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INTERNAL AUDIT DIVISION

Survey of Automatic Vehicle Location Systems in Cobb County

Report Number: 2010-004

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COBB COUNTY INTERNAL AUDIT

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MEMORANDUM TO: David Hankerson, County Manager

FROM: Latona Thomas, CPA, Manager *LT*

SUBJECT: Survey of Automatic Vehicle Location Systems in Cobb County

This report presents the results of our Survey of Automatic Vehicle Location Systems in Cobb County. We conducted this survey at your request to determine how Automated Vehicle Location (AVL) systems are used in the departments within the County and if there are any potential benefits derived through consolidating the current systems.

The countywide survey was conducted in October and November 2010. In order to gather the necessary information, we discussed AVLs with representatives in the following offices: Information Services, Public Safety, Cobb County Water System (CCWS), Fleet, DOT and Tax Assessor. We discussed the use, cost, capabilities, problems, and benefits of the AVL system with the appropriate personnel within the respective departments. We also evaluated the feasibility of consolidating the existing systems.

AVLs are being utilized in several departments to increase efficiency, document service trips, monitor employee work activities, save fuel and lower emissions. Details are included in the attached report. Please contact me at (770) 528-2559 or Barry Huff, Auditor-in-Charge, at (770) 528-2558 if you have questions.

Background

Automatic Vehicle Location (AVL) provides up-to-date location information for vehicles. AVL systems usually consist of a GPS receiver on the truck or vehicle, a communications link between the vehicle and dispatcher, and PC-based tracking software for dispatch.

The communication system is usually a cellular network similar to the one used in cell phones. The diagram to the right illustrates the AVL system. It shows the GPS signal arriving from a satellite to the truck (on the left). The truck location is communicated to the PC dispatch software (on the right). That's all there is in a basic AVL setup.

Concerned with the use of Automatic Vehicle Location (AVL) systems in the County, the County Manager asked us to conduct a survey to determine which departments use AVLs and how each department's management is using them.

Results of Survey

About 18 months ago, the Information Services department facilitated a discussion of developing a countywide AVL system. A proposed solution was put on hold pending the purchase and installation of a 'Bus AVL Computer-Aided Dispatch System' for Cobb Community Transit (CCT). Information Services wanted to explore the possibility of other departments using the CCT system. Since CCT is a division of DOT, DOT is already in the process of exploring this possibility.

In addition, the Department of Public Safety hired a contractor to perform a study of its AVL functional goals and develop an implementation plan. At the time of the study, the Police Department had a grant to cover the initial costs of the implementation plan; however, we are unsure if the initial costs have been expended. Because the Fire Department does not have the necessary funding, they will revisit the implementation plan in the future, as funding becomes available.

Number of Systems

We determined that there are currently two AVL systems in the County tracking 109 vehicles (see chart below). Fleet tracks 10 vehicles using a web-based[1] system and CCWS tracks 99 vehicles on a server-based[2] system located at the CCWS headquarters office. As of the date of our review, 17 of the 99 server-based units were not functioning and reporting location data to the server, and the vendor of the units is no longer installing and providing maintenance for these units. DOT has one vehicle (sign truck) on the Fleet system and five on the CCWS system. All 12 of the Tax Assessor's vehicles are tracked on the CCWS system.

Office	Intergis-Vericom (Fleet)	Intergraph-TrackForce (CCWS)
CCWS		82
Tax Assessor		12
DOT	1	5
Fleet	9	
Total Vehicles	**10**	**99**

Figure 1
Source: Al Curtis, Business Manager, Fleet Service; and
John Knowles, GIS Manager, CCWS

Primary Use of Automatic Vehicle Location Systems

The **CCWS** uses their system to:
- Dispatch service calls (primarily used by the Field Operations Manager)
    - Provides most efficient routing for service calls
    - Locates closest truck for call
    - Monitor night calls (i.e. identify where vehicles went and when)
- Secondary Uses:
    - Disciplinary reasons to support misuse of vehicles (out of area, not at appointed area)
    - Monitor speeding (not always accurate)
    - Verify time stamps on service calls to determine if crews are working efficiently

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[1] Web-based system – access to the software and remote hosting system is via internet.
[2] Server-based system – user has own server on location and hosts software and mapping data on their system.

