

CONVOY

How every shipper can benefit from

FLEXIBLE DROP-AND-HOOK

Overcome traditional drop's big problem
to save money and flex to cover any surge



Introduction

Today, the majority of US Fortune 500 shipments are sent through preloaded drop trailers. If they could, many shippers would move 100% of their loads as drop-and-hook to benefit from its efficiency, foregoing live loads altogether.

Unfortunately, shippers can't move all their loads this way because there is a BIG problem with drop. Despite its efficiency on established lanes with predictable volume, traditional drop is highly inflexible, making it impossible to react to rapid changes in demand.

Today, an asset-based carrier can commit to a fixed number of drop loads on fixed lanes. When a shipper needs to flex above this commitment, they convert the load to live, paying more through load-in and load-out costs and spot premiums, and reducing the facility's daily shipment throughput. This inflexibility costs shippers 9% of their annual freight spend on average, representing millions of wasted dollars.

In 2017, Convoy Go became the first drop service to let carriers of all sizes haul power-only loads using a shared pool of smart trailers. This unique approach to drop offered shippers flexible capacity with the reliability they'd come to expect from asset carriers. Convoy Go has since expanded to offer primary drop freight nationwide.

This year, Convoy has taken an unprecedented step by expanding drop-and-hook across the routing guide to cover backup and spot freight. For the first time, shippers can get automated, nationwide drop capacity across primary, backup, and spot—all from the same provider.

In this white paper, we'll cover drop's big problem and its consequences, which prevent shippers from moving all the loads they want, and how this can cost shippers 9% of their annual freight spend, on average. We'll then introduce the concept of a flexible drop service and how it empowers shippers to overcome traditional drop's problem. Finally, we'll drill into how Convoy uses innovative technology to make this all happen.

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TRADITIONAL DROP'S BIG PROBLEM

Drop-and-hook is the most efficient way to ship truckload freight.

By preloading trailers in advance, shippers avoid the headaches that come with live loads, such as scheduling pickups and drop-offs, handling missed appointments, and paying detention fees for trucks waiting to unload. Drop cuts average dwell times by two-thirds, improves fleet utilization, and reduces inefficiencies in the supply chain.

Yet despite all the benefits, traditional drop has always been plagued by a fundamental flaw.

It's inflexible.

Drop operates well with a fixed set of tractors and trailers running predictable head hauls and backhauls between a fixed set of facilities. For this reason, drop is used almost exclusively for primary contract freight on lanes with consistent volume.

Of course, even dense lanes with consistent demand aren't immune to freight market dynamics. Surges in customer orders, seasonal storms, changes in distribution, and "Black Swan" events like the COVID-19 pandemic create fluctuations in demand that disrupt drop's stability. These unforecastable events result in hidden overhead costs, reduced operational efficiency, and increased risk to service quality.

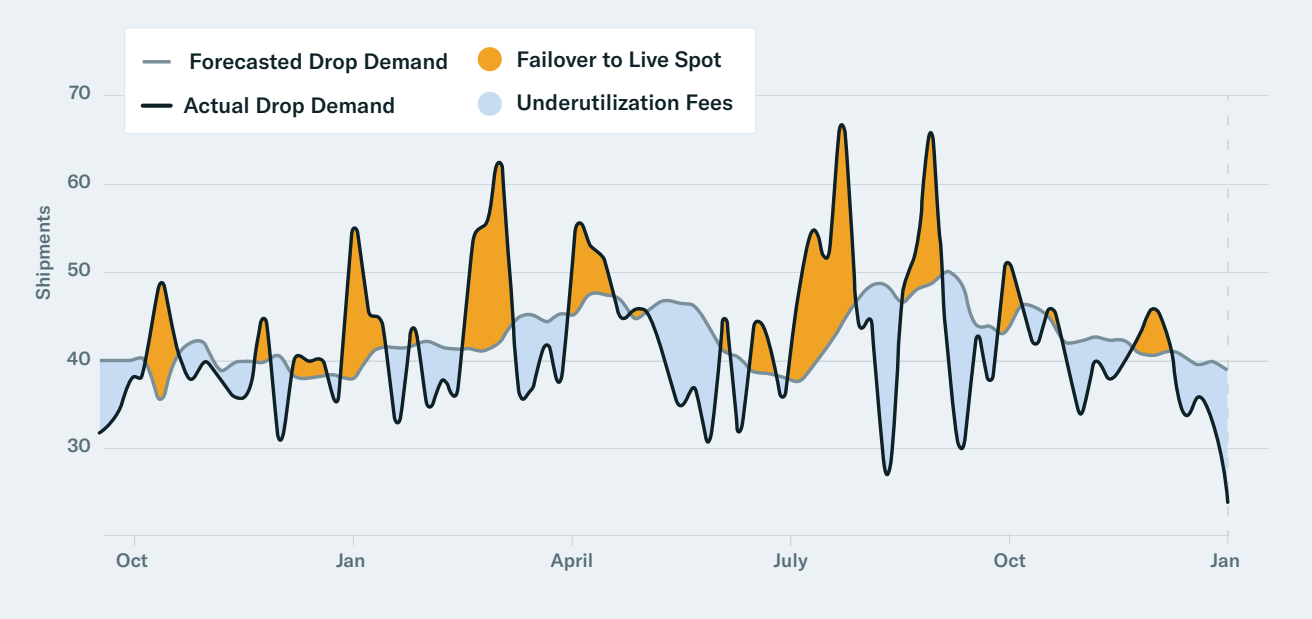
In the chart below, the gray line represents forecasted volume on a lane running drop, and the black line represents actual volume. Every time these lines diverge, shippers suffer the consequences of inflexible drop.

