



# GeoCheck™

## BRIEF

March 2023

**An E-GPS™ Enabled Value-Added Component  
of an ETC Lane Assessment Service**

[info@geotoll.com](mailto:info@geotoll.com) | [www.geotoll.com](http://www.geotoll.com)

Electronic Toll Collection Systems offer a convenient and efficient way to collect tolls. While they have many advantages, they are not without challenges, including missed transactions due to lane equipment issues. As soon as ETC components are installed, all of them begin to degrade. At some point, they will fail. They will fail sometimes without being detected by the agency. The result is lost revenue. Because of that, it is important to regularly assess the performance of ETC lane equipment.

## This is where GeoCheck™ comes in.

GeoCheck™, based on GeoToll's E-GPS technology, provides an important part of a comprehensive assessment of a toll collection system, namely the automatic vehicle identification (AVI) technologies used to create a toll transaction. GeoCheck™ helps agencies know if the RFID and ALPR equipment in their network is functioning and that all vehicles that should be identified are being identified.



## The Power of E-GPS™ Technology

At the heart of GeoCheck™ is E-GPS™, a form of GPS GeoToll developed that is 10 X more accurate than conventional GPS. E-GPS™ has been tested in various toll road scenarios, including elevated and paint-separated express lanes. With patented lane-level accuracy and satellite-based timing, E-GPS™ can precisely associate a vehicle to a lane at a specific time and **inspect** the equipment at that point. Transaction events are registered in real-time and sent immediately via the cloud to an agency, allowing for quick evaluation of equipment performance. Issues are thus **detected** fast, allowing the agency to **correct** them fast.

## GeoCheck's Comprehensive Approach

A GeoCheck assessment is a more efficient and comprehensive assessment than currently performed at agencies now (the following is an actual toll agency lane assessment contract):

- Consultant performs a toll lane audit of 4 main gantries (out of 21 main gantries) and 8 ramp gantries (out of an existing 172 ramp gantries).
- The lane audit will utilize existing data loggers to capture lane data for a period of 2 - 24 consecutive hours for each tolling location analyzed.
- Approximately 2,000 transactions (of the 3M transactions the agency sees per day) will be collected per location and will be analyzed according to the following:
  - Vehicle count
  - Vehicle classification
  - ETC (AVI Reads) - tag correlation and bad toll tags
  - Image capture rate for image-based transactions
  - Assess captured image quality and OCR confidence / camera types in use in lanes.
- Cost: \$900K

The assessment takes just a small snapshot of the overall health of the entire system. The reason for the small sample is because checking more toll points is cost prohibitive.

GeoCheck allows agencies to assess lanes across a larger share of their system. More equipment is inspected, and more compromised equipment is detected, which permits the agency to prioritize the work to correct issues, leading to less leakage.

GeoCheck is also cost-efficient in terms of tracking equipment performance over time to inform data-driven decisions that improve operations and ultimately increase revenue even more. GeoCheck's comprehensive view of an agency's ETC equipment helps agencies see correlations and get other insights about how any number of conditions affect performance. Whatever the objective, GeoCheck leads to better-informed maintenance and less leakage.

## Helping MOM

A Maintenance Online Management System (MOMS) is software that supports an operator's efforts to maintain their ETC systems. MOMS provides real-time monitoring and control of components, identifies various issues and presents data to understand system performance and potential reduced costs associated with ETC maintenance and operation. MOMS continuously collects data from lane equipment and generates alerts for potential problems. MOMS can also provide a central database for tracking and scheduling maintenance tasks, and a framework for assigning and tracking their status.

GeoCheck, as a smartphone-based system, can work independently of the agency's BOS system or integrate via GeoToll's SDK directly with the toll agency's MOMS to improve overall operations. By providing real-time field-derived data, GeoCheck helps MOMS work better.

## Knowing...

"There are known knowns. There are known unknowns. There are also unknown unknowns..." That quote is from a famous government official and is often used today to describe the limitations of knowledge and the difficulty in forecasting events or outcomes. This is the idea behind GeoCheck™: that there are some things agencies are aware of and know of for certain, and other things agencies are aware of but don't have all the information about. However, there are also things agencies don't even know they don't know. In this context, toll agencies do not know the revenue that is leaking from their systems if they don't know of the leak. And agencies are leaking, even with MOMS.

## How GeoToll Knows

GeoToll pilots captured millions of GPS reads across many toll scenarios. Each test vehicle had a GeoToll-equipped smartphone and a regular toll tag. GeoToll routinely reported 2-4% more transactions at the end of the reporting period than the ETC system did.

