



OFFICE OF INSPECTOR GENERAL

UNITED STATES POSTAL SERVICE

Geo-Fence Technology in Delivery Operations

Management Advisory Report

Report Number
DR-MA-14-006

August 14, 2014





OFFICE OF INSPECTOR GENERAL

UNITED STATES POSTAL SERVICE

Highlights

The Postal Service's planned use of geo-fence technology in the delivery environment is a proactive way to increase carrier visibility to aid street management.

However, we identified an inaccuracy in the Delivery Management System. Inaccurate scan variance data may cause supervisors to react to carrier delays that are actually justified based on their daily delivery assignment.

Background

The U.S. Postal Service is developing and pilot testing the Delivery Management System to improve carrier efficiency during street delivery. This system combines Global Positioning System data and other data from various systems to allow supervisors to see "at a glance" the location of each carrier and whether they are ahead of or behind their scheduled delivery time. These scheduled delivery times are based on each routes' base evaluation and the associated Managed Service Point scan times on each route.

This system will also include geo-fence technology to assist supervisors in monitoring delivery operations. Geo-fence technology is a system based on the concept of virtual geographic zones. Should a carrier deviate from his or her designated geographic zone during street delivery, an alert is sent to the supervisor in an email or text message. The geo-fence component of the pilot program was expected to begin in July 2014. There are seven planned test sites consisting of one delivery unit in each of the seven Postal Service areas of operation.

Our objective was to assess the Postal Service's efforts to implement geo-fence technology in delivery operations.

What the OIG Found

The Postal Service's planned use of geo-fence technology in the delivery environment is a proactive way to increase carrier visibility to aid street management.

However, we identified an inaccuracy in the Delivery Management System. Specifically, projected scan times are not adjusted for authorized route deviations when carriers are assigned deliveries on portions of additional routes. This occurs because the Postal Service has not updated the Delivery Management System for these authorized route deviations. Management planned to address this scan variance issue in April 2014; but, as of June 2014, had not finalized the adjustments.

Inaccurate scan variance data may cause supervisors to react to carrier delays that are actually justified based on their daily delivery assignment.

What the OIG Recommended

We recommended the vice president, Product Information, modify the Delivery Management System software to capture adjustments for time and location projections when carriers are assigned deliveries on more than one route prior to nationwide implementation of the Delivery Management System.

Transmittal Letter



OFFICE OF INSPECTOR GENERAL
UNITED STATES POSTAL SERVICE

August 14, 2014

MEMORANDUM FOR: ROBERT CINTRON
VICE PRESIDENT, PRODUCT INFORMATION

E-Signed by Robert Batta
VERIFY authenticity with e-Sign
Robert J. Batta

FROM: Robert J. Batta
Deputy Assistant Inspector General
for Mission Operations

SUBJECT: Management Advisory Report – Geo-Fence Technology
in Delivery Operations (Report Number DR-MA-14-006)

This report presents the results of our review of Geo-Fence Technology in Delivery Operations (Project Number 14XG023DR000).

We appreciate the cooperation and courtesies provided by your staff. If you have any questions or need additional information, please contact Rita F. Oliver, director, Delivery and Post Office Operations, or me at 703-248-2100.

Attachment

cc: Corporate Audit and Response Management

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Findings

Introduction

This report presents the results of our self-initiated review of Geo-Fence Technology¹ in Delivery Operations (Project Number 14XG023DR000). Our objective was to assess the U.S. Postal Service's efforts to implement geo-fence technology in delivery operations. See [Appendix A](#) for additional information about this review.

The Postal Service is developing and pilot testing use of the Delivery Management System (DMS) to improve carrier efficiency for street delivery. This system will include geo-fence technology to assist supervisors in monitoring delivery operations. Geo-fence technology is a system based on the concept of virtual geographic zones. If a carrier deviates from their designated geographic zone during street delivery, an alert is sent to the supervisor in an email or text message. The DMS will enable supervisors to see "at a glance" the location of each mail carrier and determine whether the carrier is ahead of or behind their scheduled delivery time. To accomplish this, the DMS will combine Global Positioning System (GPS) data gathered via handheld scanning devices with data from various existing systems² (see [Appendix B](#)).