When demand surges above expectations (in orange), carriers struggle to flex tractor or trailer capacity, rejecting tenders and forcing shippers to switch to live loads on the spot market. This drives up shipment costs, creates logistical hassles of appointment scheduling and live loading, and increases service quality risk by introducing unfamiliar spot carriers.

Even when demand sinks below expectations (in blue), shippers face hidden costs. As tender volume drops, trucks stop moving. Lower fleet utilization results in punitive fees, either charged directly to shippers or indirectly by carriers passing along their higher fixed costs.

This ongoing cycle of spot market spillover and punitive fees has always been part of traditional drop-and-hook, creating undue burden and risk for transportation teams and constraining the potential of this otherwise highly efficient form of shipping.

Drop-and-Hook Demand: Forecast vs. Reality



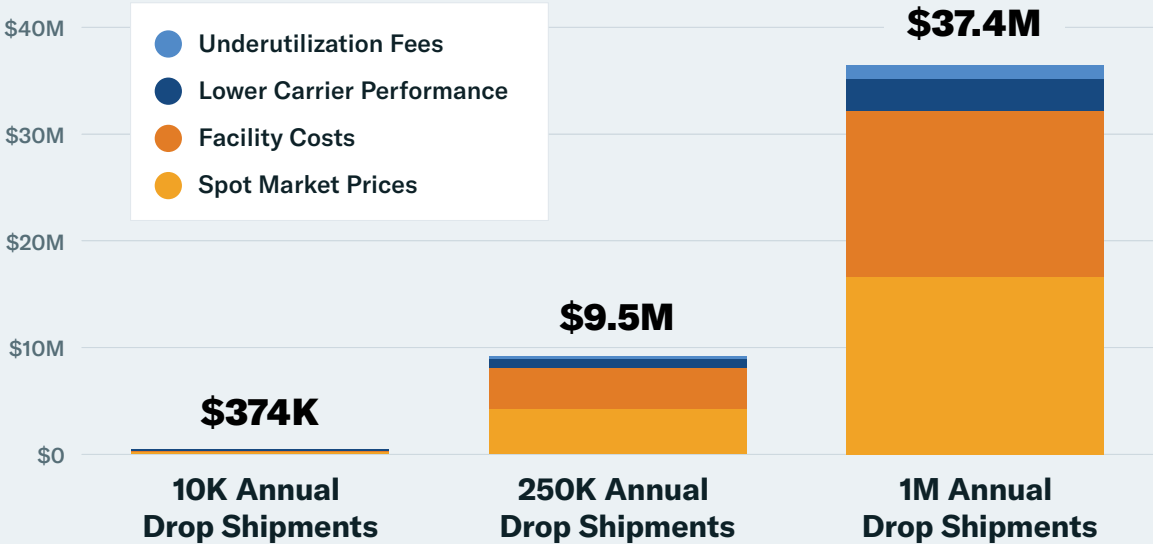
Traditional Drop's Cost

Traditional drop's inflexibility not only causes stress and wastes time, but it also costs shippers money in ways that are often hidden. These costs represent 9% of a shipper's annual freight spend on average, or \$9.5 million for shippers who move 250,000 drop loads per year, and \$37.4 million for shippers who move one million drop loads per year.

Let's take a look at four factors that drive these costs when traditional drop breaks.

Annual Estimated Costs from Traditional Drop

Hidden costs can represent 9% of a shipper's annual transportation budget



Higher Spot Market Prices

When a shipper's primary drop load fails and needs to be converted to a live load on the spot market, they end up paying 18% more per load on average. With an average drop-to-live failover rate of 15%, this can equate to \$4.2 million for a shipper moving 250,000 drop loads per year (representing 4% of their total annual transportation budget).

Increased Facility Costs

When a failed drop load is replaced with a live load, it requires more facility space and employees to load and unload it at the dock. To accommodate these converted live loads and meet the expected volume at any given facility, shippers maintain larger warehouses and workforces, which increases operational costs. A shipper who moves 250,000 drop loads per year could pay up to \$6.2 million in annual facility costs (rent per square foot, plus operating expenses) to support converted live loads, when they could have paid \$2.3 million if they had the ability to keep their freight as drop. This additional \$3.9 million represents 3.7% of a shipper's annual transportation budget.

This lower facility productivity also presents an opportunity cost. Live loading and unloading keeps trucks at the dock for substantially longer than drop loads, reducing the number of shipments a facility is able to move each day by 2.7x. For example, a facility with four docks moving 96 drop loads per day could only move 36 live loads per day.

Lower Carrier Performance

When a shipper's primary carrier fails to accommodate a drop load, the shipper turns to different carriers on the spot market. In doing so, they lose the benefit of their primary carrier's familiarity with the pickup and drop-off facilities. Our data shows that carriers who are unfamiliar with a facility have a 0.7 higher marginal probability of failure, and each failure increases truck costs by 5%. With an average drop-to-live failover rate of 15%, this can equal \$860,000 for a shipper who moves 250,000 drop loads per year (representing 0.8% of their annual transportation budget).

Higher Prices or Fees from Underutilization

Even if drop demand falls below forecasts, shippers still pay more than anticipated, because the carrier still has to cover their expensive, asset-heavy operations. Some carriers charge underutilization fees to shippers who tender less than their contract stipulates. While other carriers might not charge these fees, they still charge shippers higher rates over time to cover their structural asset costs, and on top of that, they are likely to reallocate their trailers to another customer, hurting the shipper when demand picks up again.

