POV

Solving the last-mile delivery with Vehicle Routing and Optimization

infios
a Körber company

Every step of the transportation process, from the first mile to the final mile, needs optimization to remain efficient. Today's demands on shippers and transportation providers create a supply chain environment governed by last-mile delivery capabilities and increasing consumer pressure.

To overcome adversity, transportation service providers must understand the nuances and value of optimized vehicle routing. Whether routes are next-day, same-day or multi-day delivery, Vehicle Routing and Optimization (VRO) improves cost control and customer service.

In this point of view, we examine:

1. The last-mile delivery problem
2. What is Vehicle Routing and Optimization?
3. The forms of routing and last-mile delivery optimization
4. How last-mile delivery vehicle routing should work

VRO creates an environment where:

- All stops (pickup or delivery) are live, in real-time and dynamically optimized
- Estimated time of arrival updates are provided in real-time
- Routes are optimized for the least number of miles and stops, without dispatcher intervention
- Driver mobile capabilities encompass a configurable workflow that captures proof of delivery (POD), accessorial charges, camera integration, messaging and barcode scanning

This perspective outlines how to improve efficiency across your network of shippers, drivers and end customers.

The last-mile delivery problem

Several common pain points exist concerning modern last-mile delivery. Today, optimization and innovation are constantly required to accommodate e-commerce growth that has shaped the marketplace since the pandemic. In 2025, U.S. online retail sales reached $1.2337 trillion, up 5.4% compared to 2024, and triple the sales of 2015 ($338 billion).

Even as the frantic growth normalizes, online sales continue to challenge service providers' ability to fulfill last-mile delivery efficiently. Despite changing consumer demand, many carriers have not updated their vehicle routing approach.

As a result, problems persist in their ability to meet service and delivery protocols, jeopardizing their customers' brand credibility and creating additional costs for the shippers. Meanwhile, competitors keep pace with customer and marketplace expectations.

U.S. e-commerce sales accounted for 16.4% of total retail sales in 2025.

Outdated last-mile delivery processes lead to problems impacting end-to-end shipping services and performance. These include:

- Poor network and ground-level visibility
- Lack of efficient communication
- Higher operational costs
- Slow response to disruptions
- Excessive delays in deliveries
- Lack of sustainability initiatives
- Increased occurrence of errors and mistakes
- Poor customer retention and support

When consumers expect free and reliable shipping services, excessive fees and unexpected charges quickly increase the total landed cost and influence your service to customers.

What is Vehicle Routing and Optimization?

Last-mile delivery challenges are plentiful, but they can be overcome with proper optimization and innovation. Vehicle Routing and Optimization refers to the logistical process of optimizing delivery services and methods to meet customer expectations and improve their experience. The design helps service providers build their brand, attract repeat customers, lower shipping-related expenses and improve sales.

While all transportation providers benefit from enhanced last-mile services, many industries depend on last-mile optimization to maintain a competitive advantage. These include time-sensitive service for medical, food & beverage, climate-controlled goods, component parts and raw materials.

Better vehicle monitoring and routing means:

- Less waste and spoilage
- More profits for shippers
- More products on shelves for consumers
- Better carrier, shipper and customer relationships

This is especially important as consumers expect both speed and reliability. When it comes to speed, research shows that:

- 80% want to see a same-day option at checkout
- 68% of shoppers are more likely to shop online if offered same-day delivery
- 51% of online retailers offer same-day delivery

At the same time, 36% of consumers prioritize reliable delivery windows, yet only 59% of organizations use shipment data proactively to predict and prevent issues, according to the FedEx Future of Logistics Intelligence Report. Just 18% can always intervene to minimize the impact when delays occur.

As more customers begin asking for and expecting these services, transportation providers must improve last-mile delivery to fulfill those requests while keeping profits high and expenses manageable.

VRO sets apart successful companies from those that continue to struggle to keep up with the times and their competition.

How VRO works in the last mile

For decades, retailers and shippers have focused on improving the online channel, from the initial order placement and fulfillment to outbound shipment and final delivery. Today, consumers who prefer to shop online instead of in-store are doing it for convenience (72%) and to save time (68%).

