



**A Report to the  
Audit Committee**

**Mayor**  
Megan Barry

**Chief Operating Officer**  
Richard Riebeling

**Audit Committee Members**  
Robert Brannon  
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Talia Lomax-O'dneal  
Bob Mendes  
Brack Reed

**Metropolitan  
Nashville  
Office of  
Internal Audit**

# Audit of Metropolitan Nashville General Services Department Radio Communication Division

November 2, 2015

The Metropolitan Nashville Government General Services Radio Communication Division must adhere to the security requirements placed on them by the Tennessee Bureau of Investigation and the Federal Bureau of Investigation. These requirements included restricting the distribution of information related to the underlying technology infrastructure and supporting system and communication security services.

Due to the sensitive information included in the report, which could detail vulnerabilities, weaknesses, and possible threats to Metropolitan Nashville's information and communication technology services, the distribution for the full confidential report was limited to management of the Metropolitan Nashville Government General Services Radio Communication Division. This exemption is granted by Tennessee Code Annotated § 10-7-504 (i) (1) "Information that would allow a person to obtain unauthorized access to confidential information or to government property shall be maintained as confidential."

Sections of the public report are redacted or deleted to protect the security of public safety communication infrastructure.

## EXECUTIVE SUMMARY

November 2, 2015



### Why We Did This Audit

The audit was initiated due to the critical impact radio communication is to public safety services.

### What We Recommend

- Enhance radio network security monitoring activities.
- Establish formal inventory procedure.
- Improve billing and collection procedures.

For more information on this or any of our reports, email [Mark.Swann@nashville.gov](mailto:Mark.Swann@nashville.gov)

# AUDIT OF GENERAL SERVICES RADIO COMMUNICATION DIVISION

## BACKGROUND

The Metropolitan Nashville General Services Radio Communication Division is in charge of the daily operation and maintenance for the 800 MHz trunked radio system. About 39 Metro Nashville departments and other organizations benefit from this communication system.

The division supports eight tower sites, 6,307 radios in the "A" system for public safety, and 2,823 radios in a "B" system for other agencies. In 2015 the \$22.5 million upgrade project for the "A" system was completed. The "B" system will be upgraded starting in 2015 at an estimated cost of \$18.9 million.

### Exhibit 1 – Radio Shop Operational and Maintenance Expense Recovery

	FY 2013	FY 2014
Operational and Maintenance Expense <sup>1</sup>	\$2,099,605	\$2,365,673
- Infrastructure Maintenance	835,176	1,361,284
- Shop Maintenance	1,264,429	1,004,389
Operating Revenue	1,615,578	2,011,761
Expense Recovery Percentage	77%	85%
Expense in Excess of Operating Revenue	\$ 484,027	\$ 353,912

Source: Metro Nashville's EnterpriseOne Financial System

John Johnson, with 35 years of experience in radio communications, was hired to assist with the technical aspects of this engagement.

## OBJECTIVES AND SCOPE

The audit scope includes transactions between June 1, 2013, and May 31, 2015. The objectives of the audit are to determine if:

- Effective internal controls are in place to keep the radio communication system available for use 99.999 percent of every day.
- Radio shop operational costs are fully recovered from system users.
- Radio communication assets and equipment are safeguarded.

## WHAT WE FOUND

We found that Radio Communication Division was effectively managing the 800 MHz trunked radio system. However, information system controls should be tightened, asset management procedures should be established, and billing and collection processes should be improved.

<sup>1</sup> Expenditures do not include depreciation or communication equipment expenses (object accounts 505901 and 503853).

## GOVERNANCE

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The Metro Emergency Radio Management Committee provides oversight for the management of the 800 MHz radio system. The Radio Communication Division within the Metropolitan Nashville Government General Services Department is charged with daily system operation and maintenance of infrastructure and radio equipment. The division functionally reports to the committee, and administratively to the Director of the Metropolitan Nashville Government General Services Department.

## OBJECTIVES AND CONCLUSIONS

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1. *Are controls in place to ensure 99.999 percent system availability of every day?*

**Generally yes.** A subject matter expert was hired to assess the radio system operation from the perspectives of radio network security, preventive maintenance, system availability, capacity and interoperability, and potential impact of emerging technology and regulation changes. The subject matter expert's report commended the practice at the Radio Communication Division while identifying several areas for improvement. The report is classified confidential due to its sensitive content related to the radio system infrastructure.