The DMS will display an icon to indicate the location and timeliness of each carrier. As illustrated in Figure 1, a red circle indicates the carrier is more than 15 minutes behind schedule, a yellow square indicates the carrier is fewer than 15 minutes behind schedule, and a green diamond indicates the carrier is either on time or ahead of their scheduled delivery time. The accuracy of this information is paramount to enabling delivery supervisors to quickly determine which routes require attention (see Figure 1).

Figure 1: Example of DMS



¹ The Postal Service expected the geo-fence phase of the pilot to begin in July 2014.

² The DMS will combine data from GPS, the Delivery Operations Information System (DOIS), the Product Tracking System, the Address Management System (AMS), the Collection Point Management System, and the Time and Attendance Collection System.

During our review, we identified an inaccuracy in DMS. Specifically, if a carrier is assigned deliveries in addition to the carrier's primary route, a common practice known as "pivoting," the Managed Service Point (MSP) scan variance data provided to DMS will be inaccurate. Inaccurate scan variance data may cause supervisors to react to carrier delays that are actually justified based on their daily delivery assignment.

Conclusion

The Postal Service's planned use of geo-fence technology in the delivery environment is a proactive approach to increasing carrier visibility to aid street management. During our review, we identified an inaccuracy in DMS. Specifically, if a carrier is assigned deliveries in addition to the carrier's primary route, a common practice known as "pivoting,"³ the Managed Service Point⁴ (MSP) scan variance data provided to DMS will be inaccurate. The inaccurate variance occurs because projected scan times are not adjusted for authorized route deviations recorded in the DOIS. Also, management has not updated the DMS to incorporate data elements related to pivoting. Management planned to address the scan variance inaccuracy by April 2014; however, as of June 2014, they have not finalized the adjustments. Inaccurate scan variance data may cause supervisors to react to carrier delays that are actually justified based on their daily delivery assignment.

Geo-Fence Technology

The Postal Service's planned use of geo-fence technology will increase carrier visibility to aid supervisors in performing street management. Our analysis shows that MSP scan variances would be accurate on regular routes, but inaccurate when there are authorized route deviations. For example, supervisors often divide an unstaffed route among multiple carriers who each cover a part of the route in addition to their regular routes. This arrangement is used to augment the work of some carriers with less than 8 hours of work on their routes.

For example:

- If management assigns a carrier a regular route⁵ (without pivoting), the DMS accurately reflects the MSP scan variances as illustrated in [Table 1](#). The variance range of 8 minutes early to 15 minutes late would also be accurate.
- If management assigns a carrier a 1-hour pivot on their route to accomplish prior to delivering to the primary route, the primary route will appear to be 1 hour behind schedule for the remainder of the day. Likewise, the MSP scan variances will be inaccurate as they will be 1 hour behind, as shown in [Table 1](#). The variance ranges in DMS will also be erroneous, showing from 52 minutes to 1 hour and 15 minutes late.

³ Pivoting is a management tool used as a part of normal delivery operations to allow supervisors to balance carrier workloads. Management stated they do not calculate the number of actual pivoting occurrences; therefore, we could not measure the extent of inaccuracies due to pivoting.

⁴ MSP is a designated location along a delivery route with an affixed barcode that a carrier is expected to scan. Management uses MSP scan times to help with supervising the performance on each route.

⁵ As of May 2, 2014, there were 140,903 city delivery routes nationwide.

Table 1. Illustration of MSP Scan Variances With and Without a 1-Hour Pivot Added to Route⁶

Projected MSP Scan Times:		9:00 a.m.	11:00 a.m.	1:00 p.m.	3:00 p.m.
Regular Route	Actual MSP Scan	8:52 a.m.	11:02 a.m.	1:10 p.m.	3:15 p.m.
	Variance (According to DMS)	-0:08 	0:02 	0:10 	0:15 
With 1-Hour Pivot Added	Actual MSP Scan	9:52 a.m.	12:02 p.m.	2:10 p.m.	4:15 p.m.
	Variance (According to DMS)	0:52 	1:02 	1:10 	1:15 

U.S. Postal Service Office of Inspector General (OIG) analysis.