These fees can range from \$25 to \$75 per day per asset, depending on how long the carrier's assets remain underutilized. For example, consider a shipper who moves 250,000 drop loads per year and has 28 facilities. If this shipper has nine drop trailers that have been unused for 30 days at each facility, these fees could equate to \$485,000 (representing 0.5% of their annual transportation budget).

INTRODUCING FLEXIBLE DROP-AND-HOOK

In 2017, we introduced Convoy Go, a unique drop-and-hook service that turned the traditional model on its head by opening up drop freight to the million+ US carriers with small fleets, creating a massive addition to capacity while maintaining high efficiency and reliability. Unlike traditional drop's rigid structure and fixed equipment, Convoy has access to a shared pool of smart trailers that can be hauled anytime by thousands of power-only carriers in Convoy's network.

We've since grown Convoy Go nationwide, scaling its ability to offer flexible and reliable primary drop capacity through machine learning and automation technology that rebalances trailers and matches head hauls with backhauls.

In 2021, we've put the final puzzle piece in place, expanding Convoy Go to backup and spot freight. This novel solution turns traditional drop's costs into savings by avoiding live loads while moving as much nationwide drop as you want, all from a single provider.



Flexible Primary, Backup, and Spot Freight



Nationwide Coverage



Unmatched Visibility



Quality and Reliable Capacity



Flexible Primary, Backup, and Spot Freight Even during demand surges

Convoy Go is the first drop service of its kind to provide nationwide capacity across primary, backup, and spot freight. Its flexibility is unmatched, and it can meet unexpected demand at a moment's notice.

Let's explore how this looks on two levels.

First, Convoy Go overcomes traditional drop's constraint of fixed assets, where capacity is limited by trailers, power units, and drivers. Each represents a potential failure point when a shipper tries to expand beyond established lanes or react to a demand surge.




Imagine a shipper needs to move 12 extra drop loads from a single location in short order. Their asset carrier happens to have 12 trailers in the shipper's yard, so trailers are not an issue. Next, the carrier checks to see how they can move

these trailers, but finds they have six drivers and two power units in the vicinity. As a result, only two extra drop loads can be hauled, and the carrier rejects the remaining 10, sending the shipper scrambling to replace them with live loads.

Convoy Go only has one limitation: the trailers (we'll go deeper into this later). In this same scenario, let's say Convoy Go trailers aren't in the shipper's yard; however, there are 30 nearby trailers in Convoy Go's trailer pool that can be routed to the location in a matter of hours. With tens of thousands of power-only carriers and thousands of smart trailers in its network, Convoy effectively has unlimited power units and drivers nearby. This distinguishes us from an asset carrier, who could cover two of the 12 loads in this scenario, while Convoy has the on-demand capacity to handle 30 loads.

Flexible Drop's Capacity Advantage

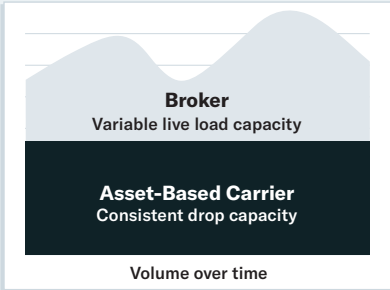
With a network of thousands of power-only carriers, Convoy has fewer limiting factors for providing shippers extra drop capacity vs. traditional drop providers.

Limiting Factors	Asset-Based Carrier	CONVOY
 Extra Trailers	12	30
 Extra Power Units	2	Thousands
 Extra Drivers	6	Thousands
Resulting Extra Capacity	2	30

Next, let's look at how you might apply Convoy Go to your overall freight mix. Traditionally, shippers move a fixed portion of their loads as drop, and then supplement whatever fails or is needed in a surge with live loads from brokers. Today, you can use Convoy Go to cover all of

your nationwide primary drop, and you can supplement your existing drop loads from asset-based carriers with Convoy Go's backup and spot freight, effectively eliminating the need to ever do live shipments again.

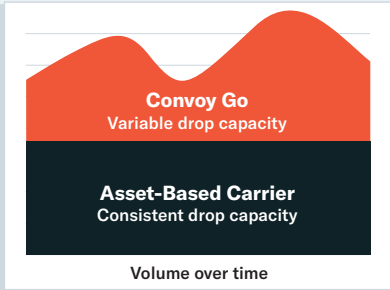
Convoy Go can flex to cover all drop-and-hook capacity, including surges.



DROP + LIVE

Traditional Drop

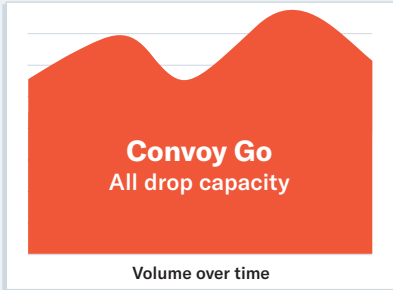
Shippers use assets to cover consistent drop volume, and brokers to supplement variable demand with live loads.



ALL DROP

Convoy Go for Backup and Spot Drop

Shippers continue working with asset carriers for primary drop, and supplement variable demand with Convoy Go to keep the loads as drop.



ALL DROP

Convoy Go as One-Stop Shop

Shippers can single-source all of their drop loads with Convoy.

Nationwide Capacity with Dynamic Backup

When you choose backup from Convoy through Convoy Go, you keep your drop loads as drop, avoiding the cost and hassle of falling to live when your primary load fails. Shippers who manage freight through their TMS can also secure backup drop using Convoy's Dynamic Backup program. Dynamic Backup offers 100% tender acceptance with real-time rates, acting as a virtual safety net to protect you from falling to the spot market. To see a list of compatible TMS providers and how to get Dynamic Backup, visit convoy.com/shippers/tms-integrations.



