WHITE PAPER

THE CHALLENGES OF PAY BY PLATE: YOUR GUIDE TO PAY BY PLATE SUCCESS

gtechna Turnkey Essentials Series

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INTRODUCTION

In recent years we have seen a huge spike in demand for pay by plate technologies. It is obvious to parking professionals that these technologies are the way to go because it is more efficient and at the same time grows revenue. For these reasons this technology adoption is happening; there is no turning back now. So, in the near future you will see deployments that will fail and others will flourish, this will depend on great integration points and on how to deal with exceptions like real time communication. This white paper has been written for Decision makers, IT Directors and Managers of parking enforcement and parking infrastructure. This paper is non-technical and has been written to give an overall understanding of potential pitfalls. After reading this document you will understand the things to look out for before purchasing and implementing this new technology.

THE PROBLEMS

We have categorized 4 main elements that will challenge everyone in the parking market with plate based enforcement. In all cases, tickets can be given in error which we do not have to explain can be detrimental for several factors.

	Latency	No Communication
Brief explanation	Speed of communication of data slowed down	System down, stopping any chance of communication
Possible reasons	Computer systems overloaded	Modem in Kiosk down
	Cell network overloaded	Kiosk in dormant stage
	LAN network overloaded	Cell tower down
	Wireless coverage poor	LAN down
	Pull instead of push interfaces	Interfaces down

Latency (real time) - For parking enforcement latency is seen as the time it requires between a parker paying for parking and when that information is available to the PEO for enforcement. How do you handle a parking terminal that pushes transactions to a server late? Generally, no technology is perfect, things will go wrong. These issues can be caused by several factors:
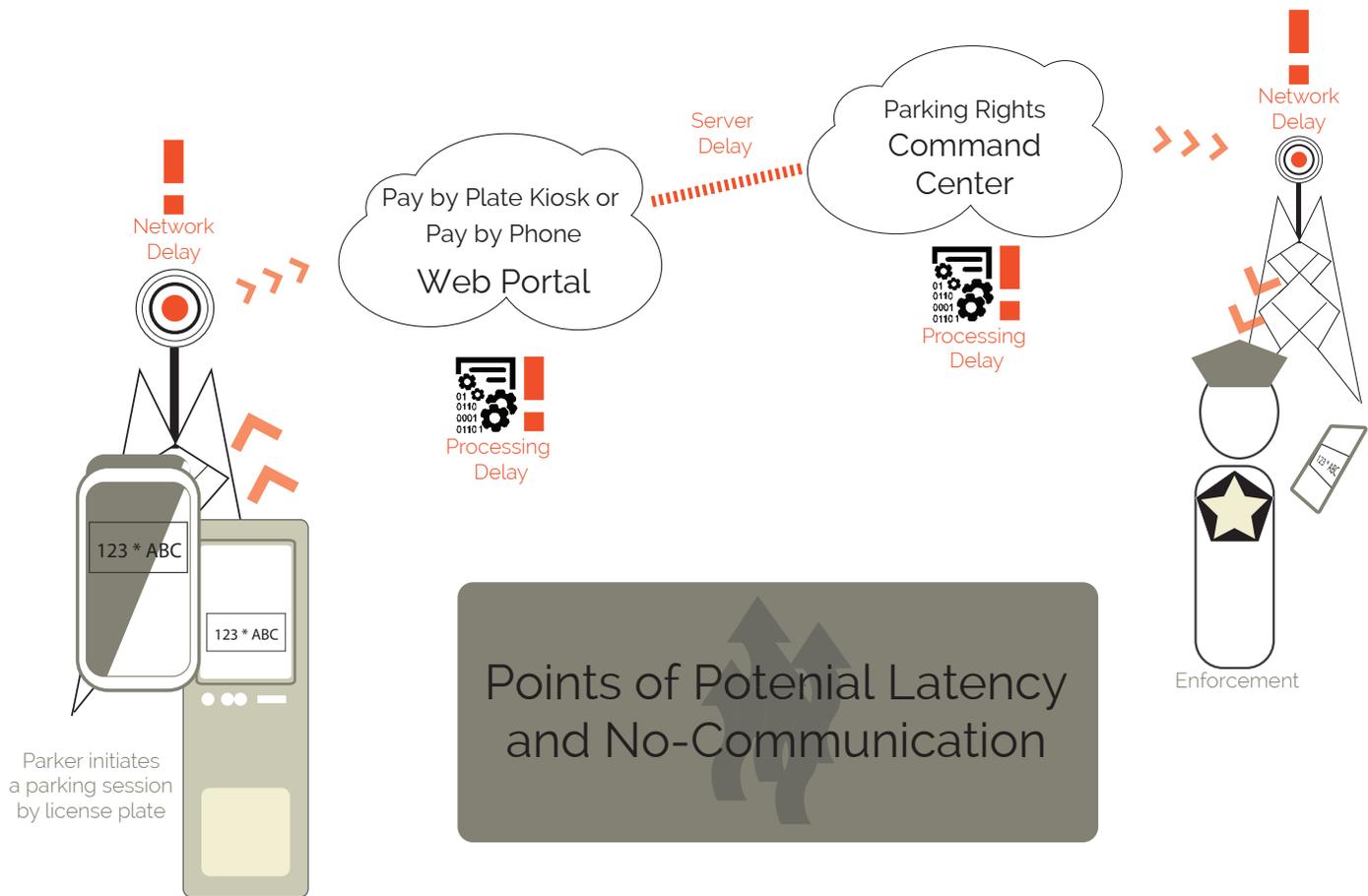
1. Wireless coverage issues relating to several factors. As everyone knows from using a cell phone, sometimes moving one foot can mean being able to understand a conversation or not; this same principle applies for pay machines, wireless is not a guarantee and can be affected by reflection from buildings, the weather, foliage to name a few.

