FROST & SULLIVAN

LUMEN

2022
MARKET
LEADER

*UNITED STATES BUSINESS CARRIER
ETHERNET SERVICES INDUSTRY*

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 business carrier ethernet services space.

AWARD CRITERIA

Growth Strategy Excellence	Technology Leverage
Implementation Excellence	Price/Performance Value
Brand Strength	Customer Purchase Experience
Product Quality	Customer Ownership Experience
Product Differentiation	Customer Service Experience

Leveraging Technology to Support Mission-Critical Applications

As enterprises continue embracing cloud services to enhance business efficiency, connectivity becomes a critical aspect of their digital transformation strategy. Businesses need reliable, secure, and high-speed connectivity to support mission-critical applications. Lumen Technologies' (Lumen) business carrier Ethernet services deliver on all these aspects.

"Lumen is one of the largest network service providers. Its extensive terrestrial and subsea fiber optic long-haul network spans across North America, Latin America, Europe, and Asia-Pacific and connects to its metropolitan fiber networks. The company does business with customers in more than 60 countries and connects its customers via fiber to 292 Lumen data centers and over 2,200 third-party data centers. Lumen continues to invest in expanding its network infrastructure to deliver high bandwidth connectivity."

- Amrit Singh,
Senior Industry Analyst

In a global economy, enterprises require consistent, secure network coverage wherever they do business. Lumen's Ethernet services leverage its global network, which consists of 150,000 on-net buildings and approximately 400,000 fiber route miles of fiber optic network globally.

Lumen is one of the largest network service providers with 6 million fiber miles stretching out across our intercity network, an extensive terrestrial and subsea fiber optic long-haul network spanning the globe, and a dense metropolitan fiber network.

The company serves customers in more than 60 countries and connects its customers via fiber to 292 Lumen data centers and over 2,200 third-party data centers. Lumen continues to invest in expanding its network infrastructure to deliver high bandwidth connectivity. Frost & Sullivan noted that Lumen's expanded metro and long-haul footprints are unmatched in the market and, not surprisingly, Lumen is the revenue leader in the US business carrier Ethernet services industry.

Continued Investment in Infrastructure Fuels Growth Strategy Excellence

Enterprises are increasingly adopting digital technologies, such as Internet of Things (IoT), robotics, artificial intelligence (AI), video, and Big Data analytics. To address these technologies' demand for high bandwidth connectivity, Lumen recently extended its investment in high bandwidth Ethernet architecture (meeting Metro Ethernet Forum's MEF 3.0 standards) to offer upgraded Ethernet services that deliver high-speed connectivity options ranging from 2 Gbps up to 30 Gbps. The company plans to bring these upgraded Ethernet services to over 40 US cities by the end of 2022, and services have already been rolled out in 33 cities. This upgraded high-bandwidth Ethernet architecture supports its other services, including Lumen Cloud Connect, Dedicated Internet Access (DIA), High Speed IP Transit, Fiber Internet and IP VPN services. Lumen has also strengthened its global subsea network by investing in a new on-net subsea fiber route. The investment will pave the way to deliver high-speed connectivity to address its customers' ever-increasing bandwidth demand for the next few years while supporting its IP, voice, and content delivery networks (CDN).

Broad Ethernet Portfolio and Route Diversity Provide Competitive Differentiation

Many modern business applications, including those that use AI and data analytics, are increasingly latency sensitive and require high-bandwidth connectivity to perform efficiently. Enterprises typically consume Ethernet services to support the growth in bandwidth-hungry business applications, provide connectivity to third-party cloud service providers, and interconnect corporate data centers. While the need for connectivity continues to drive demand for Ethernet services, enterprises are looking for bandwidth and require diversity in networking service configurations, flexibility, security, and reliability.

> *"Lumen has a well-established, global, and continually evolving Ethernet product portfolio. Leveraging its vast, diverse network, it can offer enterprises point-to-point, point-to-multipoint, or multipoint-to-multipoint connectivity to link company headquarters with office branches, data centers, cloud locations, or any location in the world. The company offers a broad range of port speeds (100 Mbps to 100 Gbps) on its expansive E-LINE and E-LAN available network footprint."*
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In addition to network density, Frost & Sullivan notes that route diversity is a distinguishing factor in the market. Lumen´s ability to provide customers with a comprehensive transatlantic subsea portfolio with six on-net diverse fiber routes, including a European

gateway is an important differentiator. Such an approach provides customers with diversity in inter-city routes and in metro areas. Frost & Sullivan's research confirms this is a capability that other carriers simply cannot offer.