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### Supporting Objectives and Conclusions

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d. *Are performance measures monitored for the purpose of improvement?*

**Yes.** The system monitoring software, provided by the vendor, monitors major indicators for system performance.

performance reports presented to the Metro Emergency Radio Management Committee are manually edited for planned maintenance downtime by the vendor's technician. (See Observation D.)

- f. *Is there a long-term strategic planning procedure to evaluate future upgrade needs regarding technology evolution and financial feasibility?*

**Generally yes.** The division is monitoring current and emerging radio technologies. However, the division should solicit user feedback as a basis for establishing strategic planning. (See Observation E.)

- g. *Are radio system technicians trained to maintain technology infrastructure upgrades?*

**Yes.** The Radio Communication Division's field crew is trained through programs provided by the vendor. The division should consider developing internal knowledge of producing and analyzing performance reports from the system monitoring software. (See Observation D.)

2. *Are assets for radio communication tracked and safeguarded?*

**Generally yes.** The Radio Communication Division keeps track of radio system assets. However, a formal assets management procedure should be defined to efficiently track equipment transfers and cost of assets. Moreover, the ambiguity of responsibilities between the Radio Communication Division and the Fleet Management Division should be clarified. (See Observation E.)

3. *Are radio shop operational and maintenance costs fully recovered from system users?*

**Generally no.** Exhibit 1 shows that user fees recovered approximately 77 percent and 88 percent of operational and maintenance expense for fiscal years 2013 and 2014 respectively. Some of the difference could be for labor or other expenses related to the capital project to upgrade the "A" system for public safety. The Metro Emergency Radio Management Committee should review its cost recovery methodology.

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### Supporting Objectives and Conclusions

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- a. *Are controls designed and working to reasonably ensure billings are complete, accurate, and protected from alterations?*

**Generally no.** The current rate structure is based on costs estimated in 2005 by Maximus. Although some of the estimates were reviewed in 2008 and 2010, those costs are no longer current. Moreover, not all costs are consistently charged to user departments. (See Observation F.)

- b. *Are controls designed and working to reasonably ensure revenue collections are complete and recorded in the Metro Nashville Government's accounting system?*

**Generally no.** The segregation between billing, payment receipts, and records keeping is lacking. There is no defined procedure to track outstanding client balances. (See Observation F.)

## AUDIT OBSERVATIONS

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Internal control helps entities achieve important objectives and sustain and improve performance. The Committee of Sponsoring Organizations of the Treadway Commission, *Internal Control – Integrated Framework (COSO)*, enables organizations to effectively and efficiently develop systems of internal control that adapt to changing business and operating environment, mitigate risks to acceptable levels, and support sound decision making and governance of the organization. The audit observations listed are offered to assist management in fulfilling their internal control responsibilities.

### ***Observation A, Observation B, and Observation C – Confidential***

The Metropolitan Nashville Government General Services Radio Communication Division must adhere to the security requirements placed on them by the Tennessee Bureau of Investigation and the Federal Bureau of Investigation. These requirements included restricting the distribution of information related to the underlying technology infrastructure and supporting system security services.

Due to the sensitive information included in the report Observations A, B, and C, which could detail vulnerabilities, weaknesses, and possible threats to Metropolitan Nashville’s information and communication technology services, the distribution for these report observations was limited to management of the Metropolitan Nashville Government General Services Radio Communication Division. This exemption is granted by Tennessee Code Annotated § 10-7-504 (i) (1) “Information that would allow a person to obtain unauthorized access to confidential information or to government property shall be maintained as confidential.”

### ***Observation D – Radio System Performance Monitoring***

Radio Communication Division technicians are unable to monitor the radio system performance independently. Performance reports are prepared manually by the maintenance vendor technicians for management review. It would be beneficial for the Radio Communication Division to develop additional competence in radio system performance monitoring, analyzing, and reporting.

