How to Free Up Our Trucks

A Cost/Benefit Study on the Impact of Local Relays

BATON

Executive Summary

A supply/demand imbalance for truck drivers is the major bottleneck in America's supply chain.

Wondering why your Amazon Christmas orders aren't going to arrive until after the holidays, why shelves seem to be empty, or why costs are going up right now?

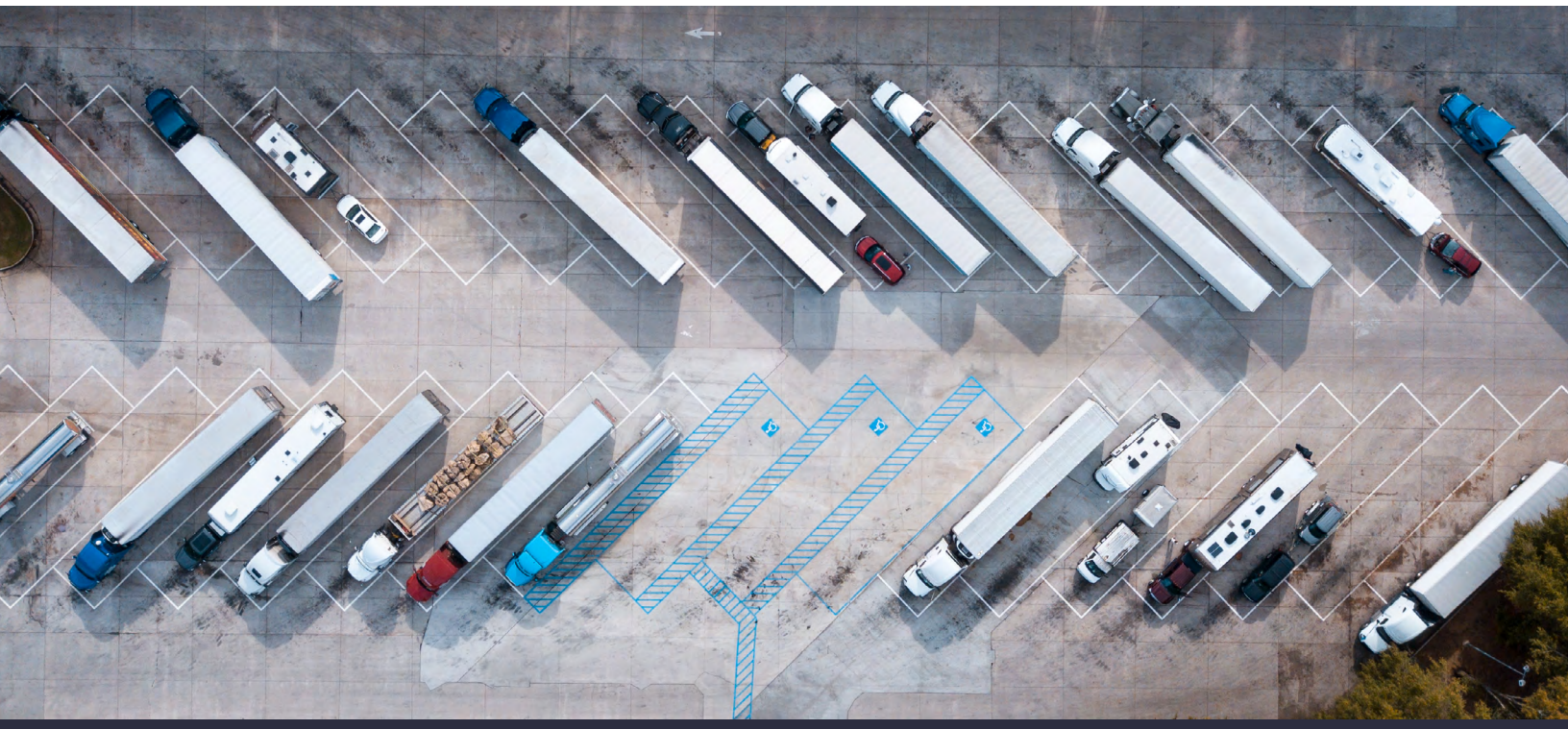
Read the news and everyone seems to be talking about the biggest kink in America's supply chain. There are not enough truckers to move America's goods.[1] The American Trucking Association reports that the industry is short a record of 80,000 drivers.[2]

On a macro level, this supply/demand imbalance is widespread, driven not only by a supply shortage, but by a pandemic-fueled "demand shock" that has no end in sight.[3]

Large carriers are doing whatever they can to hire drivers and keep up with demand, while allowing more time at home and dramatically increasing wages (some drivers are making up to as much as 6 figures).Yet, annualized turnover rates for large long haul carriers continue to exceed 90% according to the DOT.[4]

In summary, we don't have enough driver capacity to meet market demands and carriers are struggling to retain the capacity they do have.

There has to be a better way.



Carriers lose 40% of their available capacity every day because of inefficient coordination between drivers and warehouses.[5]

Testifying in Congress, MIT's David Correll, explained that long haul full truckload drivers spend an average of 6.5 hours every day driving out of their available 11 hour clocks.

He explains, "this chronic underutilization problem does not seem to be a function of what the drivers themselves do or don't do, but rather an unfortunate consequence of our conventions for scheduling and processing the pickup and delivery appointments."

Correll goes on to say that we may be able "overcome what many of us feel is a driver shortage" by adding just 18 minutes of driving time to every existing truck driver's day.

All of this adds up to half a billion wasted hours and over $15 billion of lost profit opportunity across all of long haul trucking per year. That's not even counting the $3 billion of fuel wasted per year due to truck's idling[7], the increase in accidents associated with increased dwell times[8], or the millions of dollars companies spend recruiting new drivers who leave each year because wasted time at warehouses is associated with massive reductions in annual driver earnings.[8]

In short, there is a massive opportunity to increase available capacity in the market and improve the experience for drivers if we can fix the inefficient coordination between drivers and warehouses.

Half a billion wasted hours

Over $15 billion of lost profit opportunity

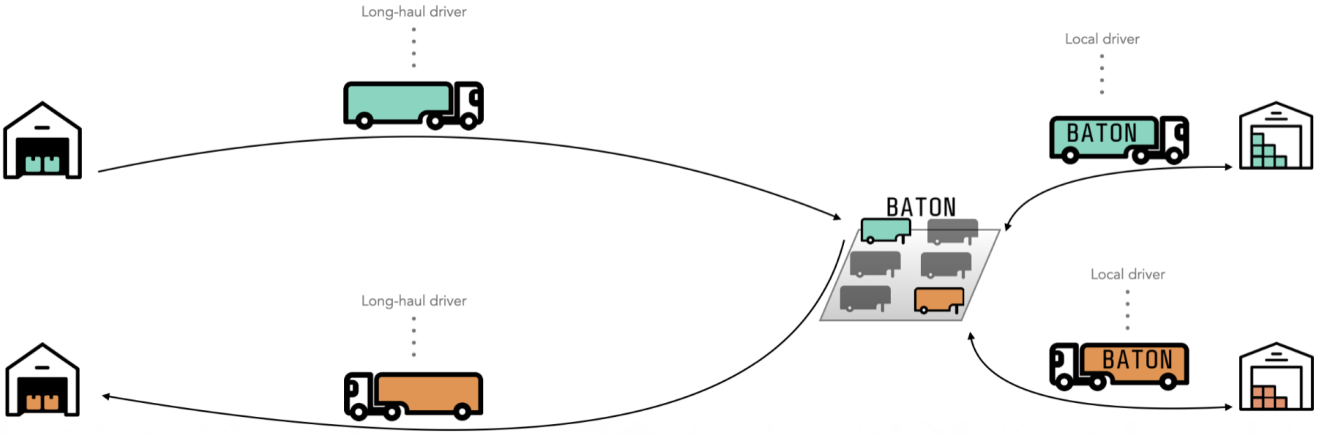
$3 billion of fuel wasted per year

Proposed Solution

Local relays can free up a massive amount of wasted long haul driver capacity by simplifying driver/warehouse coordination.

