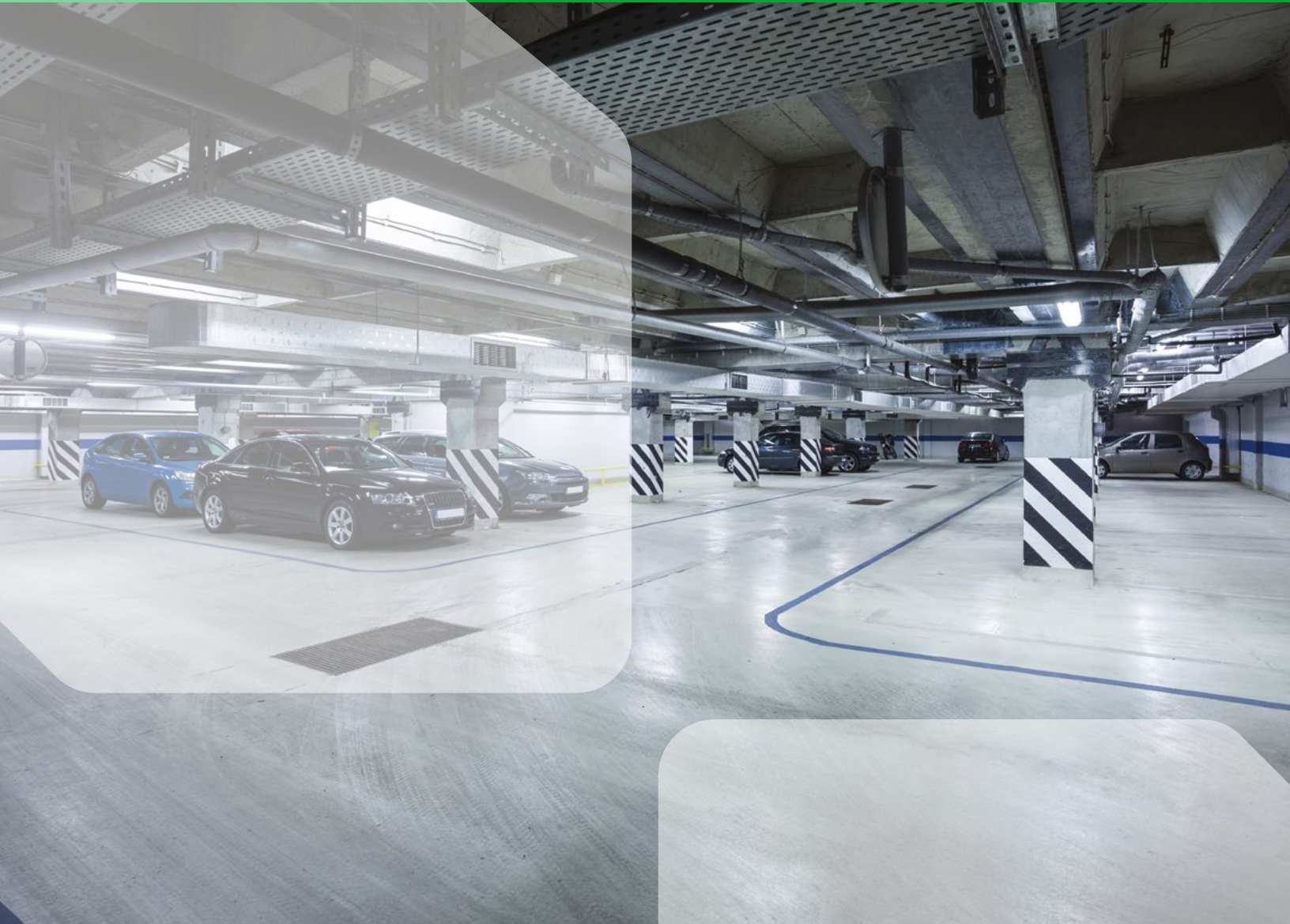


NEW TECHNOLOGIES TO OPTIMIZE PARKING AVAILABILITY, SAFETY AND REVENUE



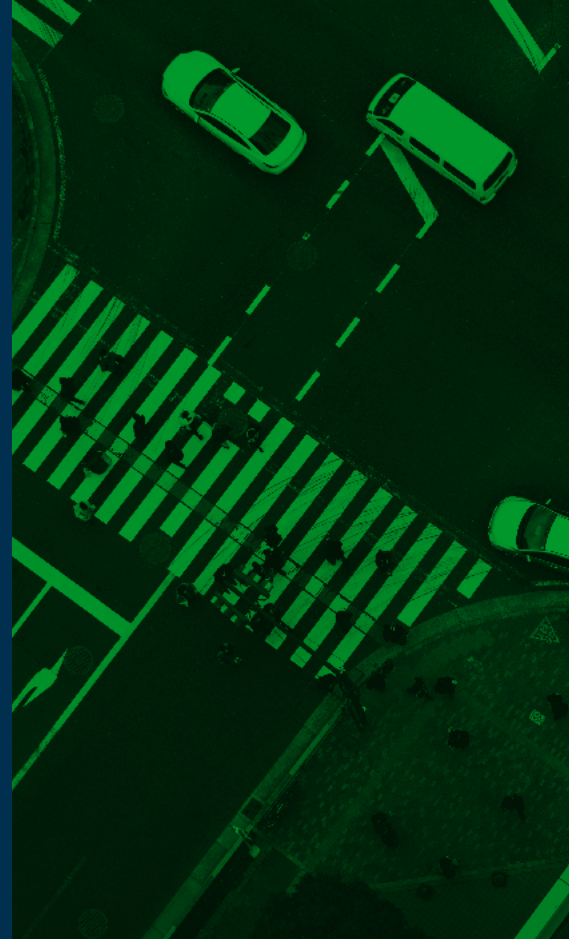
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CONTENTS

Introduction	3
Parking Technology: A Brief History	4
The Current State of Parking	4
Solving Parking Challenges with Technology	6
New Technologies and Efficiencies	7
New Ways to Maximize Revenue	8
The Importance of Tracking Occupancy	9
Using Occupancy Data to Improve Wayfinding	10
Increasing Safety	11
Data Reports	11
Case Study – Major University	12
Conclusion	12





Introduction

Here at All Traffic Solutions our parking solutions specialists talk to facilities managers every day. The particulars of each conversation are different, but the underlying questions are pretty consistent:

1. *What's the most efficient and accurate way to optimize parking availability?*
2. *How can we maximize parking revenue at our facilities?*
3. *What can we do to keep parkers and pedestrians safe?*

These are not simple questions to answer. There are many solutions on the market that promise to efficiently optimize parking availability, other tools for wayfinding, and still more for calming traffic. And although we may argue about which are the best approaches to take, most people will agree on one point: there are a limited amount of resources available to make it all happen.

At the same time, populations are increasing, cities are growing, customer bases are (hopefully) increasing, accidents are up, and aggressive driving is on the rise. How can you maximize your parking revenue, but at the same time keep parkers and pedestrians happy, the town happy and keep everyone safe?