#### *Criteria:*

- *COSO, Monitoring Activities–Principles 17*–The organization evaluates and communicates internal control deficiencies in a timely manner to those parties responsible for taking corrective action, including senior management and the board of directors, as appropriate.
- Metro Nashville Information Security Policy, Inventory and Ownership of Assets

#### *Recommendations for management of the Radio Communication Division:*

- 1) Develop competency in radio system performance monitoring to aid in management oversight of the system and contractor performance.

### ***Observation E– Inventory Tracking***

The radio and parts inventory management should be improved. The integrity of inventory records in the MCM assets management system has a direct impact on the accuracy of charges billed to customers. The following concerns with inventory tracking exist:

- Multiple spreadsheets are used to track assets and radio IDs while the MCM assets management system can be used in an integrated approach and avoid unnecessary redundancy.

- Movements of radio equipment are not captured, while the MCM assets management system provides the capability for asset swap and transfer.
- No reconciliation records exist to whether the numbers of radios purchased agrees with physical radio inventory records. The last physical radio inventory was completed in April 2015.
- Some items for radio shop use only are ordered and tracked by the Office of Fleet Management. This causes unnecessary delay in getting the parts and uncertainty of stock on-hand, as well as allocating costs.
- The ID Manager module in the MCM assets management system is not used to maintain one-to-one relationship effectively and efficiently between radio IDs and radios registered in the system.
- Vehicles that do not belong to Radio Shop are tracked in the MCM assets management system as assets.
- Labor rates are tracked as an inventory item in the MCM assets management system.
- Serial numbers of radio equipment are not consistently recorded in the MCM assets management system causing confusion for inventory management.
- A physical inventory showed 77 portable and mobile radios are not on tracking spreadsheets maintained by the Radio Communication Division. It is believed most of these radios are the old devices from patrol cars during the last system upgrade. These old radios originally cost over \$2,000 each and still have some resale value.
- Out of 103 new radios purchased, one radio serial number could not be located in records maintained by the Radio Communication Division.
- A procedure to help guide with the disposal of surplus radios does not exist. Measures are performed to return these radios to their original manufacturer setting, but the number of radios, as well as their serial numbers is not recorded before being transferred to Metro Nashville eBid.

*Criteria:*

- Metro Nashville Finance Policy 14, Capital Assets.
- Metro Nashville Information Security Policy, Inventory and Ownership of Assets
- *COSO*, Control Activities–Principle 10–The organization selects and develops control activities that contribute to the mitigation of risks to the achievement of objectives to acceptable levels.

*Recommendations for management of the Radio Communication Division:*

1. Establish an inventory control procedure to ensure that radio equipment and parts are tracked from purchase, receiving, distribution, and disposition. Movements of radio equipment, and other items of value or critical to the mission, should be captured, and an annual physical inventory should be reconciled to recorded inventory quantities.
2. Solicit training about the use of the MCM assets management system for assets tracking and billing.
3. Establish procedure to ensure the ID Manager module in the asset management system is efficiently used to track active radio IDs on the Astro system so that each radio ID can be tied back to the serial number of the radio assigned to the user.

4. Clarify radio system inventory responsibilities between the Office of Fleet Management and Radio Communication Division. The Radio Communication Division should limit its activities strictly related to radio communication functions. In the case of the need to charge radio shop for other non-related activities, the scope of tasks and cost allocation should be clearly defined.

### ***Observation F – User Billings and Collections***

Radio billing and cash handling procedures should be improved. The following concerns with the billing and collections process exist:

- Service charge rates are not recovering the entire annual operational and maintenance expense associated with the system. The current rates were based on costs estimated before fiscal year 2010.
- Some billing and cash handling duties are not effectively segregated. The billing employee assigned to prepare and send invoices to external radio users also opens mail with payment checks and records payments into the central accounting system.
- A billing employee had administrator privileges providing permissions to every activity in the MCM system. This privilege was removed by management upon notification of this special privilege assignment.
- Billable work orders are not consistently charged to user departments.
- Estimated number of radios instead of an actual number of radios assigned is used for internal user billings.
- Several department billings could not be located in the MCM system.
- Comparison of a sample of invoices against MCM records showed that 42 out of 120 invoices did not match. This resulted in \$16,536 not being billed to external users.
- Records reconciling external customer invoices and payments are not available. A review of external customer accounts showed eight customers with outstanding balances totaling \$6,028, one customer short paid the invoice amount by \$314, and one \$1,288 payment could not be attributed to a specific customer.
- Electricity bills for radio tower sites and one vendor’s uninterruptible power supply maintenance expenses are recorded to a different business unit than the business unit used for radio infrastructure maintenance. The total amount invoiced to Nashville Electric Services after the fiscal year 2014 true up was \$24,028 short than what was billed.