A "local relay" is an operation where instead of driving into a city, waiting in traffic, waiting for a scheduled appointment, or waiting to be unloaded, a long haul driver can instead stage and pick up loads from a drop yard.

A local driver then "relays" the load to or from the warehouse. This is often more efficient because local drivers can deliver off-peak and don't have to wait for appointments.



However, there are two primary objections when it comes to local relays:

1. Local relays increase costs and add service risk to an already margin constrained trucking operation.
2. Local relays don't actually reduce wasted time in the system but instead inherit it.

In a two-month experiment, Baton demonstrated an ROI positive implementation of local relays as a way to dramatically increase the productivity of long haul drivers.

In the linked white paper, we outline the results of a two-month experiment carried out with one of the nation's largest asset-based carriers. The goal of this experiment was to test out in a controlled setting, using actual driver log data the degree to which local relays can free up long haul capacity. Secondarily, we analyzed the actual return on investment (incremental profitability vs cost) of using a local relay.

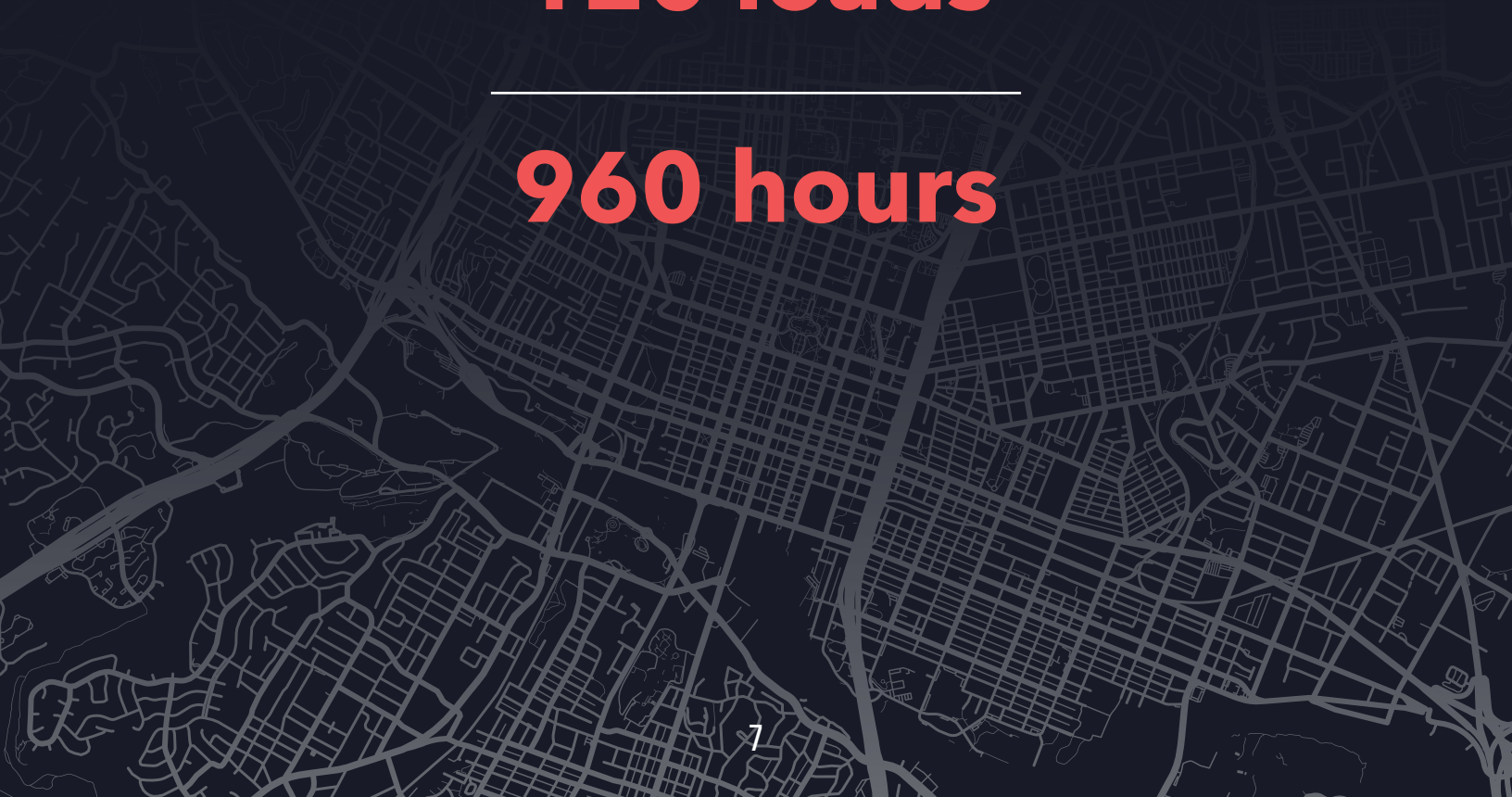
The Result

8 hours of freed-up time per load

98% on-time service performance

120 loads

960 hours



Summary of Experiment

Baton's local-relay-as-a-service model freed up as much as 8 hours of productive driving time per load even on loads that are considered "efficient" by the industry, appointment-based drop and hook loads.

The experiment was carried out on over 120 loads delivered or picked up with 98% on-time service performance (0 min grace). With this freed up time, the long haul drivers who relayed loads to Baton drove enough incremental profit (increased miles per week) to cover the costs of the relay in the most strict use case (drop and hook).

Our Thoughts

We believe that local relays are an effective way to increase the nation's driver capacity while enabling a better experience for drivers and reducing astronomically-high turnover rates. The reality, however, is that not everyone has the scale to establish a relay. It takes capital and a high amount of consistent load volume to justify the fixed real estate and local driver costs needed to make a relay model work.

Our mission is to eliminate wasted time in trucking by democratizing local relays for all carriers in all major cities.

Bottom line--more profit for carriers and happier drivers.

"I like that we're able to drop and go. I'm not wasting any time trying to get unloaded and get to use all my hours."