The final delivery plays a big role in fulfilling those expectations. With post-purchase experience carrying as much weight—or more—than the first leg of the buying journey, transportation providers' last-mile capabilities and delivery performance are under the microscope.

Vehicle Routing and Optimization protects last-mile delivery experience using different tactics based on the industry involved, the type of cargo hauled and the origin and delivery destinations. However, three primary optimization conditions often apply in most last-mile delivery scenarios.

1. Dynamic batch vehicle routing before loading

With a batch vehicle routing approach, companies work based on a set idea of what tomorrow and the rest of the week will hold for shipments. Plan today for all the activities expected tomorrow.

For years, this has been the approach.

Providers have a batch of orders and work diligently to take care of the finite details associated with each shipment. However, with dynamic routing, planning consideration is given to pickup locations, delivery locations and all the attributes of that delivery.

As a result, trucks get loaded based on where each stop will occur, what cargo needs to be loaded and unloaded, the capacity limit of trucks and what drivers are available. The cargo layout can be optimized to coincide with the utilized delivery route.

All decisions about mode, loading, shipping, delivery and route optimization are made based on the entire batch of shipments, from the first to the last-mile delivery.

2. Within route optimization

Route optimization and freight management plans are based on the ability to apply in-route optimizations based on real-world conditions.

Unfortunately, the best-laid plans often fall through. Disruptions, delays and other issues can throw route plans and delivery schedules off track at a moment's notice.

Optimizing deliveries within the given route allows for changes in delivery times and orders to accommodate the best delivery deadlines, customer needs, cargo specifications and other factors.

50% of consumers value free same-day delivery more than curbside or in-store pickup.

3. Dynamic, on-demand vehicle routing

VRO enables real-time entry of new shipments into a vehicle's route at any given time. Partnering with a logistics and shipping partner with innovative tools and systems can make last-mile logistics more straightforward and efficient.

Actionable analytics should be readily accessible in support of informed decisions about route planning, logistics, delivery schedules and shipment handling specifications.

New pickups and deliveries can be easily assimilated into existing route plans with on-demand routing processes and insight into real-time data and information. As a result, rather than losing out on shipments due to an inability to fit them into pre-planned schedules, transportation providers capitalize on all orders and maximize capacity utilization on every trip.

Benefits of vehicle route optimization in the last mile

With the continued rise in consumer demand for fast, affordable and reliable shipping services, carriers that optimize their performance can ensure service expectations are met for shipping customers and end consumers.

Increased demand in e-commerce, online ordering, same- and next-day delivery and on-demand tracking and monitoring continues to shape the industry. Likewise, white-glove delivery services are becoming increasingly common as consumers seek home installation for e-commerce orders.

From the way consumers shop and make purchases to how they want to receive their products, last-mile delivery service is essential to the entire purchase, transport, and delivery process. The point of Vehicle Routing and Optimization is to adjust in real-time and improve routes based on the characteristics of each delivery, then keep stakeholders informed about changes. This approach is integral to the future of e-commerce and online shipping services.

With innovative dashboards and remote access apps, drivers, carriers and customers can access live status updates and reports about any shipment on a truck. And for logistics managers, shippers and carriers, these tools make it easier to slip in new orders (pickups or deliveries) along the way to accommodate rush orders and urgent shipment needs.

Within mobility and logistics apps, VRO is intelligent enough to calculate the best place to add stops within the driver's route—instead of throwing in a new shipment at the end of the day. This approach ensures existing deliveries avoid delays while maximizing capacity and updating estimated arrival times.

Accessing this power and versatility brings these benefits:

Visibility and transparency

Last-mile delivery transportation is a top priority for shippers to keep up with the market and consumer demands. In addition, end-to-end visibility ensures shipments are streamlined and optimized. Providers must be able to provide shippers with clear visibility into scheduled orders, including data-backed updates, real-time push notifications, on-demand communications and live data analytics. With improved logistics and supply chain optimization, orders can be shifted and moved as needed with reliable insights and accommodations to capitalize on available orders. Further access to this data allows transportation providers to proactively identify and address trends in their last-mile business.

More sustainable operations

Unfortunately, from a sustainability standpoint, the last-mile is a visible contributor, accounting for 30% of the logistics sector's carbon dioxide emissions. Urban last-mile delivery growth is expected to increase carbon emissions 30% in the world's Top 100 cities by 2030.