Dynamic Capacity Enhances the Customer Purchase Experience

NSPs are increasingly focusing on enhancing customers' digital experiences to differentiate their offerings. Bandwidth-on-demand and application-aware networking functionalities provide customers with more control of their network and enable bandwidth optimization. Lumen's dynamic networking capabilities address the on-demand bandwidth needs of businesses for cloud and data center networking. The company evolved its offering with software-defined networking (SDN)-based capabilities to provide dynamic capacity, enabling clients to instantly scale bandwidth-on-demand up to 3X with predictable billing. Additionally, Lumen Dynamic Connections and a self-service functionality allow clients to quickly add or remove connections, considerably improving customers´ digital experience. Frost & Sullivan recognizes that such an approach is another key aspect differentiating Lumen from its other competitors.

The growing reliance on a remote workforce that accesses cloud-based applications from different devices and locations exposes enterprises to new types of security threats. Consequently, security needs to be integrated at the connectivity and network functionality level. Understanding that security is at the top of enterprises' priorities, Lumen´s IP product portfolio has an integrated secure key management tool that strengthens the security of Ethernet services. It includes built-in threat protection, proactive network monitoring, full network visibility, and 24X7 support from Lumen´s network operations center.

Adaptive Networking Offers Future-Proof Customer Ownership Experience

To address growing business needs, enterprises are looking for the most cost-effective networking solution and are combining public and private network services. Choosing the right network solution and architecture empowers the IT strategy for enterprises. Lumen offers an extensive and comprehensive networking portfolio that can provide the solution that best suits customers' connectivity needs at different locations. The company also offers services that complement its Ethernet services, including software-defined wide area network (SD-WAN) services, adaptive virtual services, cloud connect, IP VPN MPLS, dedicated Internet access, fiber-based Internet, content delivery solutions, professional services, and managed services.

Lumen's adaptive networking solution is more than a product or service; the solution is a set of tools that leverages various technologies to elevate network performance. Lumen´s Adaptive Networking considerably improves site provisioning speed, application performance on the network, and network uptime—all while improving network security and operational cost savings.

Conclusion

The underlay transport is at the core of digital transformation and is the foundation for empowering enterprises' information technology (IT) strategy. With evolving technologies, business applications are increasingly latency sensitive and require high bandwidth connectivity to perform efficiently. Enterprises typically use Ethernet services to address the high bandwidth demand.

Lumen offers an extensive and comprehensive networking portfolio that can provide the solution that best suits connectivity needs at different locations. Leveraging its vast network, the company also offers complementary services that support the ever-increasing SDN, including SD-WAN services, cloud connect, adaptive networking, and professional and managed services. Lumen's extensive global network and expanded metro and long-haul footprint in the United States are major differentiators.

With its strong overall performance, Lumen earns Frost & Sullivan's 2022 United States Market Leadership Award in the business carrier ethernet services industry.

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What You Need to Know about the Market Leadership Recognition

Frost & Sullivan's Market Leadership Award recognizes the company that achieved the greatest market share resulting from outstanding performance, products, and services.

Best Practices Award Analysis

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

Growth Strategy Excellence: Company demonstrates an ability to consistently identify, prioritize, and pursue emerging growth opportunities

Implementation Excellence: Company processes support efficient and consistent implementation of tactics designed to support the strategy

Brand Strength: Company is respected, recognized, and remembered

Product Quality: Products or services receive high marks for performance, functionality, and reliability at every stage of the life cycle

Product Differentiation: Products or services carve out a market niche based on price, quality, or uniqueness (or some combination of the three) that other companies cannot easily replicate

Technology Leverage: Company is committed to incorporating leading-edge technologies into product offerings to enhance product performance and value

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 are proud to 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 of high quality

About Frost & Sullivan

Frost & Sullivan is the Growth Pipeline Company™. We power our clients to a future shaped by growth. Our Growth Pipeline as a Service™ provides the CEO and the CEO's growth team with a continuous and rigorous platform of growth opportunities, ensuring long-term success. To achieve positive outcomes, our team leverages over 60 years of experience, coaching organizations of all types and sizes across 6 continents with our proven best practices. To power your Growth Pipeline future, visit Frost & Sullivan at http://www.frost.com.

The Growth Pipeline Engine™

Frost & Sullivan's proprietary model to systematically create ongoing growth opportunities and strategies for our clients is fuelled by the Innovation Generator™.
Learn more.

Key Impacts:

■ **Growth Pipeline:** *Continuous Flow of Growth Opportunities*

■ **Growth Strategies:** *Proven Best Practices*

■ **Innovation Culture:** *Optimized Customer Experience*

■ **ROI & Margin:** *Implementation Excellence*

■ **Transformational Growth:** *Industry Leadership*

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)**