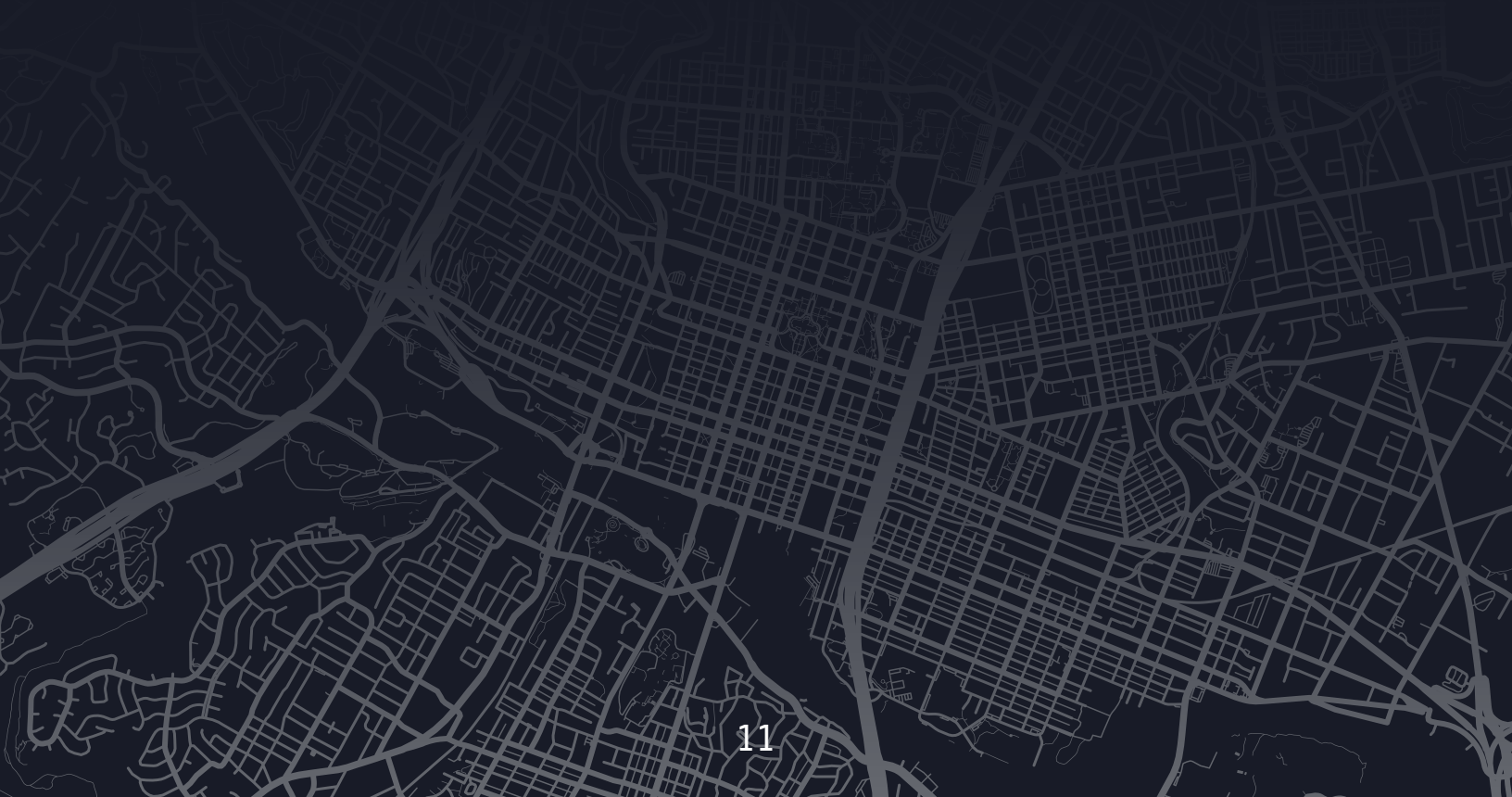
James
OTR Driver

"What I like most is how easy everything is. I can just pick up or drop off and keep rolling."

Jorge
OTR Driver

The Experiment

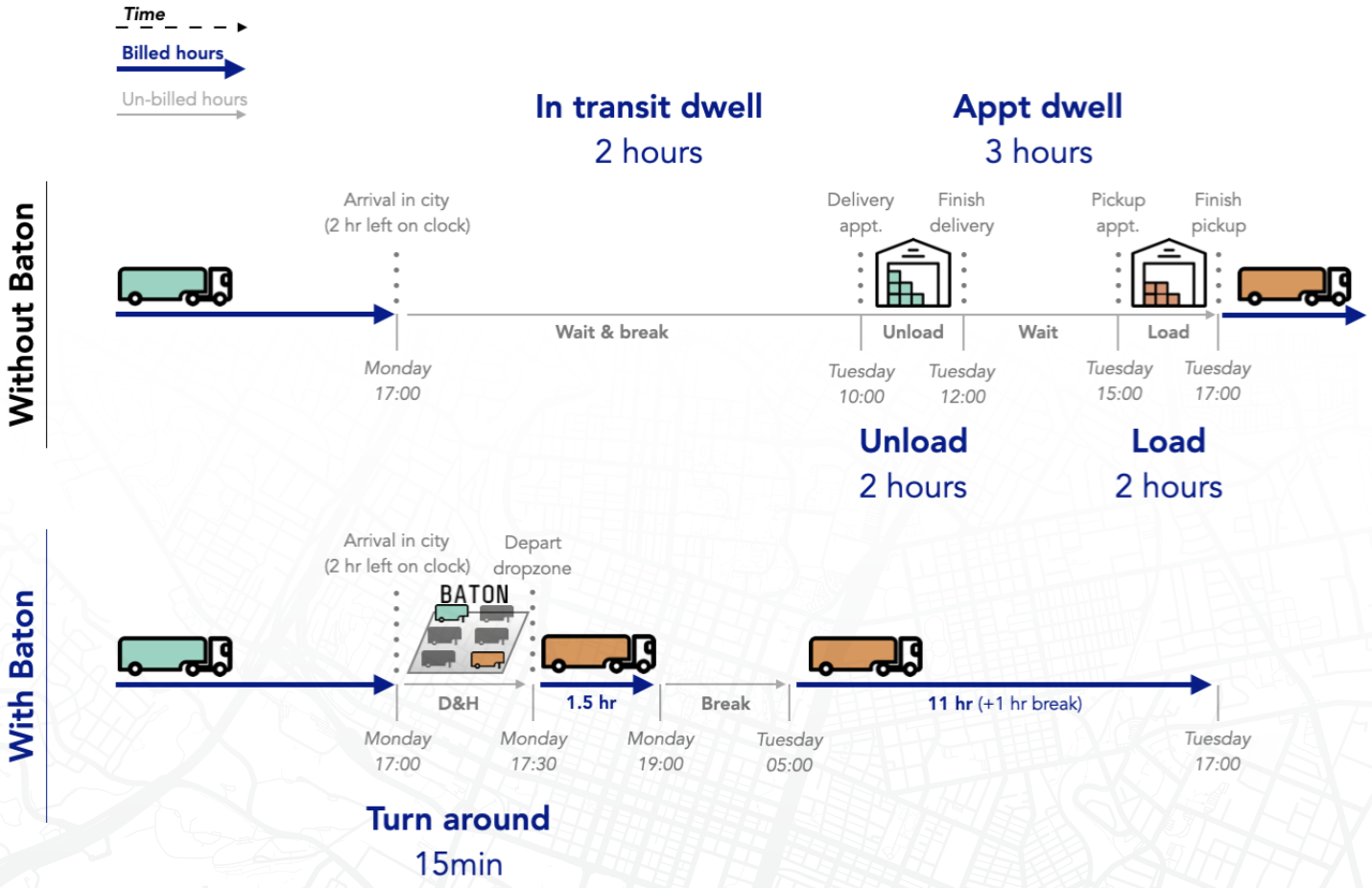
Cost/benefit study on the impact of local relays on long haul driver productivity



