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Connecting Data, Cloud, and Network Strategies to Scale AI in Retail

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Artificial intelligence is transforming retail at full tilt.

Most retailers adopted AI early, automating everything from demand forecasting and personalization to fraud prevention. But with these powerful capabilities come new performance demands that quickly push traditional infrastructure past its limits.

For most retailers, the biggest challenge isn't the technology itself but the underlying systems beneath it. "AI needs data," says Kate Johnson, CEO at Lumen, "data needs data centers, and data centers need to be connected." However, most existing data, cloud, and network infrastructure simply wasn't built for the scale, speed, and security AI demands. Retailers now face a difficult decision as a result: rush into AI before systems are prepared or hesitate and risk getting left behind.

This playbook is for retail technology leaders invested in AI and ready to see measurable results. It starts by examining the current state of AI in retail, including common challenges and future opportunities. Then, it offers a strategic approach for aligning data, cloud, and network infrastructure to deploy AI effectively at scale. Wherever retailers are in their AI journey, this playbook will help them confidently prepare for what's next.

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AI in retail:
Leading adoption, lagging returns

The message is loud and clear: retail is ready for AI. Already, 89% of retail companies use AI or plan to soon, and more than half deploy it across six or more business functions.[1,2] AI spending is projected to reach 3.3% of retail revenue this year and could hit $54.92 billion by 2033.[3,4] Most retailers anticipate returns between 20% and 50% within three years.[1]

AI in retail: Today

Most retailers already use AI to improve store operations, boost online sales, and simplify logistics:

Physical stores: AI can track inventory, update displays based on customer data, and analyze foot traffic to improve store layouts.

E-commerce & mobile: AI can suggest relevant products, automate merchandising decisions, and help customers find what they need quickly.

Back-of-store operations: AI can forecast product demand, schedule employees for busy periods, and automate order fulfillment to curb delays.

Yet few retailers report meaningful results. Instead, 73% remain stuck in planning or pilot stages, just 3% claim full-scale deployment, and only 17% report 'very positive' ROI.[1,5] Low returns can be disappointing, but they may also expose a deeper issue beneath the technology itself: **disconnected infrastructure.**

Most retail infrastructure simply wasn't designed to handle the demands of AI at scale. Retailers keep layering new tools onto legacy systems that were never meant to support them. Each new capability adds pressure to already worn-out foundations until, eventually, tiny cracks appear.

The current state of AI in retail is characterized by challenges with:

- **Data:** Often incomplete, inconsistent, or siloed
- **Cloud:** Not flexible enough for real-time, dynamic workloads
- **Networks:** Lack the speed, flexibility, and security AI requires

These gaps might seem insignificant now, but they'll only widen as AI advances and retail evolves. New tools will be faster, more autonomous, and even more dependent on real-time data. Retailers who modernize their infrastructure now will be best positioned to fully realize AI's growing potential in the future.

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AI in retail: Tomorrow

Soon, retailers will use advanced AI to automate more tasks and make faster decisions:

Agentic AI: AI will handle customer requests and tasks like processing returns or answering product questions without humans.

Physical AI: Robots will be common in stores and warehouses, stocking shelves, managing inventory, and fulfilling orders.

Real-time CX orchestration: Customer interactions will connect instantly across stores, websites, and apps.

Dynamic pricing and inventory intelligence: AI will automatically update prices and stock levels based on demand, competitor pricing, and buying patterns.

An AI-ready approach:
AI strategy = data+cloud+network

Retail's AI-powered future is exciting, but even the most advanced AI is only as powerful as the infrastructure behind it. Every AI prediction and automated decision depends on the same key components: data, cloud, and network. Without connecting these systems first, even the best AI tools will fall short.

"You can't run before you walk," says Cory Jackson, Senior Manager at Clarkston Consulting. "Retailers must assess whether they can realistically scale AI before they try."

Forward-thinking retailers start by answering three questions:

- **What** data will AI use?
- **Where** will that data be stored and processed?
- **How** will data move efficiently and securely across the business?

Retail leaders who answer these questions early can align their systems sooner and scale AI with more confidence.