2. Wireless network availability, with cell congestion and the priority that is given to data compared to voice will impact the speed of the network.

3. Speed and availability of Internet / LAN that interconnects all systems (pay by phone, pay by plate kiosk, permits, enforcement system).

4. Pull technology interfaces not as "real time" as push technology. It is more efficient for the payment manufacturer to push a transaction to enforcement instead of the enforcement constantly requesting "do you have a new transaction".

No Communication - A system or interface is down which will add to latency. No communication meaning that a system or interface was affected and could not communicate, meaning that the parker is seen as violating during the time the system was down.

1. Wireless network not available so in this example a pay by plate kiosk is in a situation of no communication because the wireless network is not available.

2. Internet / LAN or interfaces that interconnect systems (pay by phone, pay by plate kiosk, permits, and enforcement) is partially or completely down.

3. Parking rights payment method is not a real time system. Some systems could have been designed for batch type communication meaning that the information is sent periodically and not immediately when a transaction is done. To better illustrate, here is an example: if a pay by plate kiosk accepts your payment you would expect that the payment transaction be sent in real time. Some kiosk machines on the market are not real-time machines. Meaning that the payment transaction that was accepted has not necessarily been transmitted. So, in essence the kiosk accepts the payment even before any communication attempt was done. If the machine does not accept the credit card payment because there is no communication, that would make it a real time machine.

Human input error – The license plate input from the human point of view from either the parker or Parking Enforcement Officer (PEO) is in error. Human input error or transposition will be seen more from the parker input at a pay by plate kiosk machine. Cities that use pay by plate kiosks should calculate an average of at least 1% error. Furthermore, this error does not improve over time; it actually degrades. With the years of experience we have implementing these technologies we have also noticed that PEO's

Points of Potenial Latency and No-Communication

Network Delay

Pay by Plate Kiosk or Pay by Phone
Web Portal

Server Delay

Parking Rights
Command Center

Network Delay

Processing Delay

Processing Delay

Parker initiates a parking session by license plate

Enforcement

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can make typing errors; long hours, not paying attention, and bad lighting are some of the many contributing factors that translate to input errors. These errors must be accounted for; in a city the size of Pittsburgh, for example, this could account for over 200 bad tickets a day.