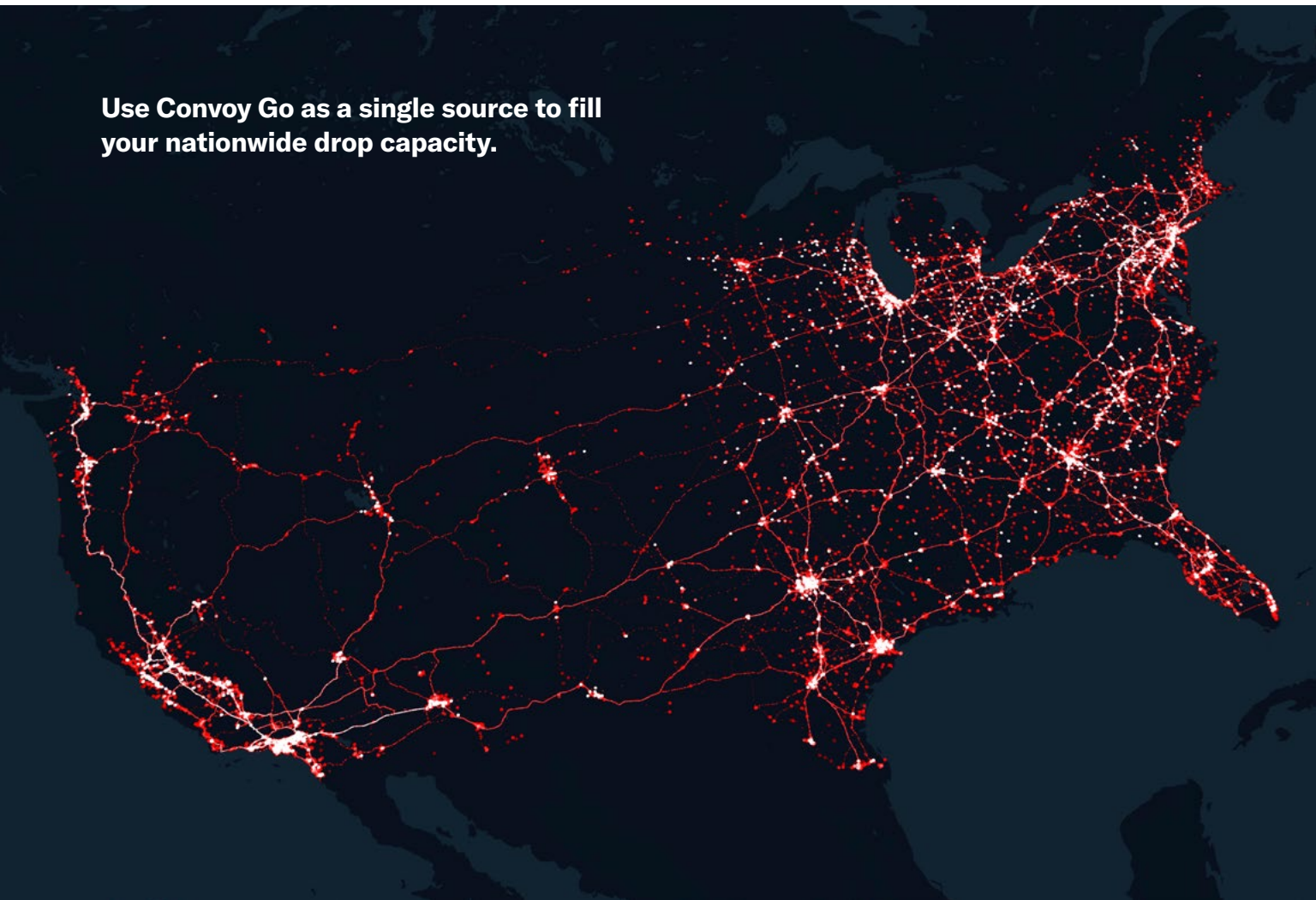
Nationwide Coverage

You can source all your drop loads from Convoy through Convoy Go, nationwide.

One of Convoy Go's biggest benefits is access to reliable capacity from practically anywhere.

With tens of thousands of power-only carriers in its network, Convoy Go helps to reduce the number of freight companies you need to manage, lowering your overhead costs and saving you time.

Use Convoy Go as a single source to fill your nationwide drop capacity.





Unmatched Visibility

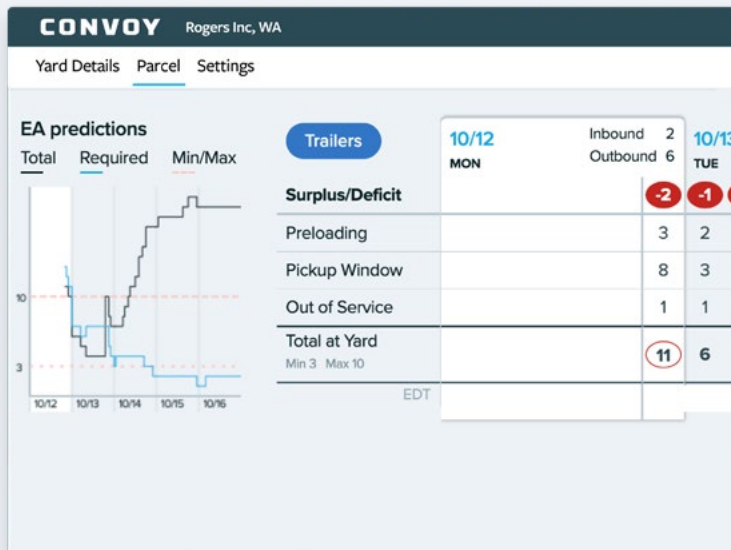
Convoy Go provides you with unmatched freight visibility on three levels.