Abstract

Long haul drivers lose time when trying to coordinate with warehouses. The average driver spends over 3 hours loading and unloading at warehouses[6]. Moreover, drivers often bake extra time into their journeys and between deliveries and pickups to avoid late penalties and hit tight warehouse appointments. All of this adds up to billions of dollars of wasted driver capacity and opportunity cost per year.

Baton has demonstrated with a top nationwide carrier that leveraging a third party local relay model can free up massive amounts of wasted long haul driver time, increasing productivity and generating profits that outweigh the direct costs of the local relay.

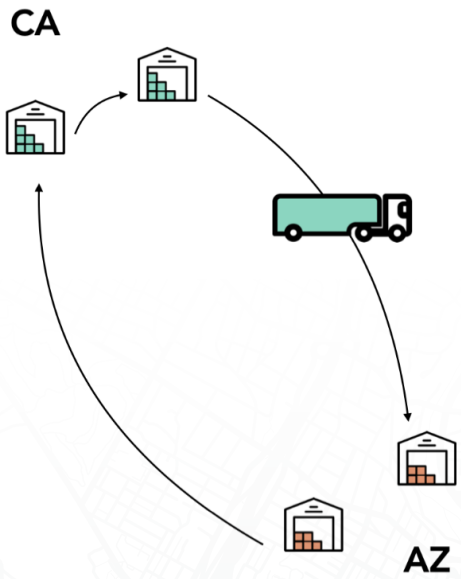


Overview of the Experiment

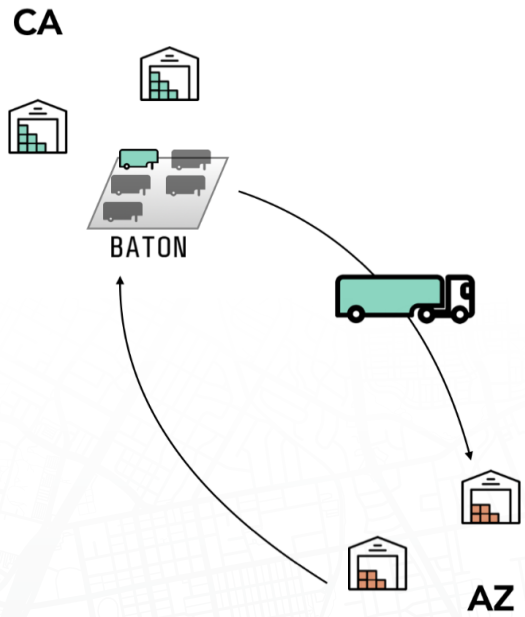
Baton ran a controlled experiment with a top-5 nationwide carrier with the goal of recapturing wasted time.

The carrier set up two groups of long haul drivers, a control group and a test group.

Control



Baton



The control group ran their standard routes to/from warehouses in LA.

Instead of going to warehouses, the test group staged pickups and deliveries at a Baton drop yard, and Baton drivers relayed the first/final mile.

Setup volume:

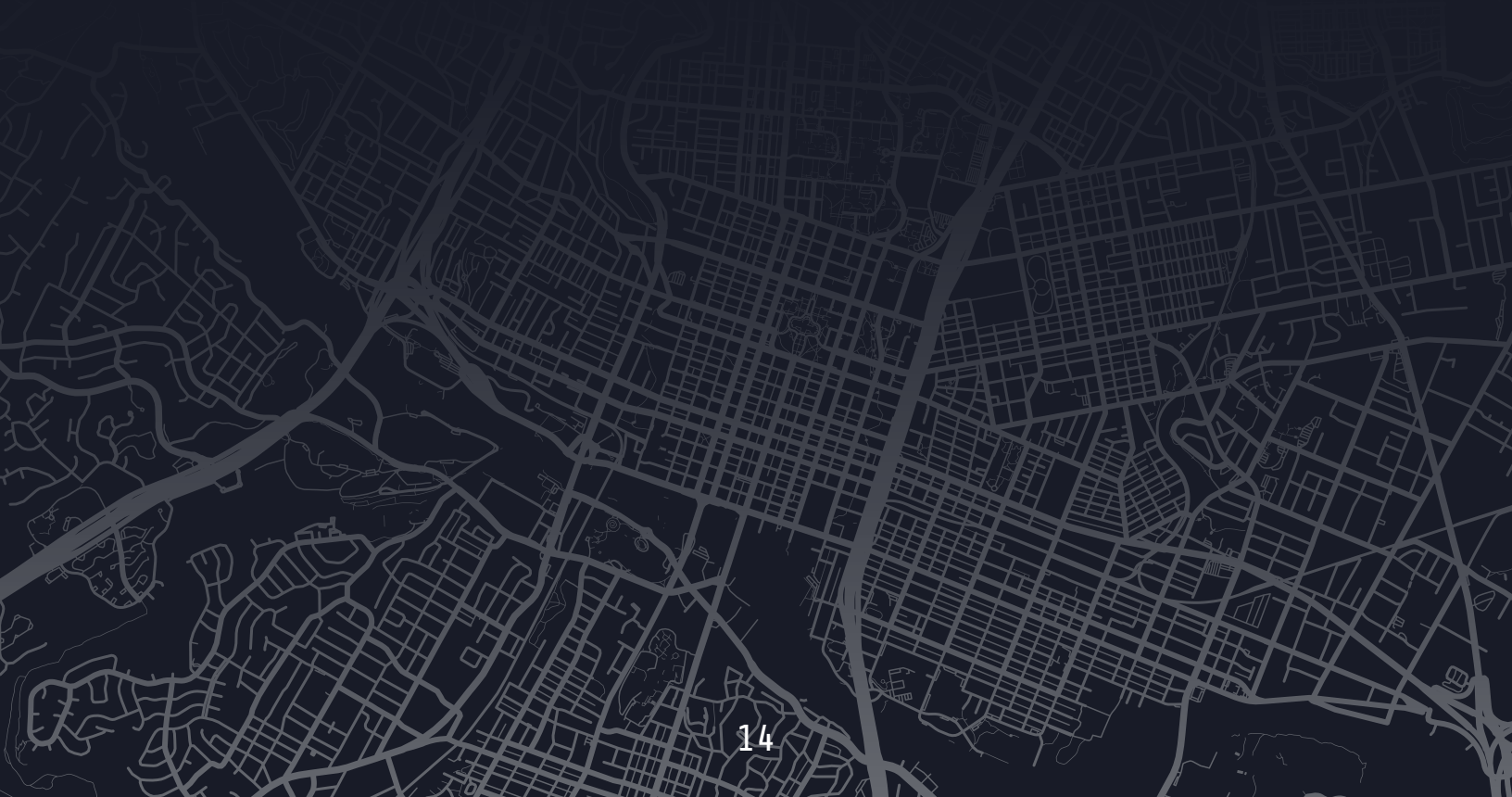
1. 123 loads each for control and test groups
2. Roughly split pickup and delivery
3. 2 loads per day for 60 days
4. Control freight mix: 8% live, 92% drop/preload