Machine input error – License plate recognition from fixed, to mobile and handheld are not a perfect science. Read rates typically range from

85% to 95%. Machine input error is categorized as such because it is not the computer making a mistake more than it is the OCR pick up that is in error. LPR OCR stands for optical character recognition and it is the method to translate plate numbers into digital characters. Several things can lower the read rate of LPR like weather (rain, snow, or road salt on the plate), lighting, type of plate and color of characters.

THE SOLUTIONS

A number of pay by plate use cases and millions of transactional data points lead down the same path: pay by plate errors threaten to undermine the technology posing a serious road block that urgently needs to be addressed. If the pay by plate project is not thoroughly managed, the integrity of the technology will suffer hence causing issues for everyone. How do we catch these errors? How do we eliminate these errors? Here are the answers for each of the 4 elements:

Statistics on average latencies from a 1 month sampling from two different cities and manufacturers
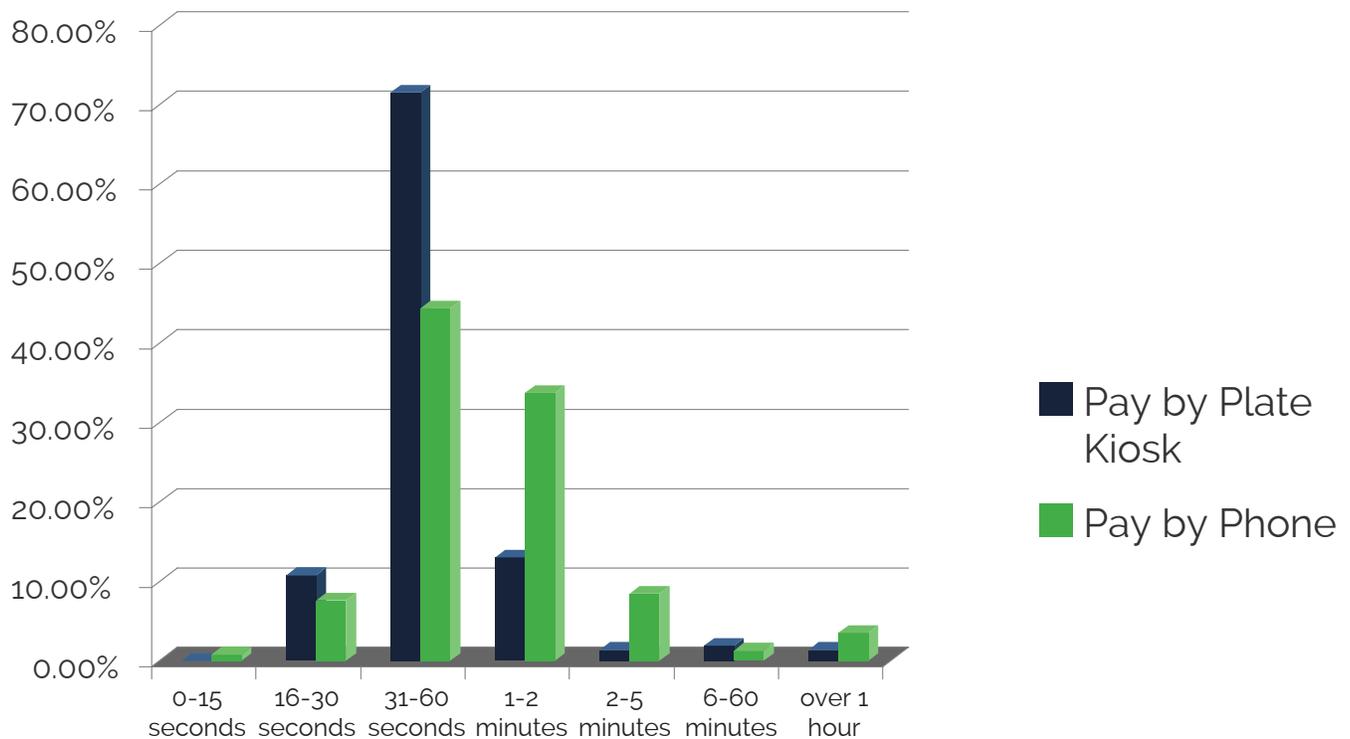
In this example even if a 5 minute grace is given there would still be exceptions to deal with, and in this specific case around 2% of transactions were communicated after 5 minutes.