First, you can track the location and status of loads currently en route. For example, the Convoy Go trailers are connected to the internet, which let you see:

1. Where the trailer is at any time
2. How fast it's moving
3. When it's projected to arrive
4. When it actually arrives
5. Whether it's loaded
6. What it was carrying previously
7. What it's slated to carry next

With this transparency, you don't need to wonder where your loads are, and you'll have peace of mind knowing that your upcoming shipments are covered.

Second, you get a granular view into your facility yards. This includes how many trailers are parked in the yard and overflow lots, each trailer's parking spot, whether the trailers are empty or full, and which are ready to be unloaded or dispatched. While asset carriers have dedicated equipment teams to manually and continually check trailer status, Convoy Go provides this information automatically, anytime, and without manual errors or the overhead costs of a dedicated team.



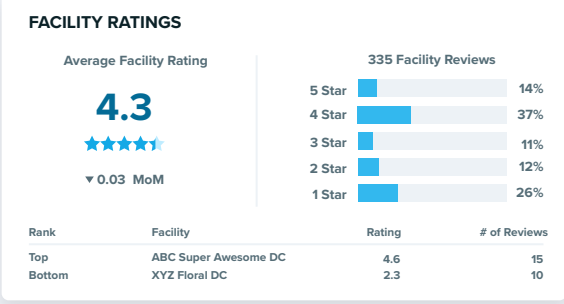
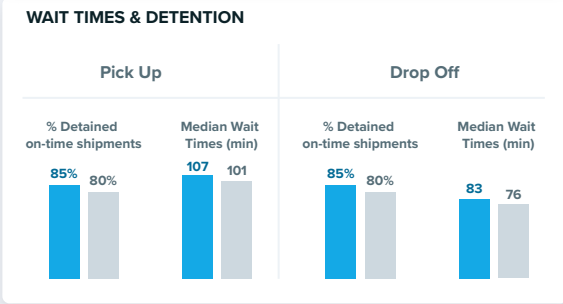
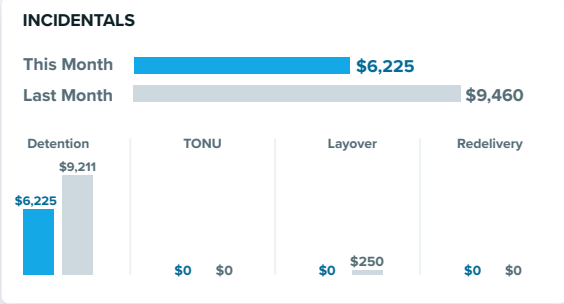
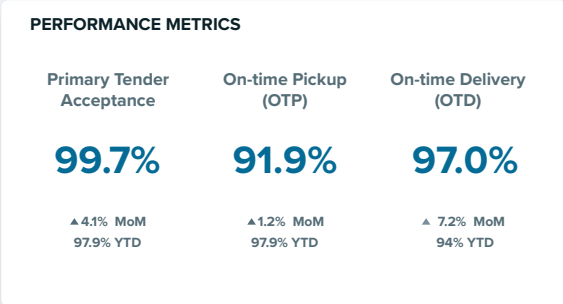
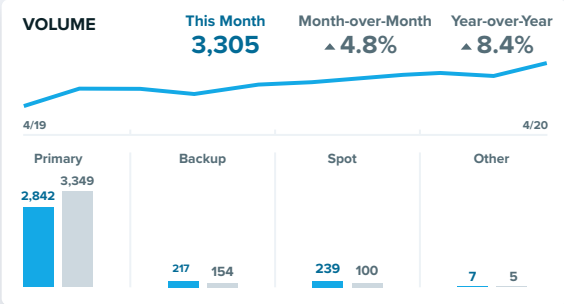
Convoy sends daily reports letting you know:

- How many trailers are in your yard
- The condition they're in
- How long they've been there
- How many additional trailers are headed inbound
- When they'll arrive

Finally, Convoy Go provides insights into opportunities to improve your facilities' performance, save money, and improve carrier preference. Convoy collects more than 1,000 data points on every shipment. We've gathered more than 1.6 million facility ratings across 25,000 locations that inform monthly business

reports with information such as individual facility dwell times and incidentals, as well as facility ratings and carrier feedback. Through this data, we've worked with shippers to eliminate inefficiencies within their facilities, create a better carrier experience, and save hundreds of thousands of dollars annually.

Convoy Go provides online tools and monthly reports to help you improve performance





Quality and Reliable Capacity

One of traditional drop's chief benefits is high-quality service with reliable drivers. Asset carriers are able to provide this by hiring a small pool of full-time drivers who can be screened before hiring and whose performance can be closely monitored. One of the downsides of this is an inability to cost-effectively scale nationwide coverage.

By contrast, Convoy provides nationwide power-only capacity through a network of tens of thousands of carriers and takes a unique approach, rooted in machine learning and automation, that results in carrier safety and performance that meet or exceed traditional asset providers.