In this white paper we'll look at the issues that parking professionals struggle with most, and how we can alleviate the pain and gain efficiencies without breaking the bank. We'll talk about how the transportation industry is changing as parking departments and transportation departments are working together and even beginning to merge. We'll look at the latest parking technology that's out there, specifically for wayfinding and availability, where that technology is going and what that means for parking operations as a whole.

Wayfinding ties into the issue of safety, and we'll touch on new ways to increase safety for pedestrians and parkers. Finally, we're going to explore how we can leverage all the parking and traffic data that is available and how we can use analytics to make things better.



Parking Technology: A Brief History

Since the dawn of recorded parking history, everything was hardware-driven, whether it was single-slot meters, parking access and revenue control systems or the handwritten tickets that were given out to enforce parking rules on the street. From the software or technological aspect, everything was very closed-architecture. No system really talked to another system, and people either used Excel spreadsheets or handwritten notes to record massive amounts of data, and there was no way of connecting any of that information.

About ten to 15 years ago, there started to develop a trend to try to fix that. That trend is the Internet of Things, or IoT for short. This essentially means that any device that can connect to the Internet has the ability to capture data, whether it's your phone, a parking meter or a parking garage gate. We slowly started to see a shift to a software-based or flexible software mobile solution, but the key is that they are accessible to the Internet. By being accessible to the Internet, they have the ability to capture and record data so that they can keep it and analyze it over time.

Connected systems and the ability to capture and analyze data is the direction parking management is headed, but there are still some shortcomings out there.

