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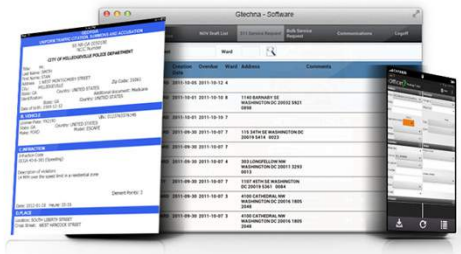

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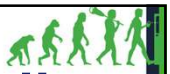
Electronic Citation Software



BIO of Sergio Mastronardi

Co-founder and VP Engineering at gtechna, Sergio Mastronardi has been developing mobile applications since 1992 and is recognized has an expert in his field. Sergio has more than 20 years of experience in software development. His work experiences include consulting, software architecture and implementation. At gtechna, he oversees software development and all mobile solutions.

Sergio worked in numerous organizations including Sûrete du Quebec, Service de Police de Montreal, Pittsburgh Parking, Public Works Dept of Washington DC, Hydro Quebec, and Montreal trust where he was recognized for his leadership, agile development and agile management skills.

Topic

Pay by plate challenges

How do we enforce this?

Single Space Meter

Pay & Display

Pay by Space

Pay by Plate

Visual Enforcement →

Mobile Enforcement by Block

1. Mobile Enforcement by Block
2. By Plate
3. Drive-By LPR

Pay by Space

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Pay by Space - pretty

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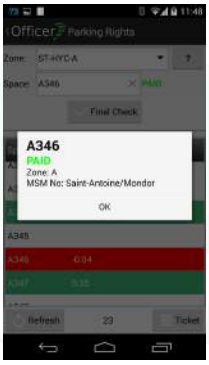
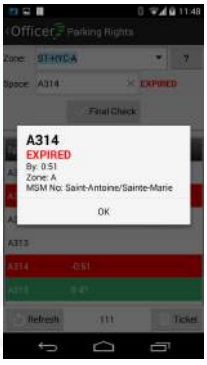
Officer Tickets

powered by: gtechna Officer™

Options for PBS enforcement

- By Zone
- By Space





- Using Zone pulls paid parking spaces for that zone
- Turbo search of PAID spaces list
- Dynamic result of Space entry – Ticket or Timing

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Integrated Enforcement

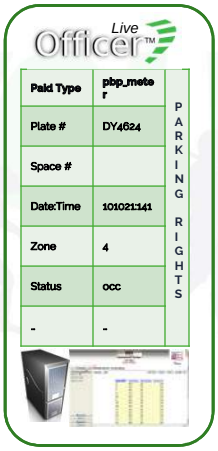
Parking Rights Enforcement

Common Data Repository

Parking Rights

ALPR

Handheld Enforcement



Pay by Phone

Pay by Meter

Live Transaction Processing!

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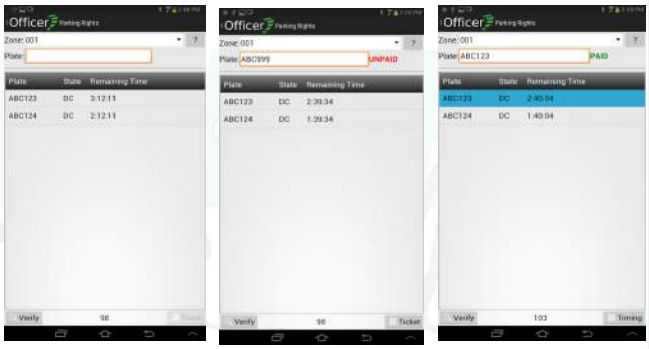
Officer Tickets

powered by: gtechna Officer™

Options for PBP enforcement

- By Plate
- By Zone
- Plate Check



- Using Zone pulls paid parking rights for that zone
- Turbo search of PAID Plates list
- Dynamic result of PLATE entry – Ticket or Timing

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Future – in roadmap

- Mobile Android LPR
- Mobile Letter Voice Recognition

https://www.youtube.com/watch?v=Q5mh-kPuqZE

Plate Input Errors

Who does the error on plate input? Is it the Parker, Officer, LPR or all?