Thesis

Local relays significantly free up wasted long haul driver capacity by reducing time lost due to:

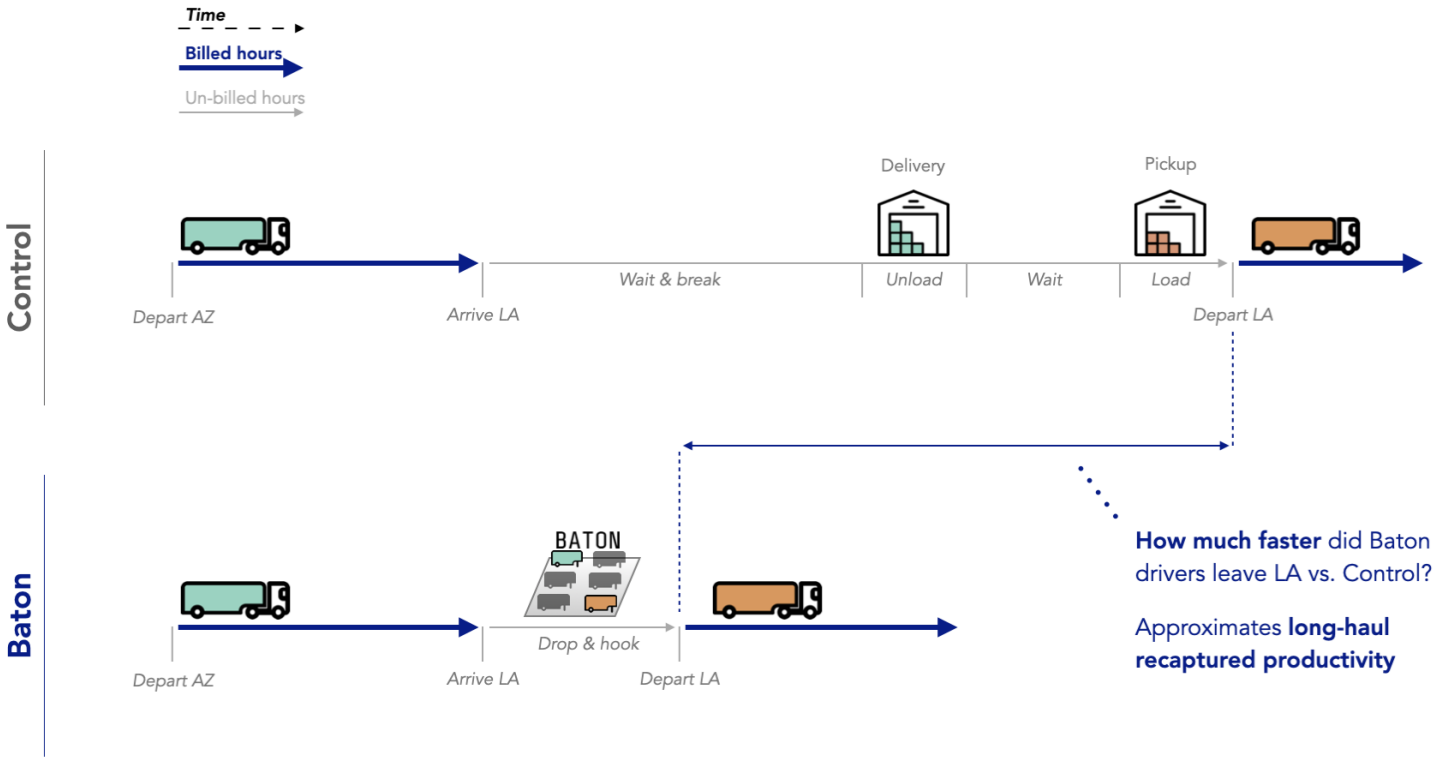
1. Peak traffic
2. Peak warehouse congestion
3. The inherent lost time due to appointment constraints (arriving early or waiting for your next appointment)

Local relays can be ROI positive while improving on-time service performance levels.



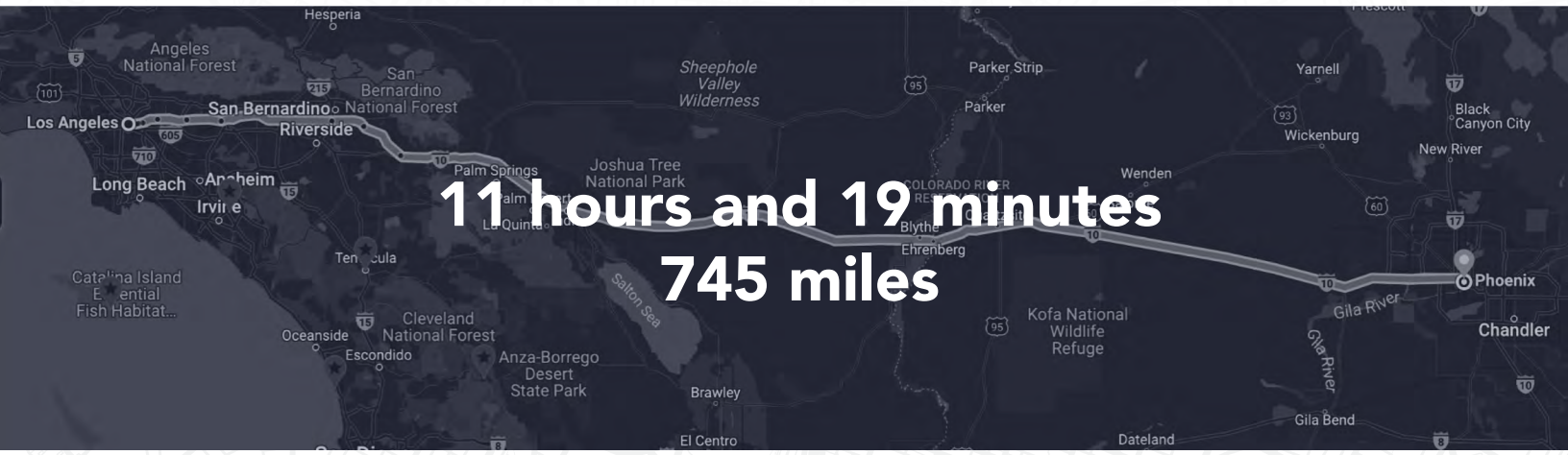
Experiment 1: Recaptured Wasted Time

Goal: Measure how much more quickly the test group returned to PHX



Experiment 2: Incremental Miles Per Week

Goal: Over a week, measure how many more PHX to LA loops the test drivers got than the control drivers