1 Data strategy: The “what”

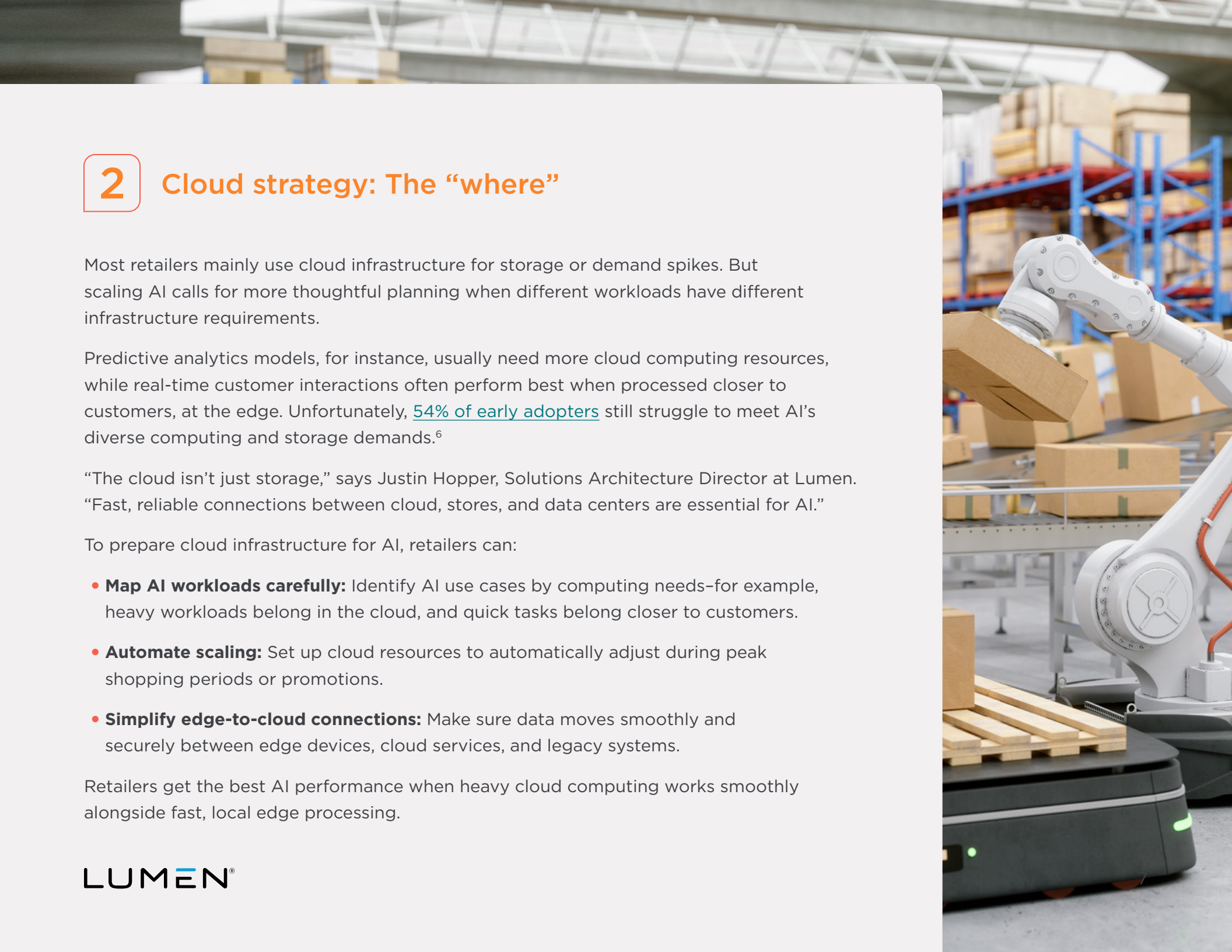
Retailers generate huge amounts of information daily from sales channels, loyalty programs, inventory systems, and more. Yet most data is unused, siloed, inconsistent, or inaccessible. In fact, 64% say integrating data across sources is still challenging today.[6]

“AI isn’t magic. It’s only as good as the quality and context of your data.” - Cory Jackson

To get data ready for AI, retailers can:

- **Prioritize integration hotspots:** Merge top data sources (like POS, inventory, and loyalty programs) into a single, central platform.
- **Launch data-quality dashboards:** Use automated dashboards to quickly spot and address errors, gaps, or inconsistencies.
- **Simplify governance checkpoints:** Embed compliance, privacy, and quality standards straight into critical input locations (like POS terminals and customer account setups).

Retailers who standardize and centralize data get better insights and make faster decisions.



2 Cloud strategy: The “where”

Most retailers mainly use cloud infrastructure for storage or demand spikes. But scaling AI calls for more thoughtful planning when different workloads have different infrastructure requirements.

Predictive analytics models, for instance, usually need more cloud computing resources, while real-time customer interactions often perform best when processed closer to customers, at the edge. Unfortunately, 54% of early adopters still struggle to meet AI’s diverse computing and storage demands.[6]

“The cloud isn’t just storage,” says Justin Hopper, Solutions Architecture Director at Lumen. “Fast, reliable connections between cloud, stores, and data centers are essential for AI.”

To prepare cloud infrastructure for AI, retailers can:

- **Map AI workloads carefully:** Identify AI use cases by computing needs–for example, heavy workloads belong in the cloud, and quick tasks belong closer to customers.
- **Automate scaling:** Set up cloud resources to automatically adjust during peak shopping periods or promotions.
- **Simplify edge-to-cloud connections:** Make sure data moves smoothly and securely between edge devices, cloud services, and legacy systems.

