

# Optimizing Driver Incentive Plans and Adapting to Market Changes



Lyft operates a peer-to-peer marketplace for ridesharing in the United States and Canada. Lyft also offers a car rental program for drivers and bike- and scooter-sharing services for riders in various cities.

**Industry:** Transportation Marketplace

**Location:** Americas

**Use Cases:** Transportation, Incentive Design

**Website:** [www.lyft.com](http://www.lyft.com)

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## Results

- Reduced solve time per linear problem by 80%
- Improved overall end-to-end solve time by 92%



With Gurobi's solver, Lyft can devise optimal incentive plans that influence positive market outcomes for both drivers and riders.

As one of the largest shared mobility networks, Lyft connects millions of people with the transportation services they need every single day, from ride services to bike and scooter rentals.

But Lyft doesn't just cater to those on the move—they also offer an opportunity to millions of drivers across the U.S. and Canada to earn money on their own schedules.

To sustain their widespread operations, Lyft uses mathematical optimization to facilitate logistics, incentive allocation, market design, pricing levels, and more.

Since adopting Gurobi as their primary optimization solver, Lyft has seen exponential efficiency gains that have changed the way they're able to plan out operations.

## Driving Positive Outcomes Despite Millions of Variables

As independent contractors, drivers using Lyft are in control of when and how they drive. Lyft's role is to enable them to be successful with timely, accurate information on market balance.

One way to influence positive market outcomes is by providing driver incentives and showing drivers how they can increase their earnings.

"An example that most riders are familiar with is Prime Time, which raises prices when the demand for rides exceeds driver supply," explains Chris Sholley, Senior Director of Lyft Driver Earnings. "That's one way for us to manage the health of the marketplace. But when we initially launched it, one of the biggest complaints from drivers was that the Prime Time levels change too frequently. So we developed a Prime

Time equivalent for the driver's side, Bonus Zones. This allows drivers to see the incremental money they can earn on a ride, represented visually on a map."

The challenge for Lyft, however, lies in determining the optimal level, location, and duration of the zones.

Under another incentive, drivers can receive a bonus after reaching a milestone, such as completing a certain number of rides in a week. But after how many rides? And how much should that bonus be? For help answering these questions, Lyft sought an optimization solver.

Sholley had prior experience with Gurobi as a college student and appreciated its seamless integrations, so when it came time to shop software vendors, he knew where to start.

## Optimizing Incentive Plans with a User-Friendly Solver

Lyft's optimization problems involve millions of variables and constraints, and they need a solver that allows them to converge on a solution within a limited amount of time.

In the past, the Driver Earnings team had tried a variety of solvers, including commercial and open-source options. But when it came to speed, they found the best results with Gurobi.

"In the end, we found that in most instances, Gurobi was the most efficient," says Sameer Manek, Senior Staff Data Scientist on Lyft's Driver Earnings team. "One of the big advantages was that Gurobi for Python has a matrix-based API, which allowed us to express our problem a lot more naturally—because a lot of our modeling

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**Chris Sholley**

Senior Director of Lyft Driver Earnings,  
Lyft



is in matrices, so being able to express it in matrices as well just made it more seamless.”

In addition to better computation times, the Lyft team has found that Gurobi is also easier to use compared to other options. “We have some new products that we are still in the process of launching, and we can very quickly and easily prototype optimization algorithms for those using Gurobi,” says Abbas Bozorgirad, Data Science Manager on the Lyft Driver Earnings team. “And it does a very good job, enough that the initial prototype could basically stay in production.”

Bozorgirad says that although Lyft could likely use other algorithms to find an optimal solution, Gurobi offers the fastest—and most reliable—route. “Besides speed, we can also be confident that we’re taking the optimal approach,” he explains.

## Faster Solve Times for More Effective Planning

Since making Gurobi the primary solver for their driver incentive optimization problems, Lyft has reduced their time spent per linear problem by 80% and improved their overall end-to-end time by 92%.

Those efficiency gains have allowed Lyft to plan ahead more effectively, which offers them a competitive advantage

and enables them to adjust to market changes more rapidly.

“One thing that has been easier to do with Gurobi—mostly because of the speed-ups—is that we can pre-populate multiple scenarios, and plan and revise with shorter timelines,” explains Manek. “So rather than needing to think about how many minutes or hours of lead time we need, we can shrink that down, which gives us more time to iterate.”

Prior to using Gurobi, when Lyft would near its deadlines for notifying drivers of upcoming incentives, they would often have to settle for suboptimal plans in order to give drivers adequate notice. But now, they have much more time and flexibility.

And because Lyft is better able to plan, they’re also able to think about different types of incentives more jointly.

“Rather than thinking about these incentives in isolation, we’re able to coordinate more easily across Bonus Zones or weekly ride goals,” Manek says.

As for future plans, one goal that Lyft would like to continue pursuing with Gurobi is an ability to plan incentives around various degrees of uncertainty. “We might not know exactly when the Taylor Swift concert is going to end, or if there’s going to be a rainstorm in Buffalo next week,” says Manek. “But our goal is to make our incentive decisions with an awareness of those variables.”

With Gurobi, Lyft can continue improving their planning processes and incentive programs without the negative effects of vendor sprawl because they have everything they need in one solver.

As Sholley explains, “Gurobi is a competitive piece of software—it can solve many different optimization problems. So rather than trying to find a set of solvers, you really can make Gurobi your one-stop shop.”

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