The inaccurate scan variance took place because MSP projected scan times are not adjusted for authorized route deviations via pivoting in DOIS. Incorrect DOIS data will be uploaded to the DMS, causing the new system's data to be inaccurate. This occurred because an adjustment to DMS has not been made to incorporate data elements related to pivoting. Inaccurate scan variance data may cause supervisors to react to carrier delays that are actually justified based on their daily delivery assignment.

See [Appendix B](#).

The development plan for the DMS initially specified that management complete adjustments for authorized route deviations in April 2014; however, as of June 2014, management has not finalized the adjustments.⁷ AMS personnel who are developing the DMS will need to calculate adjusted times for assigned pivots from DOIS prior to the nationwide launch of DMS scheduled for July 2014.⁸

⁶ This is a simulated route scenario that is not based on actual delivery data.

⁷ As of June 10, 2014.

⁸ The OIG plans to conduct a review of the geo-fence application after it has been fully developed and implemented.

Recommendation

We recommend management modify Delivery Management System software to capture adjustments for time and location projections when carriers are assigned deliveries on more than one route.

We recommend the vice president, Product Information:

1. Modify the Delivery Management System (DMS) software to capture adjustments for time and location projections when carriers are assigned deliveries on more than one route prior to nationwide implementation of DMS.

Management's Comments

Management agreed with the finding and recommendation.

Management agreed to modify the DMS software to capture adjustments for time and location projections when carriers are assigned deliveries on more than one route. Management noted they were aware of the need to make adjustments prior to the OIG review. The target implementation date is September 30, 2014.

See [Appendix C](#) for management's comments, in their entirety.

Evaluation of Management's Comments

The OIG considers management's comments responsive to the recommendation in the report.

In a March 2014 presentation, management stated they would modify the DMS for pivoting by April 2014, prior to the DMS nationwide launch. We discussed the modification for pivoting in the DMS and the completion status with management on June 5, 2014. Management stated they were aware of the issue prior to the OIG review and are making enhancements. The OIG acknowledged management's awareness of the issue and their enhancement plans; however, as of August 2014, the adjustments were not final. Management's comments stated they would finalize the adjustments by September 30, 2014.

The OIG considers the recommendation significant, and therefore requires OIG concurrence before closure. Consequently, the OIG requests written confirmation when corrective action is completed for the recommendation. This recommendation should not be closed in the Postal Service's follow-up tracking system until the OIG provides written confirmation that the recommendation can be closed.

Appendices

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Appendix A: Additional Information

Background

As the Postal Service strives to reduce delivery carriers' workhours to match reduced mail volume, officials continue to explore new management tools and technology to improve carrier efficiency during street delivery. As part of this effort, many carriers are assigned portions of multiple routes. Pivoting carriers to portions of additional routes can be an extra challenge for delivery supervisors, who must determine where each carrier should be throughout the day and when to expect the carrier to return to the delivery unit.

Postal Service managers are currently pilot testing (see Table 2) the DMS to improve carrier efficiency during street delivery. This system will combine GPS data with data from various systems to allow supervisors to see "at a glance" the location of each carrier and whether the carrier is ahead of or behind their scheduled delivery times. The Postal Service will include geo-fence technology as part of the DMS, which will assist supervisors in monitoring carriers deviations from designated zones or locations during street delivery.

Table 2. FY 2014 Test Sites for Delivery Management System

Area	District	Office	ZIP Code
Capital Metro	Mid-Carolinas	Charlotte	28215
Eastern	Western PA	Pittsburgh	15237
Great Lakes	Central Illinois	Downers Grove	60515
Northeast	Northern New England	Nashua Main	03060
Pacific	Sacramento	Sacramento Arden	95825
Southern	Rio Grande	San Antonio	78217
Western	Arizona	Scottsdale	85251

Source: AMS officials.