When one-third of consumers are willing to pay extra for more sustainable options, both shippers and carriers can earn a competitive advantage when they capitalize on efficiency gains that reduce emissions, vehicle miles and fuel usage.

Flexibility and scalability

Volatile markets and uncertain economic futures complicate transportation and logistics planning. Optimized services and last-mile-focused initiatives improve productivity and profitability by helping carriers take advantage of real-time scalability and flexibility. Last-mile transportation providers who can flex, scale and adapt to meet changing market and consumer trends stand the best chance of weathering disruptions.

Controlled costs

Labor and driver hours, fuel and vehicle expenses, failed deliveries, and tighter delivery windows. These all lead to operational cost increases. Asset-based service providers must take advantage of every opportunity to monitor expenses and control fees. Optimized vehicle route planning and real-time adjustments can enable cost reductions and improve productivity through enhanced visibility to every vehicle, driver and delivery.

Data-driven ETA updates and automated notifications

Delivery re-routes happen frequently. Weather and traffic-related delays, vehicle breakdowns and prior delivery delays—these are some of the many ways ETAs get off track and require adjustments. VRO helps carriers and their shipping customers improve speed and accuracy in their "where's my shipment?" response and communicate ETA changes as they happen. At the same time, they can collaborate to make sure end customers get their orders in full and in good condition.

Real-time disruption management

The most significant benefit of improved last-mile delivery is the power and adaptability afforded to transportation service providers. Instant response and adjustment reduce the impact on individual delivery deadlines. Real-time awareness makes last-mile delivery more manageable and streamlined from start to finish.

The rising demand for fast, reliable last-mile delivery service is unlikely to slow. The global last-mile delivery market was valued at $161.2 billion in 2024, and is projected to grow to $373.92 billion by 2033.

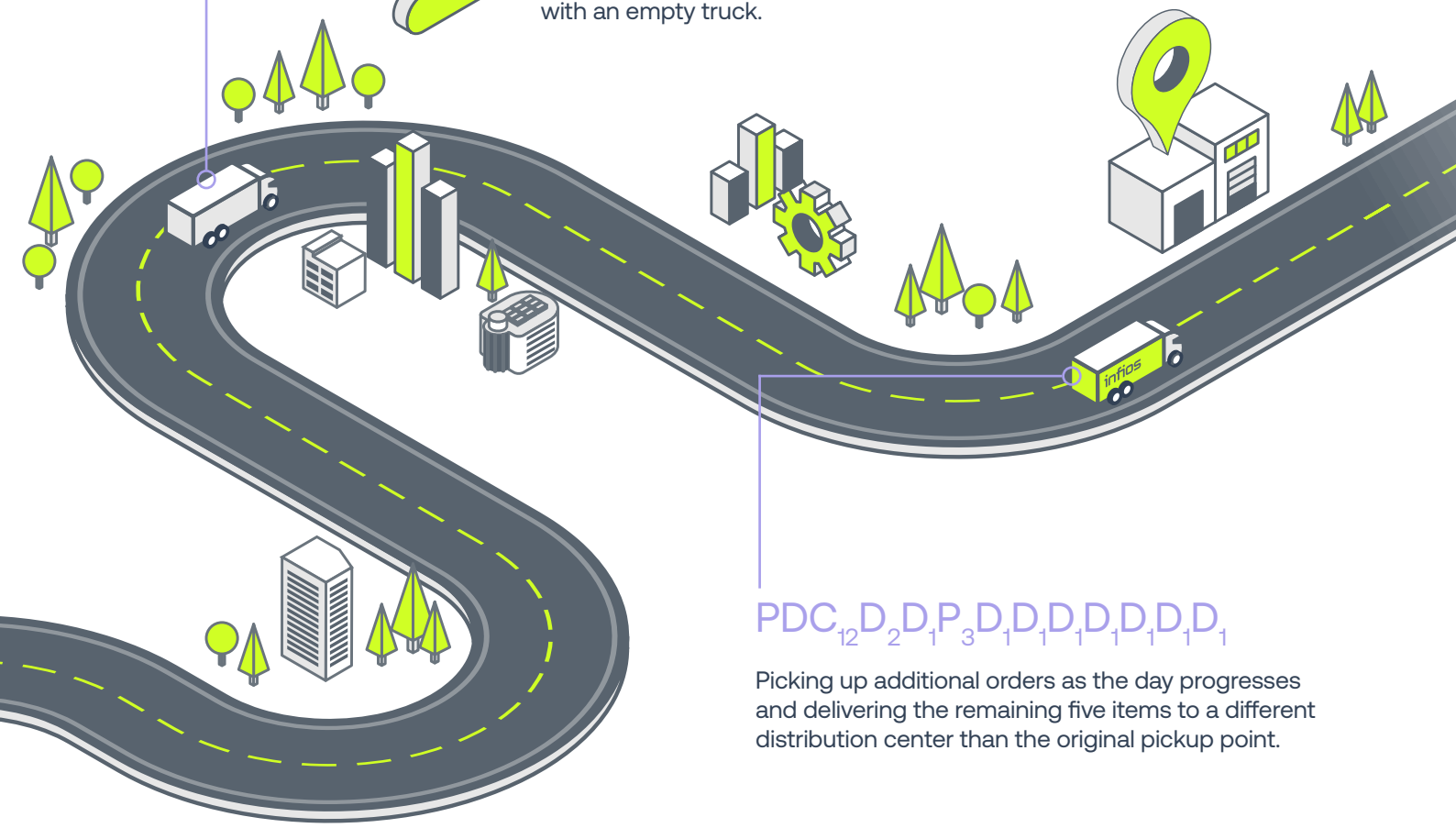
There has never been a better time to capitalize on growing market trends, secure customer loyalty, improve productivity and enhance efficiency by optimizing vehicle routing.