Plate input Errors

- Officers are quick, and doing errors
- Customers don't remember plate when using meter
  - mostly 1 character in error
  - Transposition errors

Plate Input Error after 1 year – meter based

Date	Levenshtein	Transposition	Potential Less Complaints	Metered Tickets Issued	Total Tickets Issued	Officer Plate Verify	Paid Transactions	% Of Human Error
11/01/2014	151	20	171	632	810	2,689	21,324	0.80%
11/03/2014	315	27	342	569	872	4,257	24,882	1.37%
11/04/2014	328	22	350	520	893	4,800	25,382	1.38%
11/05/2014	238	29	267	490	1,184	3,768	25,262	1.06%
11/06/2014	287	28	315	563	1,074	3,984	24,869	1.27%
11/07/2014	286	30	316	674	970	4,529	26,727	1.18%
11/08/2014	163	10	173	601	765	2,980	21,619	0.80%
11/10/2014	327	23	350	441	882	4,433	24,106	1.45%

Date	Levenshtein	Transposition	Potential Less Complaints	Metered Tickets Issued	Total Tickets Issued	Officer Plate Verify	Paid Transactions	% Of Human Error
11/01/2013	185	32	217	557	769	4,165	28,407	0.76%
11/02/2013	99	16	115	645	701	3,133	23,610	0.49%
11/04/2013	113	17	130	418	1,145	3,469	23,631	0.55%
11/05/2013	167	25	192	628	1,223	4,932	25,464	0.75%
11/06/2013	128	26	154	442	1,063	3,810	25,760	0.60%
11/07/2013	154	18	172	376	922	2,783	25,191	0.68%
11/08/2013	183	18	201	502	683	2,774	26,886	0.75%
11/09/2013	145	22	167	647	726	1,716	23,165	0.72%

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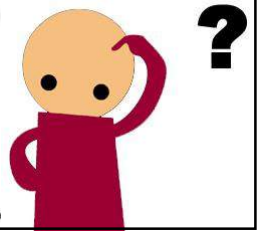
How many errors – meter based?

2014 (sample data in Nov)

1.16% which represents 290 on 25000 transactions per day. Also means 98.84% is accurate.

2013 (sample data in Nov)

0.66% which represents 165 on 25000 transactions per day. 99.34 is accurate



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Sample errors – any pattern

Parking Zone	Date	Time	Status	Client Id	Agent No	Officer Plate	Parker Plate	Method
BLF	11/10/2014	12:37:12 PM	Paid	0F88B211	108	EMS1117	ESM1117	Transposition
BLF	11/10/2014	02:56:33 PM	Paid	0F88B211	108	C0RSSIS	CORSSIS	Levenshtein
BLF	11/10/2014	03:52:07 PM	Paid	022DB2E2	10	DTB77225	DTB7725	Levenshtein
BLF	11/10/2014	02:06:51 PM	Paid	0F88B211	108	HOTREED	HOTRED	Levenshtein
BLF	11/10/2014	12:19:41 PM	Paid	0F88B211	108	C0RSSIS	CORSSIS	Levenshtein
BLF	11/10/2014	02:56:12 PM	Paid	0F88B211	108	HJY3772	HJY372	Levenshtein
BLF	11/10/2014	02:09:43 PM	Paid	0F88B211	108	08069PD	8069PD	Levenshtein
BLF	11/10/2014	03:18:54 PM	Paid	022DB2E2	10	GLF2258	GLG2258	Levenshtein
DWT	11/10/2014	12:04:30 PM	Paid	41F4B2B5	12	GP12500	FP12500	Levenshtein
DWT	11/10/2014	12:24:35 PM	Paid	41F4B2B5	12	GDG0473	GDG473	Levenshtein
DWT	11/10/2014	11:40:24 AM	Paid	42A9B8F7	15	FBC4479	FBC4470	Levenshtein
DWT	11/10/2014	11:59:14 AM	Paid	0EA8BAAD	51	CHM5304	CHM4304	Levenshtein
DWT	11/10/2014	12:03:57 PM	Paid	41F4B2B5	12	HZJ9581	HZJ0581	Levenshtein