Before any carrier in our network can accept a load, our system automatically checks crash history, vehicle maintenance, speeding tickets, traffic violations, W-9 form, operating authority, insurance certificate, and DOT number. If the carrier doesn't meet our stringent requirements, they can't accept your shipment. Our algorithms

run these compliance checks continuously, analyzing thousands of inputs across millions of driver records to ensure carriers are properly bonded, insured, licensed, and in good standing. The result is a crash rate 16% lower than the industry, with 99.99% of loads delivered without a cargo claim. This translates into fewer service delays and missed deliveries, fewer fees and chargebacks from your customers, and lower remanufacturing and redelivery costs.

Let's Keep it Clean

With Convoy Go, quality goes beyond safety and reliability. On every load, carriers in the Convoy network must complete inspection checks at pickup and drop-off through the Convoy app. The results? This helps the Convoy Go trailers run in better working condition because they enable us to address maintenance issues as they happen, and keep them food-grade clean with the tandem slid forward.



PREDICTIVE CARRIER CRASH CAPABILITY



COLLECT CARRIER DATA

Convoy combines rich carrier data from government, insurance, and safety organizations with our own digital freight network statistics.



IDENTIFY SAFEST DRIVERS

Machine learning processes thousands of inputs across millions of records spanning the past 10 years to identify carriers who are least likely to crash.



VERIFY SAFETY STATUS

Through automation, we vet the tens of thousands of carriers in our network against our rigorous standards, daily, with every load.



→ A SAFER CARRIER NETWORK

As a result, Convoy carriers have a **16% lower crash rate** vs. the industry average, with **99.99% of loads delivered without a cargo claim.**

HOW CONVOY GO WORKS

Let's look under the hood to discover a few of the ways Convoy Go is the most flexible drop-and-hook service.



Smart Trailers, Powered by the Internet of Things



Trailer Rebalancing



Deep Dive: Trailer Optimization



Automated Reloads



Dynamic Pricing Model



Smart Trailers, Powered by the Internet of Things

We're witnessing an exciting point in freight logistics, where the Internet of Things (IoT) is becoming more prevalent in our equipment. The IoT is a system of connected computing devices where unique identifiers are used to transfer data over a network without needing human interaction. Today, many of us think about our smart homes when we hear about the IoT, such as our smart thermostats or doorbell cameras.

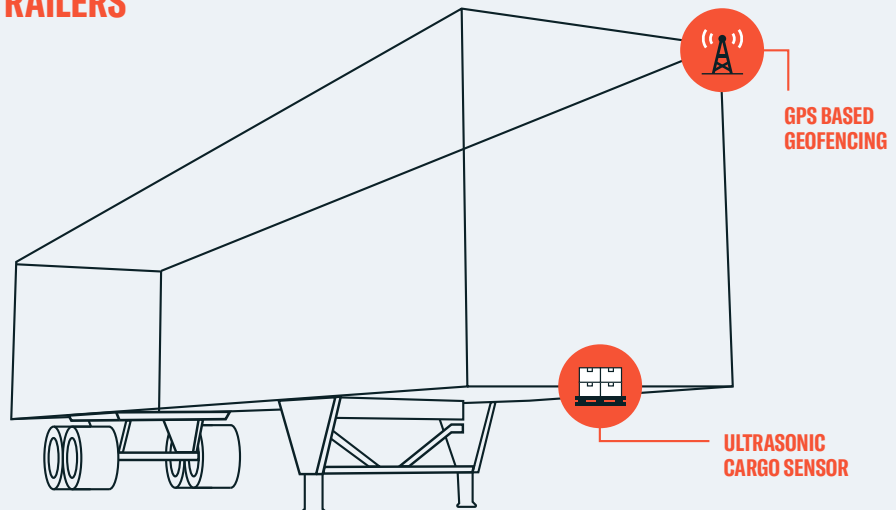
Convoy incorporated IoT into the shared pool of Convoy Go smart trailers in 2017, and has since worked with sensor manufacturers to push the limits of their capabilities to better track and gather insights on the freight we haul. Through the use of IoT, we're able to get critical information about the trailers and shipments across the country without needing a large team of people to manage them. This reduction in overhead enables us to focus our

teams on strategic relationships with customers rather than on routine operational tasks.

The trailers report their pinpoint location using GPS and geofencing, as well as whether the trailer is moving and, if so, how fast. Combinations of ultrasonic, optical, laser, and radar sensors let Convoy understand whether the trailer is loaded, which in turn lets us know whether it's time to arrange for a trailer to be picked or if the cargo isn't ready yet. We've also developed an algorithm that confirms whether trailers are being hauled by the driver assigned to the load by the motor carrier—this enables us to quickly identify and correct situations in which a driver accidentally hooks the wrong trailer. And with cargo and trailer theft becoming an increasing concern for shippers and freight companies, this algorithm can tell if a trailer has been stolen.

CONVOY GO SMART TRAILERS

- Pinpoint location
- Speed
- Expected arrival time
- Actual arrival time
- Time in yard
- Trailers en route to yard
- Loaded status
- Trailer condition

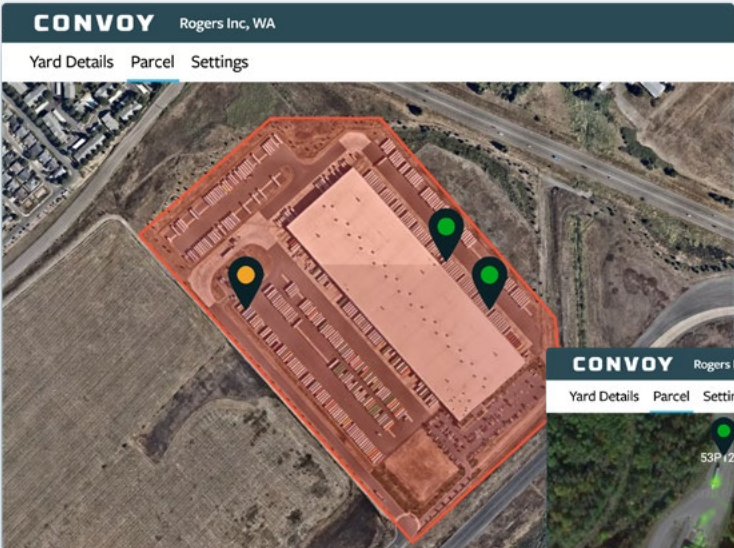


The use of IoT in trailers also enables us to provide higher service quality to our shippers, sometimes knowing more about their shipment status and facility yards than they have access to themselves.