Objective, Scope, and Methodology

The objective of this review was to assess the Postal Service's efforts to implement geo-fence technology in delivery operations. To accomplish our objective, we:

- Reviewed Postal Service documentation, including applicable policies and procedures, related to geo-fence technology in delivery operations. We also reviewed prior OIG and U.S. Government Accountability Office audit reports related to geo-fence technology use in delivery operations.
- Interviewed appropriate delivery operations managers and personnel at the headquarters and area levels responsible for the use of geo-fence technology in delivery operations to discuss implementation, status, and results.

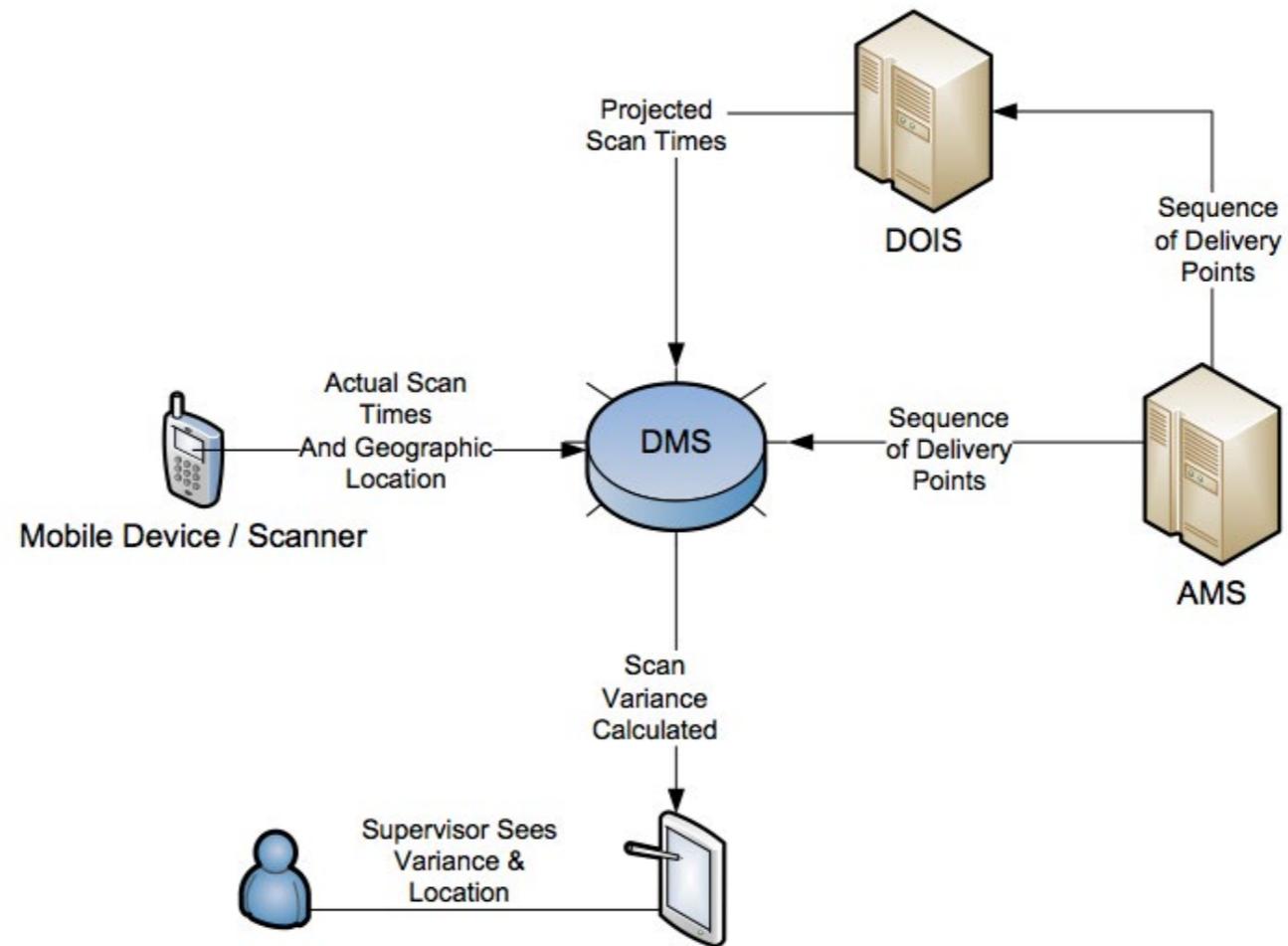
We conducted this review from January through August 2014, in accordance with the Council of the Inspectors General on Integrity and Efficiency, *Quality Standards for Inspection and Evaluation*. We discussed our observations and conclusions with management on June 5, 2014, and included their comments where appropriate.