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Plate input fix

- Allow 1 character error mismatch when validating plates for parkers and officers
  - Pure technology
- Allow transposition errors for parkers and officers
  - Pure technology
- NEW: Double plate input for every ticket for officers

Compatible with pay by plate meter and pay by plate phone technologies

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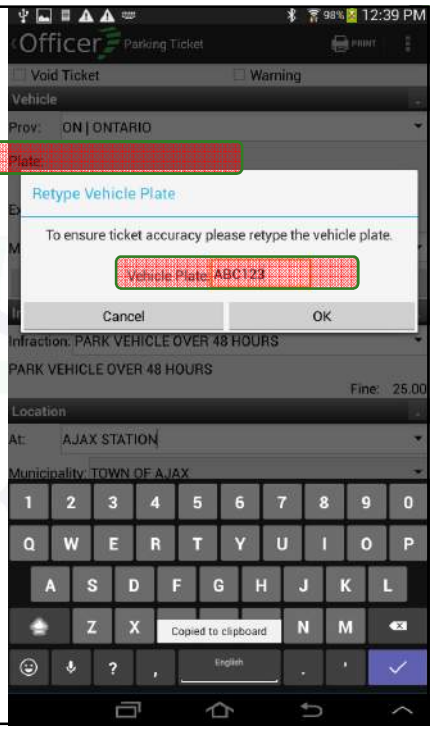
Example of hand held double plate input Fix



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Pay by Plate abuse from the parker

Is there any?

What kind?

1. They Hog prime parking spots all day
2. Pay at a cheaper parking terminal further away – no solution yet…

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Parking Hog's

- It's easy for the parker
- Timing is not enforced
- Creates high volume of circulation
- What does this have to do with pay by plate?
- How can we measure them with KPI?

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Sample Parking Hog's

PLATE	STATE	ZONE	STARTDATE	ENDDATE	STARTTIME	ENDTIME	Total Parking Time (Hours)
1485132	IL	21119	10/16/2014	10/16/2014	0:08:23	9:30:23	9.4
gFB536	MD	2277	10/16/2014	10/16/2014	1:09:29	8:59:59	7.8
gBL2839	MD	22853	10/15/2014	10/15/2014	13:05:33	21:15:14	7.5
2DAL10	MD	21275	10/15/2014	10/15/2014	8:13:47	15:13:47	7
EL9571	DC	22832	10/15/2014	10/15/2014	9:47:04	16:52:50	7
AR7364	MD	21452	10/15/2014	10/15/2014	10:23:26	17:09:38	6.7
966M410	MD	22289	10/15/2014	10/15/2014	15:14:34	21:59:59	6.6
gAW4859	MD	22032	10/15/2014	10/15/2014	13:12:06	19:03:46	6
CG2038	DC	21120	10/15/2014	10/15/2014	10:52:33	16:43:09	6
JLW0765	PA	2140	10/15/2014	10/15/2014	12:20:33	18:31:23	6
XGM5988	VA	22479	10/15/2014	10/15/2014	12:12:09	17:24:02	6
gBE3829	MD	23811	10/15/2014	10/15/2014	11:32:21	17:11:47	5.7
gUV7684	VA	22050	10/15/2014	10/15/2014	16:30:30	21:59:59	5.5
966M410	MD	22869	10/15/2014	10/15/2014	9:38:15	15:20:54	5.4

How many plate abusers per time regarding timing, ie max 2 hour

Based on our analysis:

For ~25,000 plate paid transactions, there will be approximately 200 plate violators per day.