The Current State of Parking

Today, chances are you do not have a holistic view of your parking inventory. If you're like most parking operations you have several different components of your operation. Even if you don't have a transportation department that you are also managing, you probably have multiple ways for people to park, whether that's a parking garage and a surface lot or on-street and off-street parking. There are probably multiple ways for people to get to where they want to park. You may also manage some permit parking, whether you're a university and all of your students or faculty have to wear

or carry permit or you're a municipality with residential permit programs.

No matter the type of parking you operate, chances are you don't have access to real-time information and have no way of knowing what your entire inventory looks like at any specific moment. If you have a parking garage, you might know what your availability looks like in that garage, but you don't know what your availability is in your surface lots or in your on-street program. For most parking facilities, each of those inventory components has a separate system that you have to access separately as well. You could see your garage



inventory if you look to your access and revenue-control company's software, but if you want to see your current surface lot inventory or your meter program availability, you'd have to go to those different systems. Bottom line: you don't have a way to manage it all in one consistent format or meaningful view so you can see everything in real time.

As a result of not knowing that real-time availability, your wayfinding suffers. Statistics show that 30% of traffic in any given city at any given time is people looking for a place to park. Think of it —of all the drivers that you see in any given city, nearly a third are looking for a place to park. That makes for less-than-happy drivers, less-than-happy employers who are losing precious productivity and less-than-happy business owners because it's taking their customers longer to get parked, so they have less time to shop.

If you don't have real-time, end-to-end visibility into your inventory, you can't make optimal use of all the information that lives in each of your systems. For example, there are many different apps out there today that tell people where they can go to park. Typically, however, what they don't tell us is what the real-time availability is.

Someone who uses the app to locate a parking garage may be frustrated to learn when they get there that there isn't any availability, so now they have to go somewhere else. It's no wonder that parkers are so often irritated.

Without real-time availability data, you have no visibility into how your parking organization is currently functioning nor how it is changing and adapting and what the latest trends look like. With real-time data you could do many things. At certain times of the day, you might see spikes in parking demand and then be able to act accordingly.

Potentially you might be able to change traffic patterns to help alleviate some of those spikes or, from a revenue perspective, maximize those spikes by implementing dynamic pricing for your parking. If there are certain times of day where you're seeing a spike in the number of people coming in, you may want to increase the price during those times. Having these insights allows you to learn from the past to plan for the future.



Solving Parking Challenges with Technology

For most organizations, the cost of buying another facility or building onto existing parking areas is cost-prohibitive; the better option is to optimize the parking spaces you already have.

Optimizing your parking availability is great, but you now have other issues to deal with, such as the congestion that increased volume brings, and the potential of increased speeding in parking areas which could drive up the number of vehicle and pedestrian accidents. Then there's the question of how to manage and analyze availability data and if you can trust that the occupancy data you're collecting is accurate.

For example, have you ever entered a parking garage that had a wayfinding system with a sign that said that there were many spaces available, only to find that all of the spaces were occupied? Many of these systems rely on loops, which cannot recognize tailgaters and so do not account for every vehicle that enters or exits. Over the course of a single day those counts are going to become less accurate until there are significant discrepancies between the system occupancy counts and actual occupancy.

That's not to say that loops are a completely outdated method—there are certainly loops out there that can maintain accuracy, but if yours isn't one of them you're still going to require an occupancy system to track and provide an accurate occupancy count. Many organizations



don't have a way to track occupancy, and without somebody performing manual counts they have no way of knowing what their availability looks like.

Not only does this lead to inaccurate counts, it also can result in shrinkage. Everyone in parking knows that employees may be capable of pocketing money without processing a transaction. Although the technology has gotten better and in most cases facilities have a cashier station or a handheld to process transactions, it doesn't prevent somebody from just not processing every transaction. If you're starting to see large gaps in your transactions during busy times, obviously that's going to raise some red flags, but there are ways to track occupancy by reconciling the number of vehicles coming in with the number of paid transactions.