Latency (real time) - Certain problems with latency will always exist and problems with pay by plate kiosks or the wireless networks will always be there, so the question is how the enforcement solution will adapt to various latencies.

Here are items to look for when implementing a system to ensure it is well adapted to latency:

1.   First you must decide if a grace period will be given to parkers. From here you can mathematically calculate the odds of tickets given in error. The table above provides statistics on average latencies from a 1 month sampling from two different cities and manufacturers.

2.   The enforcement solution must provide a "last check" before a ticket is issued which provides the PEO a last verification of parking rights.

3.   The parking rights needs to be pushed and not pulled from the pay by phone system, or whatever means of payment have been used, to ensure the fastest transaction time. Also no middleman should be introduced; the parking transaction where the payment

was introduced needs to be pushed to the enforcement solution. Anything that can slow down the transaction should be removed.

No Communications - No communication meaning any parking transaction that has not been communicated. Here are solutions to counter a no communication scenario.

1.   For a kiosk that has not communicated within a certain time, the enforcement solution can adapt by drawing an area around that kiosk that will automatically show all cars parked within that area "as paid". You do not want to show that an area has issues because enforcement personnel will not go in the area to enforce. The idea here is to show parkers that the parking area is still being enforced which will encourage payment at the kiosk. No communication for the kiosk is captured through the interface of the manufacturer of the pay by plate server. Once communication has restarted the "paid" is removed for real time parking rights.

2.   All parking rights interfaces, use a "keep alive" mechanism that monitors all communications between systems that basically says

"are you there" to ensure both ends are still functional and are ready to respond. If an interface does not respond, an "all paid" status is automatically displayed for that specific interface and zone. So, if a pay by phone interface is down, an all paid would be shown for the area pay by phone covers.

3.   In the case of a no-communication due to extreme latency that surpasses a grace period resulting in a ticket; "auto-void" is enacted which means that parking rights are reviewed in real time. If it is determined that the ticket was issued due to a latency or no communication the ticket is voided automatically. All this happens in real time so if a parker calls customer service to enquire about a ticket issued in error, customer service agents are empowered with the right information immediately. "Yes, Mr. Customer, your ticket was given in error and has been voided; you may throw out your ticket."

Human error - When a plate is entered the wrong way by the Parker on a pay by plate kiosk, that human error entry is pushed to the enforcement solution.

>   Within the enforcement solution you should have a method to validate if there is human error. As an example PlateCheck is an added feature on gtechna's parking rights which uses an error correction algorithm for parker entry errors. This is done with various simultaneous algorithms. The human error is cross checked with potential "matches" to eliminate wrongful tickets. All one digit errors are corrected 100 percent of the time.

Machine error - When an LPR vehicle, handheld LPR or fixed LPR are used, OCR misreads will happen. Here are solutions you should look for:

>   Within the enforcement solution you should look at ways to reduce the misreads.

Platecheck as previously mentioned is also great at providing an additional crosscheck on potential errors and flags them if a vehicle is unpaid. This improves the positive "hit" rate of LPR to over a 95% read rate requiring less human intervention and making the process easier.

CONCLUSION

The only way to make pay by plate technology reliable is by adding technology such as automatic checks and balances and by purchasing from the right manufacturers, otherwise, there will be a lot of frustration and adoption of the technology will suffer. Parkers will complain, media will spin it, revenues will go down. The good news is that all this can be avoided. Like most things, it is in the details. It is the little things that make a difference, but these "small" items are not small. Unless someone has years of experience and has actually run into these issues first hand they will not understand the importance of it. Someone saying they have an interface is nice, but how robust is the interface, will it adapt to a no communication event?

Past technologies like pay and display did not have these challenges because computer communications were not needed. No one had to worry about these issues. However, pay and display had its own set of problems related to dependency on visual enforcement. Today, we are faced with new challenges and we need to ensure that the right tools are in place to overcome them. But as systems get smarter and real time communication is required you must ensure that your system is designed for the worst case scenario. Pay by plate is happening; it is the new way to manage parking because of the huge benefits it offers to parkers, cities, universities and operators. Just ensure you do not forget the "little pieces".