Tax Assessor uses the CCWS system to:
- Monitor the use of vehicles by field appraisers. Daily reports are matched to activity logs. The route shown on the report should match what was reported on the daily production log.
- Verify that vehicles stayed in their assigned area
- Dispatch the closest appraiser to assist another appraiser in the field or to assist a taxpayer who calls for assistance.
- Monitor mileage on vehicles to ensure mileage distribution among cars
  - Goal is 1500 miles a month per vehicle
  - Mileage monitored every two to three weeks
  - Low mileage units are used by managers, if needed
- Document inconsistencies for disciplinary actions
- Locate vehicles in case of an emergency or breakdown

DOT uses both systems to:
- Monitor two emergency vehicles and three Fleet vehicles (As an alternative, they intermittently use a routing map to support logs turned in by emergency personnel.)
- Investigate overtime expenditures. (If DOT management believes overtime is too much, he will use the routing map to determine where the emergency personnel vehicle went and how long it stayed there.)
- Support documentation for service calls (i.e. to document the repair of a stop sign called in by a citizen)
- Monitor employees who go out in the field for various reasons to ensure they travel only to the intended designation

Fleet uses their AVL system to:
- Track 6 service vehicles, in addition to 2 buses and 1 van
- Monitor idling and mileage to achieve fuel savings and reduce carbon emissions (i.e. a report is automatically generated each morning and distributed to all supervisors)
- Monitor activities of the employee who visits the 13 fuel islands every day (i.e. system can monitor where he is and his progress at each station.)
- Dispatch service truck closest to next service call

Benefits and Drawbacks

Intergraph TrackForce (CCWS system)

Benefits: Reduced response time to customers, improved efficiency, and mitigation effects of sewer overflows.

Drawbacks: The current software version does not work well with all units, and does not interface with GIS maps. The system is antiquated, outdated, slow and sometimes inaccurate.

Intergis Vericom (Fleet system)

Benefits: Cost savings, increased efficiency, increased effectiveness, environmental benefit (reduced idling), increased customer service, time management, increased personnel and vehicle accountability.

Drawbacks: The system does not interface with GIS maps. Due to budget restrictions, they are unable to utilize the full capabilities of the system. Also, they don't have anyone to monitor on a full-time basis and do dispatch.

Cost Comparisons

Web-Based Intergis Vericom	Server-Based System Intergraph TrackForce
Set Up Charge per Unit **$452**[3]	GPS per Unit $200-500; Software **$85,000**[4]
Software updated by vendor	Periodic cost to upgrade software • 2005 for **$15,785** • 2009 for **$28,500**
No annual software maintenance costs	Annual software maintenance cost Average **$16,030**[5]
No server costs, hosted by vendor	Resides on GIS Server
Monthly Service Fee = **$30 per unit** (cost of GPS communication included)	Monthly Cost = **$16.99** per GPS Wireless Card

Figure 2
Source: Al Curtis, Business Manager, Fleet Service; John Knowles, GIS Manager, CCWS

Wireless Card Charges

We downloaded the AT&T (Cingular) data for all the departments (DOT, Tax Assessor, Fleet and CCWS) for FY2010, and reviewed the invoice charges for one month (4/16/10-5/15/10) for the CCWS. We judgmentally selected the CCWS invoice to review because they have the highest number of units (82) in service and the monthly bill amount for each unit varied from $16.99 to $19.09. (See Figure 3 on Page 5)

We determined the following:

- **DOT** charges were $16.99 per month, for the last nine months, for each of the units, and there were no irregularities.

- **Tax Assessor** charges were $203.88 for 12 units at $16.99. There were no irregularities.