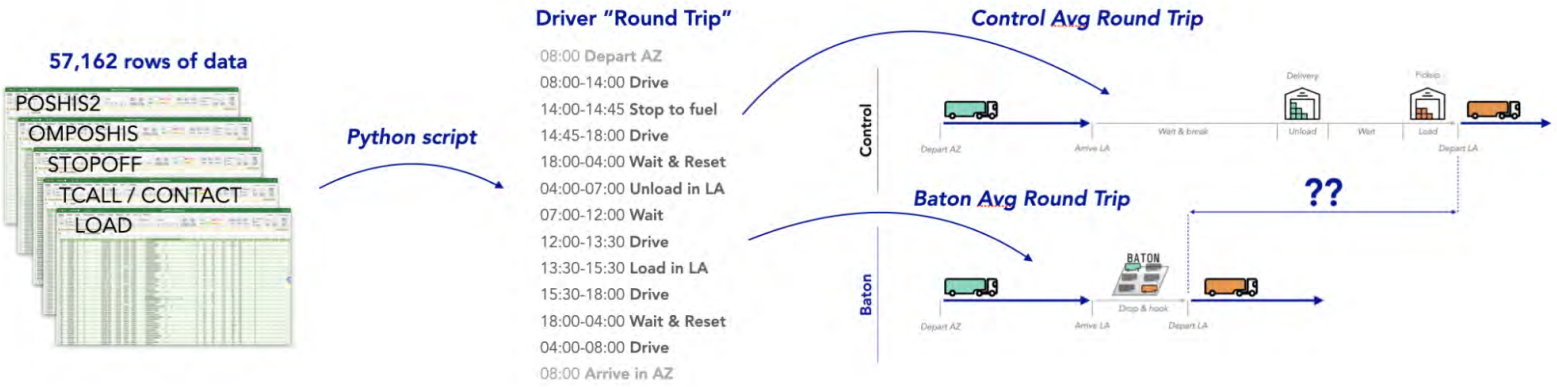


Method and Results

Experiment 1: Recaptured Wasted Time

Method

Baton analyzed timestamped driver log data with GPS coordinates provided by the long haul carrier. Data was captured for control and test drivers.



57,162 rows of driver log data for 123 loads were cleaned and formatted into a set of time stamped events using a python script.

This event list composed a driver round trip from PHX to LA to PHX.

The average trip duration was then calculated for control and test drivers by subtracting the difference between the arrive PHX time and depart PHX time stamps.

average trip duration = PHX arrive time - PHX depart time

The difference in round trip durations between control and test groups was used as an approximation for the recaptured wasted time that Baton was able to generate.

recaptured waste (theoretical) = average trip duration (control) - average trip duration (test)

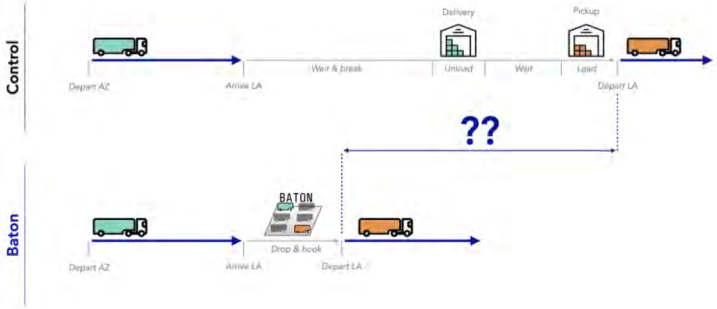
Experiment 1: Recaptured Wasted Time

Limitations

1. Some control and test drivers ended their clocks early when they were at their home locations. In these instances, an LA-based control driver could have a longer round trip because they ended their clock early to go home
2. The relay point was only in LA and further efficiencies could be gained by implementing a relay in PHX as well

Results

Test drivers returned to PHX **16.2 hours faster** than control



Analysis

	Control	Baton
Avg hours per Round Trip:	44.2	28.0
Hours saved per Round Trip:		16.2
Hours saved per load:		**8.1!!**
Control drivers % longer per load:		**57.9%**
Contribution margin:		$1.25 / mile
Theoretical speed:		50 mph
Theoretical profit opp. per load:		**$506**
Drop & hook cost per load:		$140
Theoretical ROI per load:		**+$366**

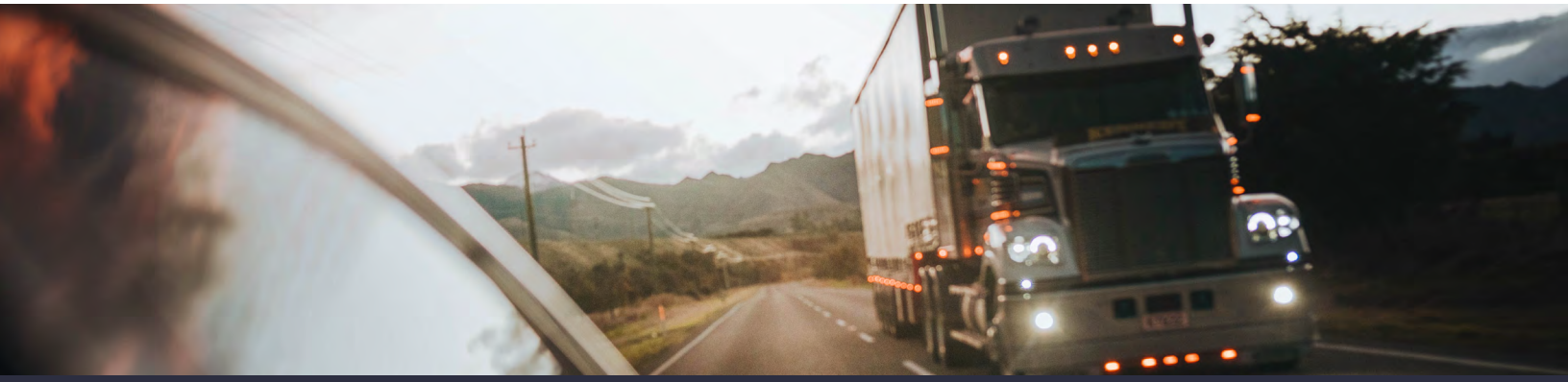
*Theoretical profit per week (4.9 loads) = **$2,486***

Theoretical profit per load was calculated by taking the recaptured waste (theoretical), dividing it by two (2 loads per loop), multiplying by the carrier's contribution margin per mile, and multiplying by 50mph.

theoretical profit / load = (recaptured waste (theoretical) / 2) x $1.25/mile x 50 mph

ROI against Baton was then calculated by subtracting the average Baton drop and hook rate for the distance used in the pilot.