This represents ~2M of annual ticket revenues

Can this be fixed?

- With every zone / plate verification's being done, this can be improved…..
- PAID message is usually green for officers…..

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Sample zone verify with total paid time

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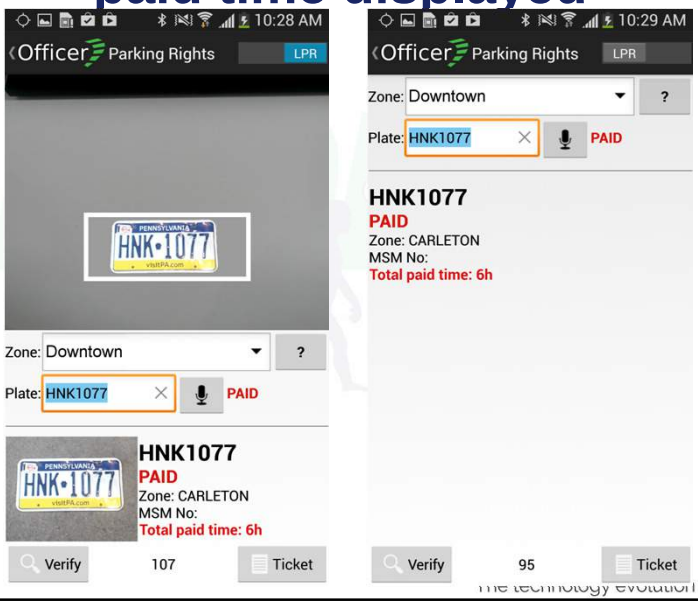
Sample Plate verify with total paid time displayed



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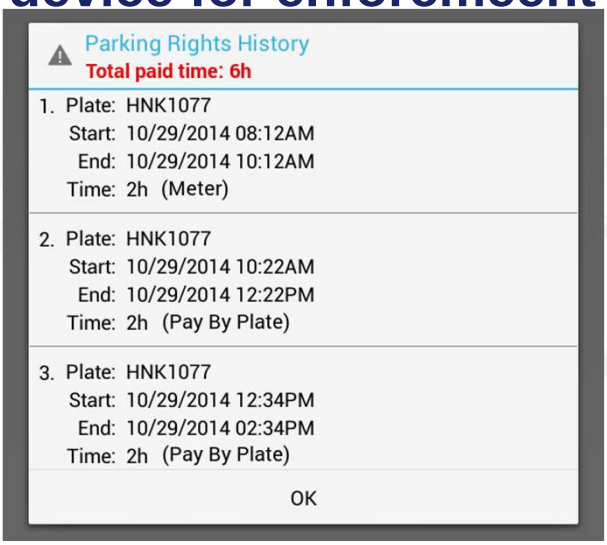
Parking Rights history on mobile device for enforcmeent



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Latency

Does it exist? Check all the connections that are needed to make sure the data available to the enforcement team in real-time….

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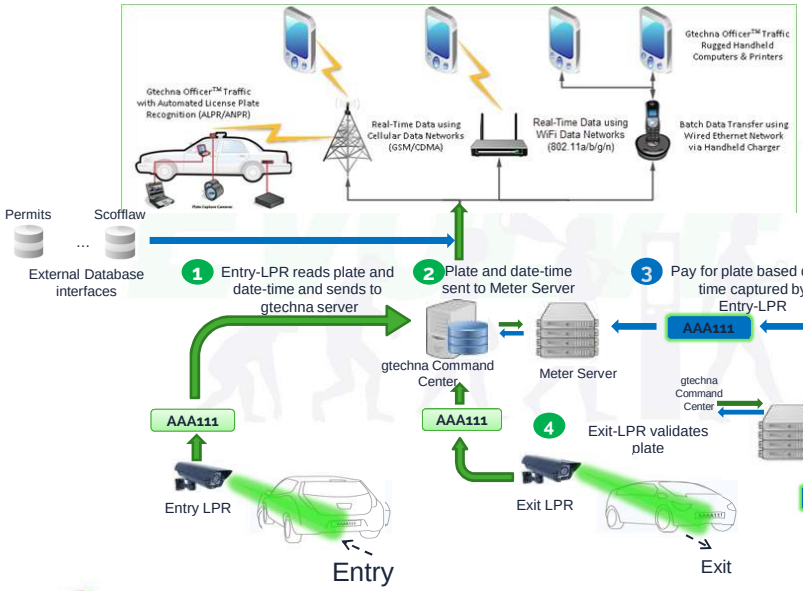
Architecture