How last-mile vehicle optimization should work

Vehicle optimization in the last mile is complex and confusing. Unlike a traditional lineup of last-mile route planning, additional factors exist. For example, consider the following conventional versus dynamic lineup of a route—where pickups at a DC (PDC), in-route pickups, and dropoffs (D) or dropoffs at a DC (DDC) occur:

$PDC_{12}D_2D_1D_1D_1D_1D_1D_2D_1D_1D_1$

Involves a single load of deliveries made and ends with an empty truck.



$PDC_{12}D_2D_1P_3D_1D_1D_1D_1D_1D_1D_1$

Picking up additional orders as the day progresses and delivering the remaining five items to a different distribution center than the original pickup point.

In order to assign each pickup or delivery to the right driver at the specific time and location without adversely impacting other drivers and overall goals, you'll need a solution that can:

1. Track all shipment data in real-time and use digital means to track the BOL, POD, and all required documentation within a single view.
2. Identify which drivers are best suited for each shipment at its exact pickup or delivery time.
3. Continuously update ETAs based on changing road or traffic conditions.
4. Automate notifications to all affected parties on such changes.
5. Share information regarding updated ETAs within the TMS to allow downstream supply chain parties more time to prepare or flex schedules to account for changes.
6. Model different scenarios to understand the best options when an original routing plan doesn't work or requires an update, then share that information in real-time with other network partners.

SUMMARY

Integration, dynamic vehicle routing and better management enable last-mile delivery optimization

Outdated methods are no longer effective in competitive markets. Innovation and optimization, especially within the delivery sector, separate successful companies from those struggling to embrace the trends that shape the future of the supply chain industry.

Innovative dashboards, digital tools, data-backed apps and remote access capabilities all give drivers, carriers and customers live status updates and reports.

Furthermore, optimized tools and tech capabilities make it easier to accommodate new pickups or deliveries along the way and work on last-minute orders when and where needed. This contributes to better customer service and higher profits for shippers and carriers.

Choose Infios for Vehicle Routing and Optimization

Even the best routing strategies break down when supported by outdated systems.

Infios Vehicle Routing and Optimization turns data into action. It helps you reduce costs, adapt in real time and execute with greater precision across every route.

With continuous optimization and clear visibility into operations, you can respond faster, improve delivery performance and keep your network moving forward.

FIND OUT MORE

See how Infios helps you optimize the last mile and deliver with confidence.

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