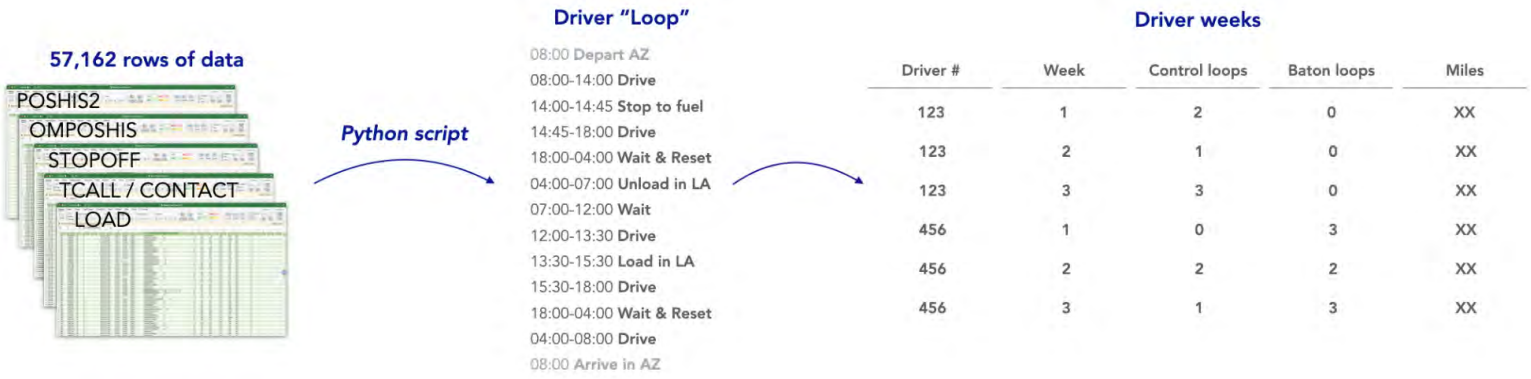
ROI = theoretical profit / load - Baton cost / load



Experiment 2: Incremental Miles Per Week

Method

Baton extended the "round trip" analysis from experiment 1 for an entire week to calculate how many PHX to LA to PHX loops control and test drivers completed on average over a week.



Mileage per week was calculated by measuring the average PHX to LA to PHX loop distance (using Google Maps) and multiplying that by the number of loops each driver completed in a work week. Incremental mileage was then calculated as the difference in miles driven by the control and test groups.

mileage/week = distance (PHX->LA->PHX) x number of loops completed

incremental mileage/week = mileage/week (test) - mileage/week (control)

Incremental profit/wk was taken by multiplying the incremental miles per week by the carrier's contribution margin.

incremental profit/week = incremental mileage/week x $1.25/mile

Baton performed 4.9 loads per week on average at a cost of $140/load.

ROI was calculated by subtracting the cost from the incremental profit.

ROI = incremental profit/week - Baton cost/week

Experiment 2: Incremental Miles Per Week

Results

	Avg total loops /wk
Control	**2.24**
Baton	**3.05**

Value Analysis	
Incremental loops /wk	0.81
Avg miles per loop	742
Incremental miles /wk	601
Contribution margin	$1.25/mile
Incremental profit /wk	**$751**

Cost	
Baton loads /wk	4.9
Avg cost per drop & hook*	$140
Total cost /wk	**$686**

Test drivers drove **601 more miles per week** than control
Baton was **ROI positive on drop and hook loads**

Discussion and Future Work

One of the more surprising findings in this experiment was the degree to which control drivers lost time even when doing drop and hook freight. Throughout the experiment and after having completed thousands of drop and hook loads for customers, we've discovered that drop and hook is only really productive when compared to live freight.

1. **Time at warehouses:** Based on ingested ELD data that we've collected, we've seen that oftentimes, drivers still spend over an hour on average at warehouses when completing a drop or hook load.
2. **Trailer hunts:** One of the largest problems in the industry is trailer detention, when warehouses effectively hold trailers hostage. In order to pick up or drop off a preload, drivers often have to replace the load with an empty trailer. If that trailer is held up, drivers will go on a citywide trailer hunt and waste precious hours.
3. **Appointment coordination:** With the exception of 24/7 freight, appointment coordination still causes a massive amount of lost efficiency for drop and hook loads. This is because drivers often buffer in additional hours to avoid late fees. Because time at the warehouse is often unpredictable, it's nearly impossible to schedule two loads perfectly back-to-back, making the time between appointments an additional source of waste.
4. **Peak traffic:** Long haul drivers end up delivering when they arrive which can be during peak traffic.
5. **Out of route miles:** If loads aren't planned perfectly, there can be a significant amount of out of route time that drivers incur between their pickup and delivery.

Local relays simplify all of this for the long haul driver and are net more efficient.

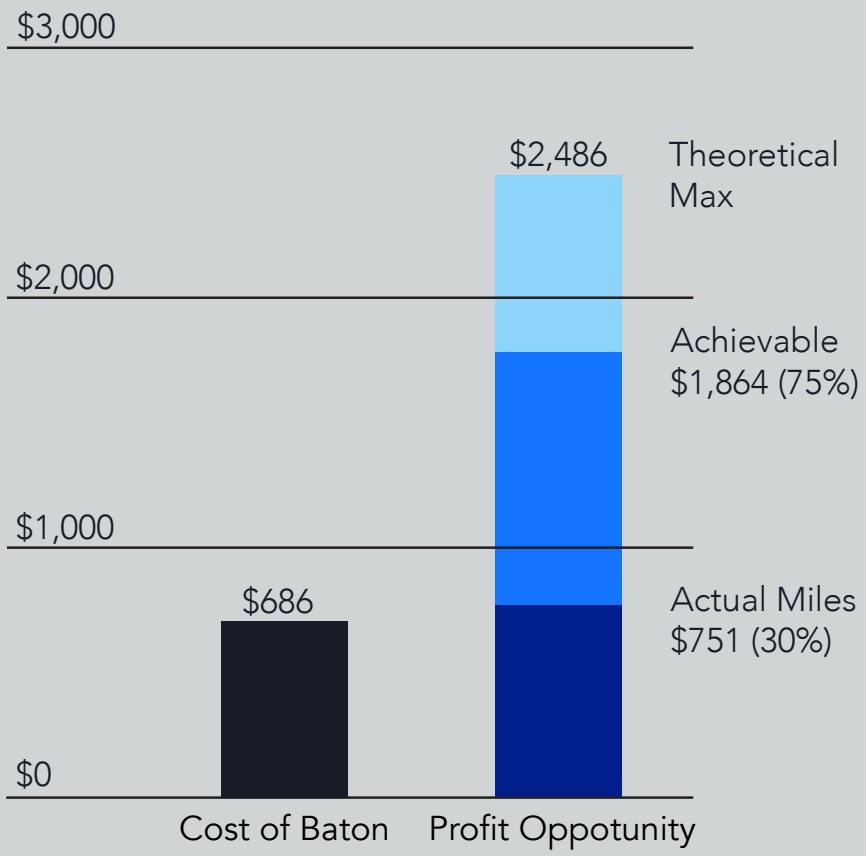
1. **Off-peak traffic:** Local drivers often can deliver or pickup during low traffic.
2. **No waiting for appointments:** Because of their proximity to warehouses, local drivers don't have to bake in hours of time to hit appointments.
3. **Trailer banks:** Using a relay model allows carriers to maintain an internal local trailer pool which dramatically reduces the times in which drivers go hunting for trailers.