#### ***Criteria:***

- COSO, Control Activities–Principle 10–The organization selects and develops control activities that contribute to the mitigation of risks to the achievement of objectives to acceptable levels.
- Metro Nashville Executive Order Dean 29, paragraph 5.b

#### ***Recommendations for management of the Radio Communication Division:***

1. Use the MCM assets management system to capture real costs of activities effectively, and review service charge rates annually based on cost analysis results.

2. Implementing an accounts receivable system that would facilitate applying payments to invoices and provide aging and statements for outstanding balances.
3. Review the billing procedure to ensure that the billing and service charge practices are consistent for all users, outstanding invoices monitored and tracked, and payments identified and recorded accurately and promptly.
4. Record all costs generated for radio system maintenance into the business units under the fund for radio operations.



## **GOVERNMENT AUDITING STANDARDS COMPLIANCE**

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We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our observations and conclusions based on our audit objectives.

## **METHODOLOGY**

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To accomplish our audit objectives, we performed the following steps:

- A subject matter expert was hired to assess the radio system operation from the perspectives of radio network security, preventive maintenance, system availability, capacity and interoperability, and potential impact of emerging technology and regulation changes.
- Interviewed key personnel within Radio Shop and other user departments.
- Reviewed and analyzed documentation for compliance with the Tennessee Code Annotated, Metropolitan Nashville Code of Laws, and other applicable laws, regulations, and policies.
- Evaluated internal controls currently in place.
- Reviewed sample selections to determine the effectiveness of internal controls.
- Reviewed financial related transaction files using analytic audit software.
- Considered risk of fraud, waste, and abuse.
- Considered information technology risks.
- Hired subjective matter expert to assist with the review of technical documents

## **AUDIT TEAM**

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Mark Swann, CPA, CIA, CISA, ACDA, Metropolitan Auditor

Qian Yuan, CIA, CISA, ACDA, Auditor-in-Charge

Nan Wen, Staff Auditor

## APPENDIX A – MANAGEMENT RESPONSE AND CORRECTIVE ACTION PLAN

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Metropolitan Government  
of Nashville and Davidson County

Megan Barry, Mayor  
Nancy Whittemore, Director



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Richard H. Fulton Complex  
730 2<sup>nd</sup> Avenue South  
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October 30, 2015

Mark Swann, Metropolitan Auditor  
Office of Internal Audit  
222 3<sup>rd</sup> Avenue North, Suite 401  
Nashville, Tennessee 37201

RE: Audit of Department of General Services, Radio Communications Division

Mr. Swann:

This letter acknowledges that the Department of General Services is in receipt of the most recent audit of the Radio Communications Division along with the ensuing recommendations from you and your staff.

Please find attached a listing of the audit recommendations along with the corresponding Department of General Services responses and associated target dates for where applicable to corrective actions.

We appreciate the thorough and hard work completed by your staff in an effort to help us to continually improve Radio Communications Division operations. It is a complex area, and it is no small task to come to grips with it.

Thank you and please let me know if you have further questions of me.

Sincerely,

A handwritten signature in blue ink, appearing to read "Nancy Whittemore".

Nancy Whittemore, Director of General Services

Attachment

## APPENDIX A – MANAGEMENT RESPONSE AND CORRECTIVE ACTION PLAN

We believe that operational management is in a unique position to best understand their operations and may be able to identify more innovative and effective approaches and we encourage them to do so when providing their response to our recommendations.