One day, a large consumer packaged goods customer called our operations team requesting we arrange for four smart trailers, stating they didn't have any in their yard. We were able to instantly see a map of this customer's facility, with four pins representing these available trailers in an overflow

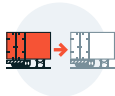
lot just one block away. They were able to move these trailers to their loading docks within minutes.

Another time, a large, national retailer emailed to let us know their drop shipments were loaded in Convoy Go trailers and ready to be picked. We were able to provide the good news that the smart trailers had notified us of this 12 hours earlier, and we had already made arrangements to move the freight, saving them time.



Convoy Go smart trailers use IoT to deliver high service quality, at times providing higher visibility into loads than our customers have themselves.





Trailer Rebalancing

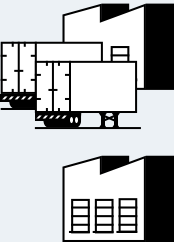
If you've ever been to a city that has one of those many app-based rental bike services, you may have noticed an interesting phenomenon at the top and bottom of hills. In the morning, there are plenty of bikes at the top of hills, but by the day's end, there is a clump of bikes at the bottom. Not surprisingly, fewer people are interested in biking up a steep hill than those who are happy to coast down. And at some point, the bikes need to be "rebalanced" by people in vans who collect and then place them back at the top of the hill.

This is a problem of uneven supply and demand, and nationwide drop networks face the same challenge, albeit on a much larger scale. Facilities in cities with high demand have a tendency to accumulate trailers, leaving less supply in other locations. This requires periodically rebalancing trailers between facilities.

The only way to solve this challenge at nationwide scale is to use machine learning. Specifically, we use machine learning models to predict how many trailers our customers will need across hundreds of facilities nationwide over the next few weeks. We combine our own historical shipment data with instant reporting from trailer GPS, shipment assignments, inspection reports, and drivers' locations. We then feed this data into our optimization models to pick the most efficient rebalancing solution. Our technology enables us to constantly evaluate this information on a scale that no individual or team of people could do. This is in contrast to traditional drop, which manually routes trailers using relatively limited information, significantly limiting its scale.

REBALANCING TRAILERS USING MACHINE LEARNING

Unbalanced Supply



Machine Learning

Shipment Assignments



Inspection Reports



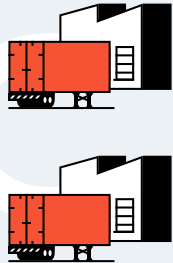
Truck and Trailer GPS



Historical Data



Rebalanced Trailer Pool



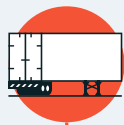


Deep Dive: Trailer Optimization

To rebalance thousands of smart trailers across the country, we developed what's called a mixed-integer programming (MIP) optimization model. MIP is used to find optimal solutions to extremely complex problems that can include thousands of variables and hundreds of constraints. The technology has been used to transform the way manufacturers staff their factories, power companies distribute electricity, sports organizations plan their schedules, and in our case, the way logistics companies optimize routes. When it comes to solving complex problems, MIP is a perfect complement

to machine learning. Machine learning is first used to predict a set of possible outcomes based on historical and current data, and then MIP is used to recommend the best solution.

Every time our MIP optimization model runs, it reviews more than 3,000 shipments, including a subset of currently available and upcoming loads. It also uses the real-time location of every smart trailer as an input, generating over 20 possible alternative routing options for each shipment. These routing options result in $20^{3,000}$ permutations.



WE CALCULATE MORE THAN
1,230,231,922,161,117,176,931,558,813,276,752,5
possible solutions

