this context, Lumen stands out due to its long haul and metro fiber assets; local fiber is important to connect compute zones spanning multiple physically separated buildings within the data center campus, which can span city blocks and public roads. Working with the hyperscalers to build their private networks is a natural extension to Lumen’s 160,000 lit buildings and 6 million miles of overall fiber (with 6 million more planned). Lumen is connected to more than 2,200 data centers globally and is considered a strong partner to the data center community and overall, a growing strategic partner for GenAI stakeholders.

The instantaneous aspect of private GenAI with private LLMs and proprietary data sets across multi-clouds necessitates network services located milliseconds away to get the best performance. Lumen successfully integrates stakeholders by drawing on its expertise to design, build, run, and deploy fiber networking, freeing hyperscalers from having to do it themselves and allocating resources to manage the digging, right of ways, permitting, and owning sophisticated long- and short-haul optical equipment.

Customer Purchase Experience

Using the IRU contracting mechanism and a modular approach to PCF, Lumen crafts a better purchase experience; it creates a long-term agreement and taps into its expertise to enable a faster market entry for hyperscalers. Supply shortages for equipment in recent years and the overall challenges of building private networks have brought hyperscalers to Lumen in search of answers. Through its PCF service, it also allows access to the Ethernet network, wavelengths, and the largest IP network per the Center for Applied Internet Data Analysis (CAIDA) — the organization that ranks the size of IP service provider networks. For the hyperscalers, the advantage of owning an IRU is that (unlike 15 years ago when it was

just dark or lit fiber purchases) they also benefit from features of modern networks, such as digital services and on-demand provisioning.

As part of its digital services, Lumen offers an optical topology viewer that allows clients to visualize and provision their wavelengths to guarantee route diversity and bring transparency to the fiber paths. Hyperscalers benefit from the ownership economics of a 20-year IRU whose cost in the first few years is similar to that of building a data center. After the upfront costs — which are cash and revenue for Lumen — the operations and maintenance fees are 10% of the optical services revenue for the remaining years. As stated, the benefit to the hyperscalers is a faster time-to-market, because the PCF and IRU combination provides digital services and tooling, while allowing ownership economics for decades as hyperscalers build these massive GenAI platforms. Another benefit to the hyperscaler is that they acquire access to the Network-as-a-Service (NaaS) platform as an extension to the PCF, which is cloud-like in that it is pay-per-use and by the hour. Therefore, hyperscalers can now have 20-year capital leases down to one-hour terms depending on the network or business model need.

Customer Ownership Experience

The PCF allows flexibility to ethernet/waves or IP layers with on-demand capabilities. Lumen has invested in NaaS and waves-on-demand services to provide more adaptability and visibility. Now, through portal or application programming interface (API) integrations, hyperscalers can flex up or down bandwidth and add ports to cope with GenAI models that lack a predetermined peak load. Furthermore, Lumen's topology viewer augments its fiber assets by allowing clients to see the network routes, providing an easier way to view and configure wavelengths. In a recent Lumen PCF industry analyst call, Executive Vice President and Chief Product Officer Dr. Satish Lakshmanan boldly stated that customer experience is Lumen's product. Frost & Sullivan expects even more innovations around ease of use, automation, and API integrations. Lumen is creating better customer experiences by integrating portals, APIs, PCF, NaaS, its topology viewer, and ExaSwitch portfolio updates.

Executive Team Alignment

Lumen's roots are clearly in telecom, but as the industry changed to API-focused and software-defined everything, the company brought in Kate Johnson in November 2022 as President and CEO. She is a former Microsoft, GE Digital, and Oracle executive that the company put in charge of the turnaround. In 2023, she added key hires from the software industry, including Ashley Haynes-Gaspar, Executive Vice President — Customer Success, Wholesale and International; Ana White, former Executive Vice President and Chief People Officer at F5, where she led the transformation from hardware-led to a software-led company; and Chief Product Officer Dr. Satish Lakshmanan, who comes to Lumen from Amazon Web Services (AWS), where he was the global leader for Artificial Intelligence Services.

This year, Lumen brought on Dave Ward as its new Chief Technology Officer, coming from PacketFabric (a data center NaaS company), but only after a long history with Cisco's engineering team. The latest addition is Ryan Asdourian as its new Executive Vice President and Chief Marketing Officer. Asdourian will oversee Brand and Product Marketing, and Corporate Communications. With much of the team coming from the software industry, Microsoft seems the logical first big win within the AI community. However, company executives have noted that Microsoft is only one of the more than ten agreements it has, and there is an

additional \$7 billion in potential orders coming from a mix of more than ten companies. Lumen's goal to refocus itself into a tech service provider by still holding on to its roots depends on the alignment of its new executive hires. Lumen's CFO has reported it is on target for a cash-flow positive in 2025, with revenue growth coming as soon as 2026.

Conclusion

Lumen has strong roots in the telecom services space with the foresight to focus on building out fiber and maintaining a strong conduit footprint in the United States. Its exit from Europe and South America bodes well for its turnaround and shedding assets to strengthen core markets. The new leadership team has helped the company transition from a telecom operator to a customer-focused technology services company. While GenAI/LLMs are in their infancy, Lumen is executing a strategic focus to partner in this space and sees it as a way to climb back to profitability and growth. Lumen has served as a leader in networks for many years, and this additional focus to become a preferred partner to the GenAI community is a positive trajectory, especially in services where milliseconds matter.

With its strong overall performance, Lumen Technologies earns the 2024 Frost & Sullivan Competitive Strategy Leadership Award.

What You Need to Know about the Competitive Strategy Leadership Recognition

Frost & Sullivan's Competitive Strategy Leadership Award recognizes the company with a stand-out approach to achieving top-line growth and a superior customer experience.

Best Practices Award Analysis

For the Competitive Strategy Leadership Award, Frost & Sullivan analysts independently evaluated the criteria listed below.

Strategy Innovation

Strategy Effectiveness: Effective strategy balances short-term performance needs with long-term aspirations and overall company vision

Strategy Execution: Company strategy utilizes Best Practices to support consistent and efficient processes

Competitive Differentiation: Solutions or products articulate and display unique competitive advantages

Executive Team Alignment: Executive team focuses on staying ahead of key competitors via a unified execution of its organization's mission, vision, and strategy

Stakeholder Integration: Company strategy reflects the needs or circumstances of all industry stakeholders, including competitors, customers, investors, and employees

Customer Impact

Price/Performance Value: Products or services provide the best value for the price compared to similar market offerings

Customer Purchase Experience: Quality of the purchase experience assures customers that they are buying the optimal solution for addressing their unique needs and constraints

Customer Ownership Experience: Customers proudly own the company's product or service and have a positive experience throughout the life of the product or service

Customer Service Experience: Customer service is accessible, fast, stress-free, and high quality

Brand Equity: Customers perceive the brand positively and exhibit high brand loyalty

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- **Growth Pipeline:** Continuous Flow of Growth Opportunities
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- **ROI & Margin:** Implementation Excellence
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The Innovation Generator™

Our 6 analytical perspectives are crucial in capturing the broadest range of innovative growth opportunities, most of which occur at the points of these perspectives.

Analytical Perspectives:

- Mega Trend (MT)
- Business Model (BM)
- Technology (TE)
- Industries (IN)
- Customer (CU)
- Geographies (GE)

