

Real-time Data Exchange Between Design & Production Centers

Semiconductor and GPU manufacturers run in one of the most data-heavy, time-critical environments in the world. Their design centers, fabs, packaging sites, and test facilities must share massive datasets in real time to keep design, manufacturing, and yield decisions aligned. But as AI accelerates product cycles and cloud-based electric design automation (EDA) becomes standard, the need to move data securely, predictably, and at scale has shifted from an IT requirement to a core source of competitive advantage.

In this industry, time-to-market, yield, and uptime define the business model. Even small delays in design-to-fab data movement can trigger missed tape-outs, quarantined lots, yield loss, or production downtime. And as new fabs come online, localization expands, and geopolitical constraints tighten, legacy network architectures can't keep pace. Real-time data exchange is no longer just a technical challenge; it has become a board-level priority.

Challenges

Semiconductor and GPU manufacturers struggle with slow, unreliable, or fragmented data movement between global fabs and design centers, creating critical operational challenges:

Slow Collaboration & Decision Making

When data moves too slowly between geographically distributed design centers and fabs, even minutes of latency can compound to hours of delay. Teams can't collaborate in real time, slowing engineering reviews and delaying critical production and manufacturing decisions.

Large-Scale Data Transfer Bottlenecks

Massive design files, inspection imagery, and telemetry data are difficult to move securely and at high speed, slowing chip design, verification, and manufacturing workflows.

AI-Driven Time-to-Market Pressure

An AI-accelerated market cycle increases pressure on inter-site data management, where slow or inconsistent data flows have outsized consequences for competitiveness and launch timelines.

Geographic Expansion & Network Constraints

Localization mandates, new fab construction, and global build-out introduce first-mile and last-mile bottlenecks that limit performance between design, manufacturing, and test environments.

Securing Cloud EDA Networks

As Cloud EDA becomes mainstream, performance bottlenecks and risk shift to the network, requiring greater bandwidth consistency, stronger security architectures, and protection of IP amid growing regulatory and geopolitical constraints.



A single hour of unplanned downtime in an advanced semiconductor fab can cost \$100,000-\$500,000 in lost production.¹

Solution

Semiconductor and GPU manufacturers depend on real-time, deterministic data exchange between global design centers, fabs, and test sites to keep design, manufacturing, and yield decisions in sync. Lumen provides a purpose-built optical connectivity foundation built to remove latency, bandwidth, and reliability constraints from the design-to-production lifecycle.

By utilizing private, low-latency connectivity, Lumen helps enable secure, predictable, and scalable data movement to support continuous collaboration, massive file transfers, and AI-driven workflows without disruption or delay.

Lumen Wavelength Solutions

Dedicated, low-latency optical connectivity delivering up to 400 Gbps of predictable, SLA-backed performance between design, manufacturing, and test sites. Ideal for:

- Near real-time synchronization of geographic design and production
- Moving massive design, simulation, and inspection datasets
- Ensuring stable, predictable data flows even at peak load

RapidRoutes

High-demand, rapid deployable, private point-to-point connectivity that can be provisioned quickly to support and large-scale data movement. Ideal for:

- Intense design cycles and late-stage design change spikes (ECOs)
- AI/ML workloads requiring fast, throughput
- Eliminating the need for off-peak scheduling or long provisioning delays



Results

Lumen delivers measurable impact for semiconductor and GPU manufacturers facing near real-time data exchange challenges, helping them operate more efficiently, reduce risk, and accelerate innovation.

Predictable, near real-time performance

Predictable, low-latency connectivity between global sites reduces variability and is designed to eliminate fragmented data paths, enabling near real-time collaboration between design and production teams.

Fast design-to-fab cycles and decision making

By reducing latency and transfer delays, Lumen enables faster engineering reviews, quicker ECO propagation, and timely production decisions to shorten overall design-to-manufacturing timelines.

Scalable high-volume data movement

Dedicated, high-capacity connectivity supports continuous, large-scale data transfers without off-peak scheduling, designed to remove limits on AI/ML workloads and reduce missed deadlines.

Operational efficiency

Predictable, high-speed transfer of design files and inspection data can reduce lot quarantine times, accelerate engineering cycles, and improve fab and test throughput.

Reliability and confidence

Private, deterministic connectivity is designed to improve reliability, security, and compliance, helping protect IP, minimize disruptions, and operate confidently across global environments.

Why Lumen?

Lumen is a trusted connectivity partner, operating the #1 peered global network² with 24/7 monitoring and threat intelligence from Black Lotus Labs®. With Lumen Wavelength Solutions delivering up to 400 Gbps and direct connectivity across key data center and cloud ecosystems, Lumen enables near real-time, high-performance data exchange customers can rely on. Built for demanding, AI-ready environments, Lumen provides scalable connectivity with near real-time visibility and consistent, reliable performance.

[Connect with a Lumen representative](#) to explore flexible solutions for your evolving needs.

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²The Center for Applied Internet Data Analysis (CAIDA), *AS Rank*, January 2026,

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