Retailers get the best AI performance when heavy cloud computing works smoothly alongside fast, local edge processing.

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3 Network strategy: The “how”

Most retail networks were built for steady, predictable transactions, not the fast and heavy data flows that AI needs. But when the network slows down, AI slows too, causing delays, mistakes, and missed opportunities.

“The Internet does not serve the digital economy,” Johnson says. “It’s not prepared for AI.” To solve this challenge, Lumen provides an expansive network infrastructure with flexible services optimized for AI workloads. “We run a large portion of the Internet,” Johnson continues, “and we’re expanding it in a material way to make it infinitely more consumable.”

Instead of standard internet connections, Lumen’s direct, private connections link retail locations, data centers, and major cloud providers to move data faster and more reliably. The result is a network scalable enough to handle increased demand, flexible enough to adapt to changing needs, with built-in security to help continuously protect data as it moves.

To ready the network for AI, retailers should:

- **Plan for capacity:** Identify peak periods (like holidays and major sales events) and then scale network bandwidth accordingly.
- **Upgrade connections for speed:** Use high-speed, low-latency network solutions to move data instantly between stores, warehouses, and cloud systems.
- **Embed security from the start:** Make security part of network design beyond firewalls with encryption and Zero-Trust.

Retailers see the best outcomes from networks that deliver fast, reliable, and secure data movement across systems.

AI-ready networks: The retailers' checklist

Resilience & scalability
Manage spikes in traffic and adapt instantly to changing demands.

Low-latency connectivity
Transfer data quickly for more seamless customer interactions.

Broad network visibility
Spot and fix issues before they disrupt performance.

End-to-end security
Protect sensitive data as it moves across the network.

Get the Checklist ↗

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Why Lumen: The trusted network for AI

The next competitive advantage in retail isn't AI—it's the infrastructure behind it. Retailers need fast, reliable connections between data sources, cloud providers, and stores without complexity or slowdowns. That means choosing the right network for AI and the right partner to help manage it.

Lumen is the trusted network for AI. It's integrated fiber, private networking, and edge connectivity simplify how data moves between over 2,200 North American data centers. With Lumen, retailers can run AI wherever it performs best: in stores for quick insights, at the edge for real-time customer interactions, or in the cloud for complex tasks.

To meet growing demands, Lumen reserved 10% of Corning's global fiber supply to handle more data faster and without delays. Its partnership with other leading cloud providers connects retailers directly to the computing resources AI needs without complicated setups or unnecessary delays.

Lumen's Private Connectivity Fabric (PCF) provides dedicated connections created specifically for AI's high data volumes. And its flexible telecom services make it easy to add new AI tools without rebuilding the network every time. Together, these capabilities give retailers a customizable, enterprise-grade, future-ready foundation to scale AI.

What sets Lumen apart: Why retailers choose Lumen

- **Enterprise-grade Infrastructure:** High-speed fiber, edge connectivity, and private networks.
- **Seamless Cloud Integration:** Direct connections to 2,200+ data centers.
- **Scalable AI Capacity:** 47M intercity fiber miles by the end of 2028 to meet growing AI demands.
- **Optimized AI Services:** Solutions optimized for AI—like Private Connectivity Fabric (PCF), Network-as-a-Service (NaaS), and Lumen Connectivity Fabric (LCF).

Lumen's network solutions: Explore the possibilities

Private Connectivity Fabric (PCF)
Secure, dedicated infrastructure for high-bandwidth and real-time responsiveness for AI workloads

Network-as-a-Service (NaaS)
Cloud-like, pay-as-you-go connectivity supports rapid AI experimentation and deployment without the overhead of traditional network management

Wavelengths
AI-ready connectivity with up to 400G speeds across public/private clouds, data centers, and retail locations

What's next:
Unlocking AI's full value

While AI adoption is growing among retailers, tangible returns are still emerging for many. Rather than add more tools, retailers seeing measurable results from AI are connecting data, cloud, and network to power them first. Doing this foundational work might not be as exciting as testing new AI models, but it often means the difference between ongoing pilot projects and real-world results.

The retail leaders who align data, cloud, and network strategies today will spend more time capturing the value AI promised from the start.

Lumen is ready to help retailers build the infrastructure to unlock AI's full potential. Explore Lumen's AI and retail-ready solutions:

- PRIVATE CONNECTIVITY FABRIC
- NAAS
- WAVELENGTHS

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Sources

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Lumen connects the world. We are igniting business growth by connecting people, data, and applications – quickly, securely, and effortlessly. Everything we do at Lumen takes advantage of our network strength. From metro connectivity to long-haul data transport to our edge cloud, security, and managed service capabilities, we meet our customers' needs today and as they build for tomorrow.

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