We did not assess the reliability of any computer-generated data for the purposes of this report.

Prior Audit Coverage

Report Title	Report Number	Final Report Date	Monetary Impact
<i>Delivery Data Transmission</i>	DR-MA-13-003	8/6/2013	None
<p>Report Results: Our report found during the scanning technology project a data transmission problem occurred that required action. While the Postal Service deployed cell phones for carriers to use in conjunction with Intelligent Mail Device (IMD) scanners to provide wireless transmission of data, it was unable to transmit all package delivery data collected by carriers because phones were not always paired with a scanner. Without this connectivity capability, the Postal Service could be at a competitive disadvantage which could adversely impact its brand. We recommended that management issue guidance on conducting a refresher stand-up talk to carriers showing how to connect cell phones and IMDs scanners and noting the importance of the connection, ensure that an onscreen connectivity indicator is installed on either carrier cell phones or IMD scanners, and modify the Intelligent Mail Device Acquisition System report for delivery unit management to provide unit- and route-specific information on cell phones and IMD scanner connectivity. Management agreed with the findings and recommendations.</p>			
<i>Global Positioning System: End-to-End Platform and Actionable, Robust Reports Needed to Achieve Goals and Potential Return-on-Investment</i>	DR-MA-11-003	9/30/2011	None
<p>Report Results: Our report found that in delivery operations, management uses standard GPS reports from the vendor (rather than customized reports) and districts did not consistently use exception data from the reports to manage operations. The existing GPS for delivery vehicles has helped in street management and anecdotally curtailed negative behavior, as well as provided a basis for return on investment. The Postal Service could develop an end-to-end, single-sourced GPS platform and back-office accountability for the entire fleet of vehicles and trucks with a focus on taking costs out of the delivery and transportation system. We recommended that management maximize existing GPS functions, create internal best practices for the existing GPS, explore an end-to-end GPS platform that includes full-range functionality and reports for Postal Service vehicles, and establish a cross-functional team of Postal Service managers to review existing barcode and scanning systems as well other related tracking and scanning opportunities. Management generally agreed with the findings and recommendations.</p>			

Appendix B: Scan Data Flow to the Delivery Management System



Source: OIG analysis.

Appendix C: Management's Comments



July 24, 2014

LORI LAU DILLARD
(A) DIRECTOR, AUDIT OPERATIONS

SUBJECT: Geo-Fence Technology in Delivery Operations (Report Number [DR-MA-14-DRAFT])

Management conditionally agrees with the findings in the OIG report "Geo-Fence Technology in Delivery Operations."

Recommendation [1]:

Modify the Delivery Management System software to capture adjustments for time and location projections when carriers are assigned deliveries on more than one route.

Management Response/Action Plan:

Management agrees with the recommendation. Management notes that the need to make adjustments in carrier workhour projections resulting from assignment of a carrier to more than one route was known prior to the OIG review.

Target Implementation Date:

September 30, 2014

Responsible Official:

James D. Wilson, Manager, Address Management

FOIA Statement:

"This report and management's response do not contain information that may be exempt from disclosure under the FOIA."

A handwritten signature in blue ink, appearing to read "Robert Cintron".

Robert Cintron
Vice President, Product Information



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