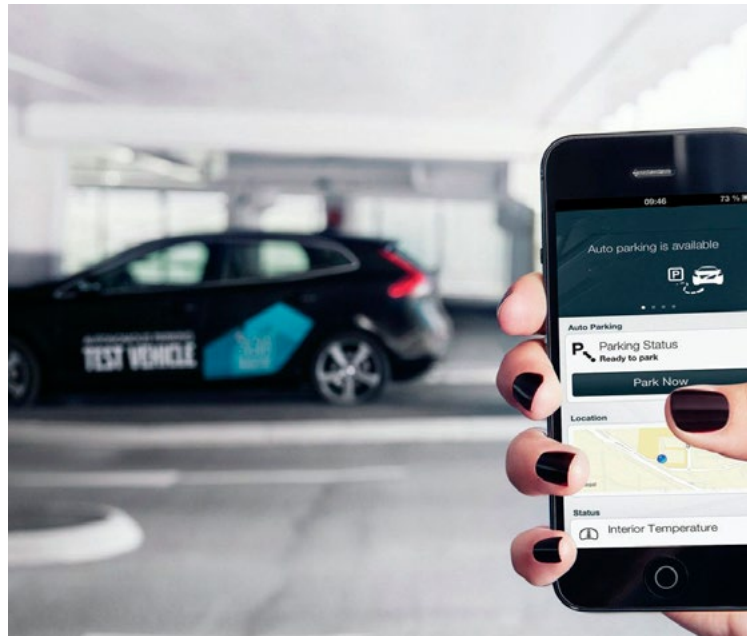
New Technologies and Efficiencies

There have been some great new technological advancements in parking, such as the Internet of Things mentioned earlier. We see more and more connected devices connecting with each other, such as integration between meters and access and revenue control companies, as well as sensor-based systems and even CCTV security cameras. There are many different options and different technologies that can provide more efficient, more accurate and more cost-effective operations.

For example, more organizations have the ability to combine their parking and transportation departments, managing bus and transit systems as well as parking operations, which has definite advantages. Some organizations are not only providing digital or variable message signs for parking, they are also displaying bus times and current bus occupancy so people can make informed decisions about whether to drive or ride public transportation. Or they are pushing real-time data to their university app or their customer website to let people know when a bus or train is running full.

Google Maps and Waze provide real-time traffic information, and they're starting to layer in parking information as well. There are apps that can track your route, so if you need to get from point A to point B, they can tell you the fastest, the greenest and the most economical ways to get there, as well as where you can park—even reserving your spot.

Combining parking and transportation systems also allows you to make more informed decisions. For example, a university that can track parking and know when campus is busiest can share that data with those in charge of creating new class schedules so they can balance out class times.



New Ways to Maximize Revenue

A lot of companies out there want to help you sell your inventory, and they will help drive people to your facility (for a fee) through advertising or through apps. If you know what your occupancy is you can sell more spaces by offering unused inventory to these companies rather than letting the spaces remain empty.

Knowing your occupancy also allows you to maximize revenue from parking permits and event parking. By tracking residential permits, you can start to see how many people are actually using your facility or lot. One of our university customers doesn't use physical permits for their lots. Everyone who purchases a permit is required to download an app, and as vehicles come on campus, they are matched using automatic license plate recognition (ALPR) cameras with the app. The app matches the license plate with the vehicle and allows the person to park. If the person doesn't have a permit associated with their vehicle, the university issues a summons.

The same technology is utilized for ride sharing programs. The system can detect when there are two people in a vehicle who are using the ride sharing phone app, and if there aren't, enforcement actions can be taken.

Our university customer has seen a significant increase in enforcement revenue by having the ability to enforce parking and HOV rules. It wasn't necessarily what they were trying to do—they really just wanted to drive enforcement of their policies—but the increase in revenue is a welcome plus.

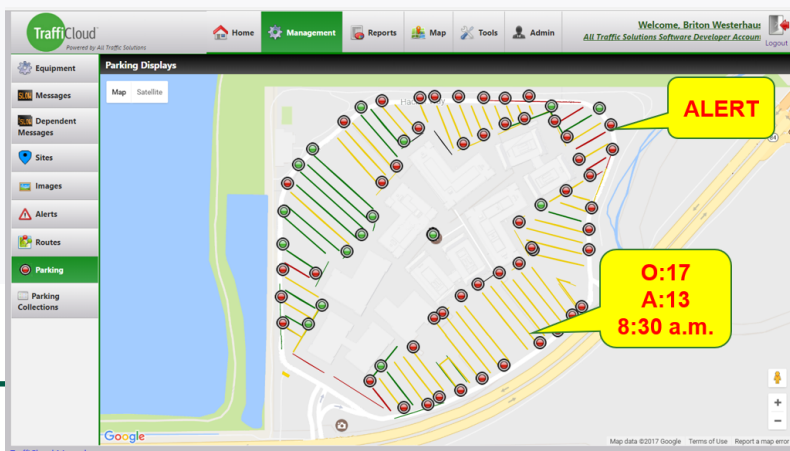
The same applies to event parking revenue. If you're using a handheld that verifies transactions or provides copies of receipts, you know how many paid but still don't know how many cars actually came in. If you know what your occupancy is in real time, however, you can reconcile against your transactions to eliminate shrinkage because those numbers will have to add up.