This may seem modest but consider a toll agency with 50 million transactions/year and an average \$3 toll. That is more than \$6M in leakage that GeoCheck™ could detect. For an agency with 800M transactions/year and a transaction value of \$1.50, that is \$48M.

GeoCheck™, GeoToll's AVI solution with location accuracy within the width of a tolled lane, is perfectly suited for AET systems. Some of the unique benefits of using GeoCheck™ are:

1. **Increased efficiency:** Using GeoCheck™ to audit ETC equipment provides more efficient and timely data collection. This helps agencies identify and resolve issues quicker.
2. **Improved accuracy:** E-GPS-based lane-level accuracy yields more precise data compared to other approaches, allowing agencies to correctly target the issue.
3. **Reduced costs:** GeoCheck™ is cheaper than manual audits. There's little to no need for personnel to physically inspect the system. This is safer too.
4. **More data:** GeoCheck™ provides more comprehensive data, including data only a smartphone can provide. With a potential for continuous monitoring, GeoCheck™ offers a more complete performance picture. You can see trends and make informed decisions.
5. **Improved transparency:** GeoCheck™ as an ETC system auditor is more transparent and accountable because it provides an independent verification of hardware performance.

## Invest to inspect, detect and correct

A well-maintained RFID-based ETC system is key to maximizing revenue and minimizing downtime and leakage. Investing proactively reduces the chance that faulty equipment is costing the agency valuable revenue. GeoCheck™ is a cutting-edge service that provides agencies with an efficient tool to monitor and audit ETC hardware.

## Implementation

GeoCheck™ can be deployed by agencies without disrupting operations or risking revenue. Using our SDK and an agency's existing consumer toll app (E-ZPass, TxTag, FasTrack), GeoCheck™ can be downloaded to a smartphone and activated. The driver has the RFID toll tag and GeoCheck running. At this point, several services become available to the agency:

1. **Lane equipment assessment.** A driver passes a toll point and GeoCheck™ records a transaction event with exact location and time stamp precision. This is compared to a correlating RFID event. If there is no correlating event, that implies (based on an analysis of subsequent transaction events in that lane) an issue with the reader. This was the result 2-6% of the time at GeoToll pilots, which meant lost revenue.
2. **Tag (Driver) Assessment.** An account holder with a toll tag passes a toll point with a verified functional RFID reader. GeoCheck™ records a transaction event but with no correlating RFID read - only an ALPR image. This implies an issue with the tag. It may be broken, degraded or not correctly placed. Regardless of the cause, GeoCheck™ gives the agency a quick way to push notify the driver's phone - a more responsive and cheaper way than waiting days collecting ALPR images and sending a letter.

## Pricing Options

- One-time fee to set-up E-GPS GeoCheck™ toll points with price varying according to the tolling/express lane/HOT lane environment and # toll points.

- A recurring fee based on several factors, including the number of toll points, audit approach and audit frequency.
- A hybrid with a one-time set-up fee incorporated into a subscription-based recurring fee. This saves up-front costs and makes it easier to budget.

With E-GPS precision, easy SDK integration, richer and fuller data to analyze, GeoCheck™ can enhance a agency's MOMS and play a significant part in lane assessments that reduce leakage and results in a better tolling experience for operators and drivers.

The host of reasons GeoCheck™ can address:

<b>Reason for Missed Transaction</b>	<b>RFID System</b>	<b>Video System</b>	<b>GeoCheck™</b>
Improperly mounted toll tag	X		✓
Tag damage or wear	X		✓
Poor tag placement	X		✓
Tag interference from other electronic devices	X		✓
Environmental factors (e.g., rain, fog, snow)	X		✓
Reader malfunction or degradation	X		✓
Technical issues (e.g., sw glitches, com problems)	X		✓
Gantry alignment or misalignment	X		✓
User error (e.g., placing tag in wrong direction)	X		✓
Sun glare, snow, ice, or other weather conditions		X	✓
Poor lighting conditions		X	✓
Dirty or obstructed license plates		X	✓
High vehicle speed		X	✓
Camera misalignment or malfunction		X	✓
Vehicle obstructions (e.g., trailers, roof racks)		X	✓
Plate style/type (e.g., small or decorative plates)		X	✓
Technical (e.g., network connection, sys failures)		X	✓

To learn more, please reach out to GeoToll by emailing [info@geotoll.com](mailto:info@geotoll.com).