Sample Latency – Nov 2013

creationdate	creationtime	starttime	endtime	lag	plate	source
11/2/2013	19:42:49	10:01:13	12:01:13	9:41:36	ECF0845	parkingRightsArchive
11/6/2013	15:33:27	6:32:46	3:30:46	9:00:41	HCS2856	parkingRightsArchive
11/1/2013	17:02:53	8:31:35	3:31:35	8:31:18	GHM4672	parkingRightsArchive
11/7/2013	19:09:39	10:47:26	12:47:26	8:22:13	HMX0970	parkingRightsArchive
11/4/2013	16:13:18	8:19:14	1:19:14	7:54:04	L77AVZ	parkingRightsArchive
11/6/2013	16:06:30	8:13:51	2:13:51	7:52:39	GLF2068	parkingRightsArchive
11/1/2013	13:39:44	5:53:41	2:55:41	7:46:03	EPV8112	parkingRightsArchive

▪ ▪ ▪

11/9/2013	19:22:41	19:19:16	0:19:16	**0:03:25**	GHW1182	parkingRightsArchive
11/1/2013	21:47:56	21:44:35	1:44:35	**0:03:21**	JGJ7380	parkingRightsArchive
11/1/2013	21:47:55	21:44:35	0:59:35	**0:03:20**	JGJ7380	parkingRightsArchive
11/1/2013	19:24:15	19:20:57	1:20:57	**0:03:18**	GFF3276	parkingRightsArchive
11/2/2013	17:07:34	17:04:17	1:04:17	**0:03:17**	HWB9213	parkingRightsArchive
11/8/2013	6:51:31	6:48:18	5:12:18	**0:03:13**	GBY6343	parkingRightsArchive
11/7/2013	20:09:21	20:06:09	0:06:09	**0:03:12**	HGF7357	parkingRightsArchive
11/2/2013	12:37:29	12:34:25	0:34:25	**0:03:04**	J80021J	parkingRightsArchive

Fixes for Latency

1. On the Print we do a final check with Enforcement Server and Payment server

2. System Auto-Void

Sample of System Auto Void

PUBLIC PARKING AUTHORITY OF PITTSBURGH
PARKING TICKET
COUNTY OF ALLEGHENY — PARKING AUTHORITY

Ticket No: 6445702
Day of week: Monday
Date: 11/03/2014
Time: 10:18 am

License No: JFD6275
State: PA Color: SILVER
Make: NISSAN 4 DOOR

Location:
600 WILLIAM PENN PL
Meter: CALE

PARKING VIOLATION:
PITTSBURGH ORDINANCE 543.03
Expired meter

Fine: $ 30.00
Cost: $ 0.00

Total Due Now: $ 30.00
If paid after 11/14/2014 $ 53.00
If paid after 12/04/2014 $ 68.00
Remarks:

CALE UNPAID
WARNING

Subject to the penalties of the crimes code (18 PA C.S. #4904): I verify that the facts set forth in this ticket are true and correct to the best of my knowledge
Officer's Signature: Badge No: 54 District: 13