Recommendations	Concurrence and Corrective Action Plan	Proposed Completion Date
<i>Recommendations for management of the Radio Communication Division:</i>		
<p><b>D.1</b> Develop competency in radio system performance monitoring to aid in management oversight of the system and contractor performance.</p>	<p><b>Concur.</b> Management will endeavor to develop additional, internal staff competency in relation to data collection for contractor performance analysis and reporting.</p>	<p>NOV 1, 2016</p>
<p><b>E.1</b> Establish an inventory control procedure to ensure that radio equipment and parts are tracked from purchase, receiving, distribution, and disposition. Movements of radio equipment, and other items of value or critical to the mission, should be captured, and an annual physical inventory should be reconciled to recorded inventory quantities.</p>	<p><b>Concur.</b> Management has already begun the implementation of improved functionality between the asset management and radio systems to eliminate duplicate databases; reduce data entry; integrate inventory and asset tracking, assignment, activation, and removal from service; and simplify billing.</p>	<p>NOV 1, 2016</p>
<p><b>E.2</b> Solicit training about the use of the MCM assets management system for assets tracking and billing.</p>	<p><b>Concur.</b> Management has already arranged for on-site, MCM asset management system training, particularly relating to assets tracking and billing as well as system updates.</p>	<p>DEC 1, 2016</p>
<p><b>E.3</b> Establish procedure to ensure the ID Manager module in the asset management system is efficiently used to track active radio IDs on the Astro system so that each radio ID can be tied back to the serial number of the radio assigned to the user.</p>	<p><b>Concur in Part.</b> Management will determine how the MCM asset management system can be used to track active radios and establish related procedures toward that end.</p>	<p>NOV 1, 2016</p>
<p><b>E.4</b> Clarify radio system inventory responsibilities between the Office of Fleet Management and Radio Communication Division. The Radio Communication Division should limit its activities strictly related to radio communication functions. In the case of the need to charge radio shop for other non-related activities, the scope of tasks and cost allocation should be clearly defined.</p>	<p><b>Concur.</b> Management will re-establish a Radio Communications stockroom and manage the inventory. All Radio Communications inventory now managed by OFM will be imported to the MCM asset management system.</p>	<p>NOV 1, 2016</p>

## APPENDIX A – MANAGEMENT RESPONSE AND CORRECTIVE ACTION PLAN

Recommendations	Concurrence and Corrective Action Plan	Proposed Completion Date
<p><b>F.1</b> Use the MCM assets management system to capture real costs of activities effectively, and review service charge rates annually based on cost analysis results.</p>	<p><b>Concur in Part.</b> Clearly, inventory will be tracked in the MCM asset management system and that data is used in routine rate calculations. Absent a significant change in typical business activities, some costs are relatively constant and reasonably predictable. Management will continue to comply with Finance Department methodologies and scheduling to routinely determine and implement justifiable rates. Management will determine how the MCM system can best be used to effectively track costs.</p>	<p>JUL 1, 2016</p>
<p><b>F.2</b> Implementing an accounts receivable system that would facilitate applying payments to invoices and provide aging and statements for outstanding balances.</p>	<p><b>Concur in Part.</b> Management will review current accounts receivable procedures and implement improvements, particularly with regard to applying payments to invoices and outstanding balance aging and invoicing.</p>	
<p><b>F.3</b> Review the billing procedure to ensure that the billing and service charge practices are consistent for all users, outstanding invoices monitored and tracked, and payments identified and recorded accurately and promptly.</p>	<p><b>Concur.</b> Management will continue to review and improve radio billing procedures including ensuring that user charges are consistent, outstanding invoices are tracked, and accurate recording of payments is timely as well as that related duties are properly segregated—specifically doing so in the next few weeks.</p>	<p>JAN 1, 2016</p>
<p><b>F.4</b> Record all costs generated for radio system maintenance into the business units under the fund for radio operations.</p>	<p><b>Concur in Part.</b> Reference the Appendix A, Section F.1 response. Management will continue to ensure that responsible staff properly record radio system maintenance costs in the appropriate business unit.</p>	<p>JUL 1, 2016</p>

## APPENDIX C – SUBJECT MATTER EXPERT REPORT

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A subject matter expert was hired with 35 years of experience with radio communications to assess the radio system operation from the perspectives of radio network security, preventive maintenance, system availability, capacity and interoperability, and potential impact of emerging technology and regulation changes.

The Metropolitan Nashville Government General Services Radio Communication Division must adhere to the security requirements placed on them by the Tennessee Bureau of Investigation and the Federal Bureau of Investigation. These requirements included restricting the distribution of information related to the underlying technology infrastructure and supporting system security services.

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