The Importance of Tracking Occupancy

There are new technologies available, including sensors and cameras that not only allow you to capture current occupancy, whether it's off-street, in surface lots or in facilities, but to track it as well. Let's look at why tracking occupancy is important.

Think of a parking garage at a shopping center with aisles of parking spaces, each equipped with a sensor so you can see in real time what your occupancy looks like. At 8:38 a.m. on one particular floor of the garage there are 17 occupied spaces and 13 available spaces, and in addition, there are metered spaces. You can set alerts (shown below) to let you know that somebody has come into in a space and hasn't paid. Before, the meter attendant had to notice if someone walked off without paying, then go to the pay station and add the information to a report or look at it on their handheld to see if the vehicle matched up. Now, you can receive an alert that says, "Somebody entered this space and didn't pay," so you can immediately take action.



Using Occupancy Data to Improve Wayfinding

If you have real-time occupancy data there are many ways you can use it to direct parkers to open spaces quickly. You can position signs outside your garage or lot, around campus, or on streets of your city to direct people to available spaces. You can push this information out to social media networks such as Twitter or Facebook or to a parking or ride sharing app that people can download to their smartphones. You can physically direct people into spaces, even giving them the option to reserve their space in the process.



Increasing Safety

By leveraging real-time availability data you can start to see an increase in safety. The faster you can direct people to parking spaces, the faster they can get off the road and out of the circling line, thereby reducing congestion and creating a safer environment. You can also make it safer by employing effective traffic calming methods. For example, in a parking garage you can install a web-enabled radar speed sign that gets drivers to slow down and sends speed and volume data to a central traffic management system for tracking. You can alert drivers to take care in areas where pedestrians might be trying to cross. You can even post bollards or signs to let drivers know that a pedestrian has entered or is nearing the roadway. No matter what devices you use, if you can push data and information out to drivers in real time, you will improve safety.

If there is heavy traffic or an accident that's causing a delay, you can alert people in advance, even before they hit the road. For example, you can send an alert to social media or to a message board in your garage or lobby that lets them know there's an accident on Road X so they should consider taking an alternate route. No matter what method you chose, if it leads to increased safety as well as increased customer satisfaction, it's worth doing.

Data Reports

Now that you have parking data, IoT and connected traffic devices, you can generate analytics and reports so you can start to plan more effectively, increase revenue and demonstrate to your constituency, your bosses or your organization the results of your safety program.

Say you're a hospital and you see the busiest traffic between 11am and 1pm and you want to raise your rates during that time. You can run a regression analysis to see what your revenue would look like if you increased your rates for that period of time for the next year versus what it will look like if you didn't increase it. The key is having accurate data that allows you to plan for the future.



Case Study—Major University

Large universities have to manage on-street and off-street programs, as well as event and transportation departments; and parking data helps inform class-scheduling and future planning. One issue was that although the university had many parking lots and garages, it had several high-volume areas in which parking was difficult to find. As a result, students and faculty were circling for parking, making them unhappy and late for class, which made the parking department unhappy as well because they had to handle the many complaints. The congestion also created traffic issues and safety issues.

The university installed ParkTrak plug-and-play counting systems, which provide over 98% accuracy, in 20 of their busiest surface lots and started using variable message signs to show availability. They also developed a parking app for students and faculty which lets users know availability in real time across all the lots. The university is now looking to install bollards that are visible to drivers as they approach the facilities and can notify them whether or not spaces are available.

Conclusion

When you use the best of the new technologies to optimize parking availability, safety and revenue, the result is a much healthier parking environment. It makes parking safer, more cost-effective as well as more profitable, allows people to get where they need to be faster with no hassle, and you improve the parking experience for everyone.



Ask us for information about ParkingCloud™, the only cloud-based IoT platform purpose-built for the parking and transportation industries that integrates all your devices, data and output in one place. With ParkingCloud, your technology choices are limitless, independent of your current environment—as complex or as simple as you need them to be. Leverage your existing technology and, at the same time, seamlessly future-proof your ability to add new technologies as they are developed or as your requirements change—without being locked into one vendor's platform.

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