- **Fleet** did not have AT&T charges related to their AVL.

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[3] $452 includes GPS units $330 + Installation cost $100 + Activation/Shipping $22.
[4] Amount provided by CCWS staff (not verified by Internal Audit Division).
[5] Average cost computed using FY2005-2010 contract data. We were unable to reconcile costs for FY05 and 06 to the payment records in the financial system.

- **CCWS** charges were not consistent from month to month. Our review of one monthly invoice showed:
  - Monthly credits[6] varied from $2.30, $2.33 or $3.00.
  - They paid for 17 cards in units that were not working.
  - There were erroneous text message charges[7] included in the invoices totaling $3.80, ranging from $.40 to $1.40.
  - Monthly charges were higher than Tax Assessor and DOT.

Charges for 82 Wireless Cards – CCWS Only!

Amount	# Billed @ Amount	Total Amount
$19.09	1	$ 19.09
$18.49	1	$ 18.49
$18.09	2	$ 36.18
$18.07	1	$ 18.07
$17.87	2	$ 35.74
$17.69	52	$919.88
$17.67	10	$176.70
$17.66	2	$ 35.32
$16.99	11	$186.89
Total	**82**	**$1,446.36**

Figure 3
Source: Cingular (AT&T) Invoice charges for month (4/16/10-5/15/10) for the CCWS

Cost to Transition 100 Vehicles to Fleet's System

It will take over $45,000 to transition 100 units to the Intergis Vericom AVL system currently used at Fleet. The major cost involves the purchase and installation of new GPS units in each of the CCWS, Tax Assessor and DOT vehicles. The existing GPS units are incompatible.

Costs eliminated by consolidating the systems are:

1. The cost of periodic upgrades to the Intergraph software (CCWS), which totaled $15,785 and $28,500 in 2005 and 2009, respectively.

2. The annual software maintenance costs that average $16,030 annually (see Figure 2 on Page 4).

Otherwise, the monthly costs for both systems are comparable, averaging approximately $3,000 monthly (see Figure 4 on Page 6).

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[6] National Account Discounts
[7] Inappropriate for a GPS unit

Charges for 100 additional units on Intergis (Fleet system)	Current charges for 100 units on Intergraph (CCWS system)
Monthly Charges: • 100 Units x $30.00 - $3,000 **Activation:** • Fee/Shipping 100 x $22 = $2,200 • GPS Units 100 x $330 = $33,000 • Install Fee 100 x $100 = $10,000 Total $45,200	**Monthly Charges:** $1,740 AT&T Charges $1,336 Pro-rated Annual Maintenance Charge $3,076 Total

Figure 4
Source: Representatives from Intergis; AMS Financial System Data, Cingular (AT&T) Invoice

Detailed Objectives, Scope, and Methodology

Our overall objective was to determine how Automated Vehicle Location (AVL) systems are used in the departments within the County and if there were any potential benefits derived through consolidating the current systems.

To accomplish our objective we:

I. Contacted the departments that use County vehicles continually to determine if they utilize an AVL system to track or locate vehicles in the system.

    A. We discussed the use, cost, capabilities, problems, and benefits of the AVL system with the appropriate personnel.

II. Discussed the subject of AVL with Information Services to determine what involvement they had in the deployment of any AVL systems.

III. Evaluated the costs of the systems.

    A. What were the set-up costs?

    B. What were the monthly/yearly recurring costs?

    C. Were there any cost savings to be achieved?

    D. Analyzed a month of billings and looked for anomalies.

IV. Evaluated whether the systems could be consolidated.

    A. We evaluated each department's needs and determined if one system could accommodate all departments.

    B. We determined if there were any potential benefits to consolidation.

Abbreviations and Glossary

AVL	Automatic Vehicle Location
CCWS	Cobb County Water System
CCT	Cobb Community Transit
GPS	Global Positioning System
DOT	Department of Transportation

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