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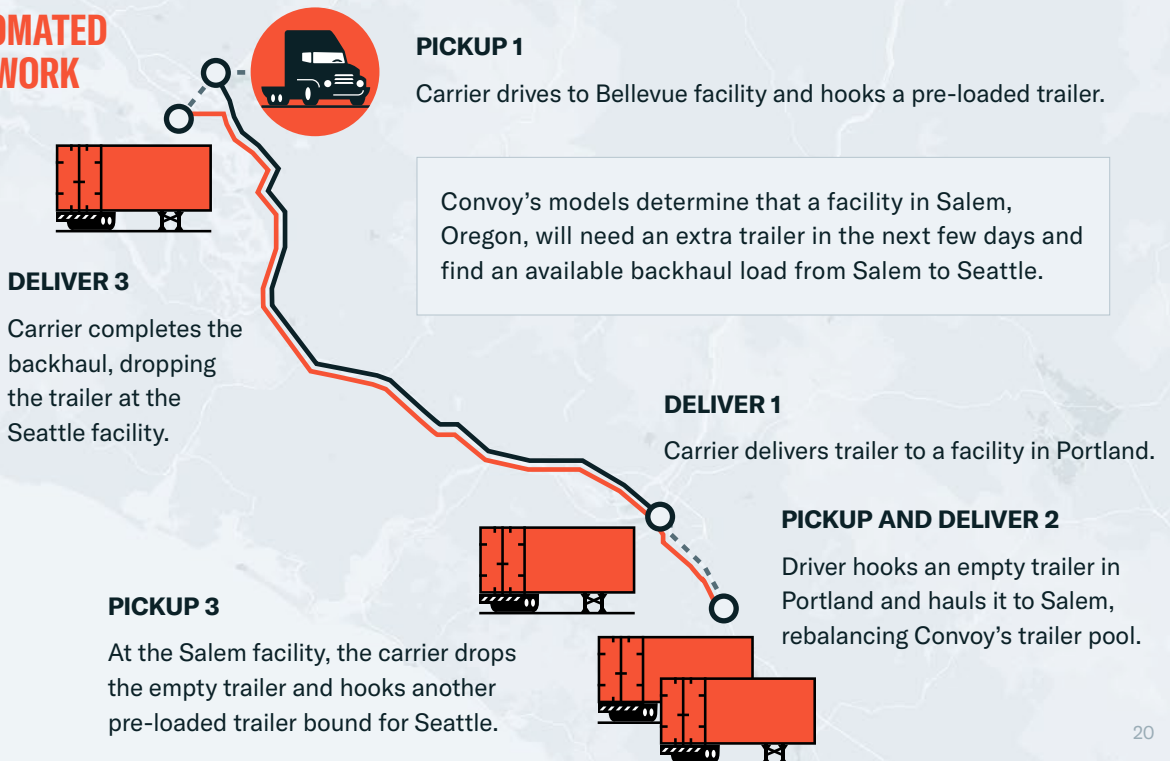
Automated Reloads

In 2019, Convoy announced automated reloads for live shipments. This enabled carriers in our digital freight network to instantly match their headhaul with a backhaul, earning more money on each run while achieving better truck utilization. For shippers, the automated reloads program results in 9-11% lower carrier falloff rates and reduces carbon emissions from empty miles, helping shippers achieve their sustainability goals.

In October 2020, we announced automated reloads for our drop-and-hook program. This provides the same benefits as live automated reloads, but it tackles a much more complex problem because it combines the need to find backhauls with the need to continually balance the trailer pool.

In the example below, the carrier drives approximately 55 miles empty—45 miles between Portland and Salem—to pick up the backhaul, and an additional 10 miles between Seattle and Bellevue after dropping the backhaul. This is compared to driving approximately 175 empty miles from Portland to Seattle had we not arranged for a backhaul load. On average, automated reloads reduce empty miles by 45%, helping drivers earn more money and achieve better truck utilization while helping shippers improve service quality, reduce carbon emissions, and achieve their sustainability goals. As of October 2020, automated reloads have prevented more than 2.5 million pounds of CO2 emissions from entering the atmosphere.

HOW AUTOMATED RELOADS WORK





Dynamic Pricing Model

One of the key barriers that has prevented freight companies from offering nationwide backup and spot drop capacity is the complexity in calculating real-time truck costs, plus all the nuances involved with drop trailers, including routing costs, availability, and utilization costs (such as amortized repairs and maintenance). Solving this problem regionally is one thing, but creating a

nationwide solution across many hundreds of lanes represents a step change of complexity.

To make this happen, Convoy’s engineers and data scientists developed an algorithm that solves multiple challenges simultaneously. At any given time, this algorithm calculates the following to provide shippers with flexible, reliable drop capacity across backup and spot.

CONVOY GO’S DYNAMIC PRICING MODEL

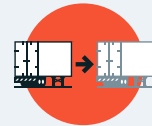
Truck costs

Convoy weighs historical truck costs over many combinations of lanes, markets, and freight types, and then predicts future costs based on the degree of market volatility, lane difficulty, and lead time.



Trailer rebalancing costs

Based on each shipment’s pickup and drop-off location, trailers needed, and loading schedules, our algorithm calculates in real time which trailers need to move, the available carriers to move them, and how much this rebalancing will cost.



Trailer maintenance costs

Our pricing algorithm factors for the wear and tear on each trailer, as well as other maintenance costs, such as repairs or cleaning.



WRAP UP

Get More of What You Deserve: Quality Drop and Peace of Mind

For many shippers, drop offers the promise of greater efficiency with less hassle. But traditional drop programs have been limited by their inflexibility.

In 2017, Convoy set out to address the problems of traditional drop with the launch of Convoy Go. Since then, we've expanded the program nationwide and added capabilities such as unique data and insights that can only be offered through a digital freight network.

In 2021, Convoy Go completed the solution as the most flexible drop service, offering shippers quality, nationwide capacity across primary, backup, and spot freight.

Whether you're looking to introduce new drop capacity or improve the performance and flexibility of your existing drop freight, Convoy is accepting Convoy Go customers for dry van service throughout the contiguous US.

Get started today by visiting convoy.com/drop





CONVOY

ABOUT CONVOY

Convoy is the nation’s most efficient digital freight network. We move thousands of truckloads around the country each day through our optimized, connected network of carriers, saving money for shippers, increasing earnings for drivers, and eliminating carbon waste for our planet. We use technology and data to solve problems of waste and inefficiency in the \$800B trucking industry, which generates over 72 million metric tons of wasted CO2 emissions from empty trucks. Fortune 500 shippers like Anheuser-Busch, P&G, Niagara, and Unilever trust Convoy to lower costs, increase logistics efficiency, and achieve environmental sustainability targets.