Using local relays for live loads will have dramatically higher ROI

This experiment demonstrated the ROI positive use of Baton on the most efficient alternative, drop and hook loads. Live loads are often much more inefficient and can cause up to days of lost driver time

1. **Tighter appointment windows:** Live freight usually has tighter appointment windows than drop freight.
2. **Average detention:** 3 hours for live freight.[6]

Why was there a gap between theoretical profit opportunity (recaptured wasted time) and actual incremental miles per week?



In the experiment, we found that on a per-load basis, the actual profits created from incremental miles driven per week in Experiment 2 were only 30% of the theoretical profits from the recaptured wasted time in Experiment 1.

We believe there are three primary reasons for this and three strategies carriers can adopt to increase their profits when using a local relay model.

1. **Driver control:** Given freed up time, some drivers will end their clocks early rather than jump on an additional load. Carriers can incentivize drivers more with a profit-share to recapture time that would have otherwise been wasted.
2. **Weekend coverage:** Baton doesn't have weekend coverage so drivers inevitably end their clocks on Friday for the week. Allowing drivers who have time to run loops over the weekend would yield more loops.
3. **Network design:** It takes time to adapt a freight network to recapture the incremental productivity gained from local relays (on average 3 to 6 months). Shippers and appointments have to be matched such that long haul drivers can get a return load. Implementing a relay for longer length of haul loads is an easy way to generate larger and easier-to-capture returns as there are fewer loads/week that have to be matched.

Closing Thoughts

In short, local relays are an economically viable strategy that carriers can use to free up lost productivity, increase capacity, and offer a better lifestyle for long haul drivers.

Ultimately, this ties back to a fundamental problem facing the US supply chain and economy. We can't bring on drivers fast enough and the drivers we do bring on aren't staying. Providing higher salaries for drivers is a good start, but this is a solution that only fuels the current inflationary cycle. Costs go down in systems that focus on increased productivity, which in this case also ties to higher wages for drivers paid per mile, not per hour. This is why we believe that focusing on solutions that free up lost time is the best way forward.

Interested in implementing a local relay yourself? Feel free to reach us at info@baton.io.

Sources

1. https://www.nytimes.com/2021/11/09/us/politics/trucker-shortage-supply-chain.html
2. https://www.trucking.org/news-insights/ata-chief-economist-pegs-driver-shortage-historic-high
3. https://www.bridgewater.com/its-mostly-a-demand-shock-not-a-supply-shock-and-its-everywhere
4. https://www.fleetowner.co1m/news/supply-chain/article/21169260/dot-roundtable-addresses-driver-retention-supply-chain-disruptions
5. https://www.marketwatch.com/story/40-of-americas-trucking-capacity-is-left-on-the-table-every-day-mit-expert-tells-congress-11637183872?mod=article_inline
6. https://s29755.pcdn.co/wp-content/uploads/2020/03/The-True-Cost-of-Detention-Time-January-30-2020-3.pdf
7. https://medium.com/8vc-news/how-to-reboot-the-trucking-industry-60757dac3968
8. https://www.oig.dot.gov/library-item/36237

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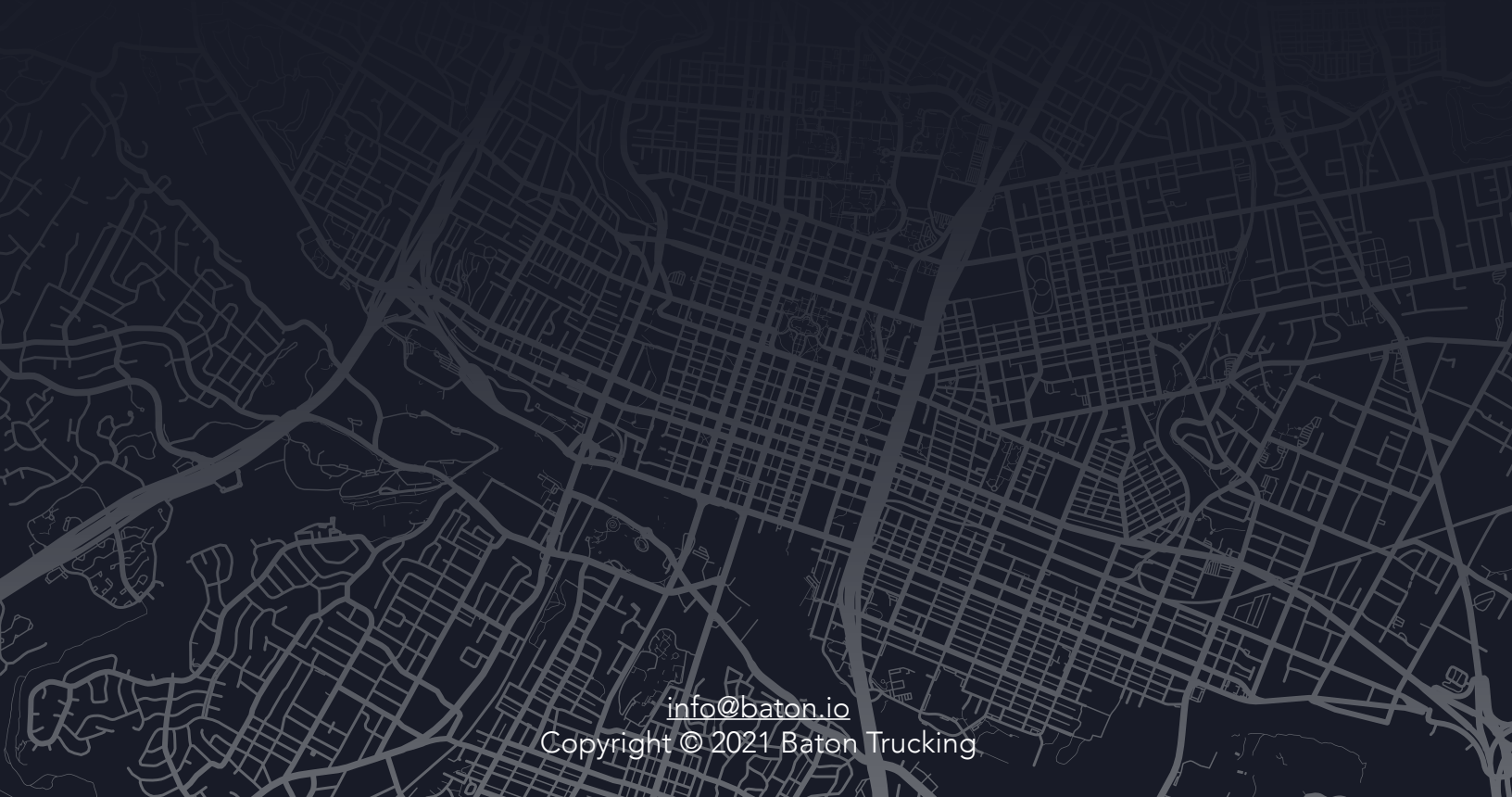

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