Send your payment and this ticket to:
PITTSBURGH PARKING COURT
PO Box 640 • Pittsburgh, PA 15230-0640
Visa or MasterCard payments accepted by Phone or Internet
See back for additional details

6445702 JFD6275 03800

Sample System Auto Void
Ticket Issued @10:18
Parker paid for 10:13 to 10:38 (late)
and
10:40 to 11:00

Pay By Plate Verification

Verify Plate	ParkingRight Plate	Verify Zone	Verify Date	Verify Time	Verify Status	Verify Method	Parking Right ID	Vendor Name/Id	Officer	Client ID
JFD6275		DWT	11/03/2014	10:19 AM	Unpaid	Standard	0		54	0037B0EC
JFD6275		DWT	11/03/2014	10:18 AM	Unpaid	Standard	0		54	0037B0EC

There are 2 records.

Parking Rights (PAID by Parker)

End Date	End Time	Created Date	Created Time	Parking Right ID	Plate	Zone	Start Date	Start Time
11/03/2014	11:00 AM	11/03/2014	10:40 AM	13384685	JFD6275	DWT	11/03/2014	10:40 AM
11/03/2014	10:38 AM	11/03/2014	10:25 AM	13384105	JFD6275	DWT	11/03/2014	10:13 AM

There are 2 records.

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Parking Terminals that are "out of communication"

Process:

- Parking terminal is always collecting payment
- Payment transactions are stuck in the terminal
- Officer is enforcing the area
- Mobile device and server are smart to determine that area has a terminal with communication issues
- Officer is not aware and continues to enforce
- All plates within the area of xxx feet of the terminal, the system will display **paid** on mobile device

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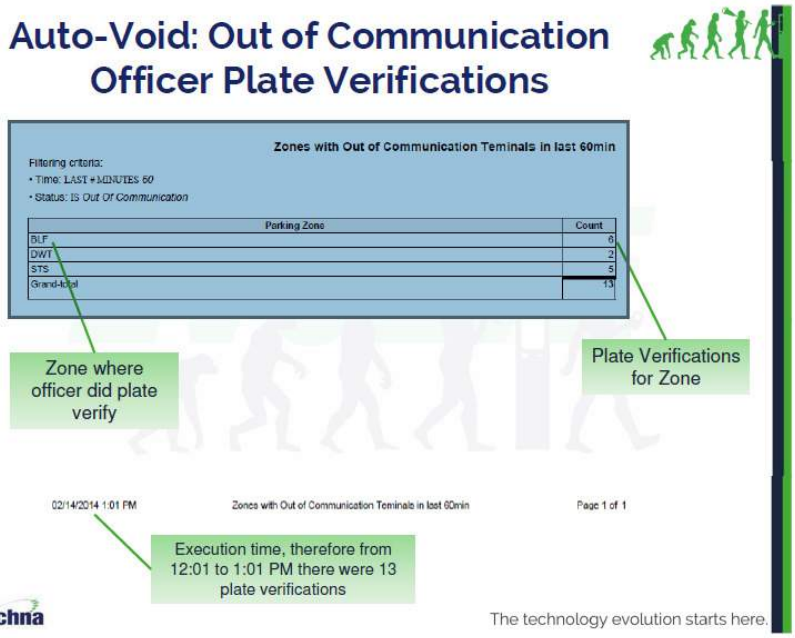
Auto-Void: Out of Communication Officer Plate Verifications



Zones with Out of Communication Teminals in last 60min

Filtering criteria:
- Time: LAST +MINUTES 60
- Status: IS Out Of Communication

Parking Zone	Count
BLF	6
DWT	2
STS	5
Grand-total	13

Zone where officer did plate verify

Plate Verifications for Zone

02/14/2014 1:01 PM Zones with Out of Communication Teminals in last 60min Page 1 of 1

Execution time, therefore from 12:01 to 1:01 PM there were 13 plate verifications

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Thank You!

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