MFP/ PS COMMITTEE #2
February 22, 2010

MEMORANDUM

February 18, 2010

TO: Management and Fiscal Policy Committee
Public Safety Committee

FROM: Dr. Costis Toregas, Council IT Adviser
Minna K. Davidson, Legislative Analyst

SUBJECT: FY11-16 Capital Improvements Program: Public Safety System Modernization

Executive's Recommendation

For FY11-16, the Executive recommends $53.7 million for a Public Safety System Modernization Project. The Executive's recommendation would fund three elements of the modernization: 1) replacement of the Computer Aided Dispatch (CAD) system; 2) replacement of the fire station alerting system (formerly a separate CIP project that has been incorporated into this project); 3) acquisition of P-25 standard radio devices. A subsequent phase of the project would include replacement of the radio infrastructure, estimated at an additional $50 million. The current project includes $1.8 million to plan for the radio infrastructure phase. The current project is recommended to be funded with a combination of $3.3 million in Federal Aid, $3.8 million in GO bonds, and $46.5 million in short-term financing. The Executive's recommended PDF for this project is attached on © 1-2. Executive staff responses to Council staff questions are on © 3-10.

Project Justification

The MFP and PS Committees have been receiving updates on the Public Safety System (PSS) for the past several months. The Committees have been told that the CAD system is approaching the end of its useful life and does not meet all of the needs of the user departments. The Public Safety Radio System is near the end of its factory support period (manufacturer's support was to begin to be phased out on December 31, 2009), and interoperability issues are arising as some neighboring jurisdictions replace older radio systems with 700 MHz systems.

In July 2009, the Committees reviewed three reports on the public safety systems. Major recommendations from the reports are summarized in the paragraphs below, and excerpts from the reports are attached as indicated.

Montgomery County Public Safety Systems Modernization Plan, July 2009. This report approaches the replacement of the PSS from an enterprise perspective. It includes a thorough inventory of the technology applications and architecture supporting public safety communications and related functions, discusses future strategies, and suggests next steps. In general, it supports the findings and recommendations of the two studies listed below. The Introduction and Next Steps sections from the PSS Modernization Plan are attached on © 13-16. The full report is available at: http://www.montgomerycountymd.gov/content/council/pdf/agenda/cm/2009/090723/20090723_PSMFP1-1.pdf.

Montgomery County Communications Interoperability Plan, July 2009. This report examines local and regional interoperability partners, issues affecting interoperability, and the County's current infrastructure. It concludes that the County's voice radio system must be upgraded/replaced in the near future, and suggests a phased implementation over a five-year period (See table on © 20-21.) The Executive Overview of this plan is attached on © 17-21. Comments on project planning, including estimated ballpark costs, are on © 22. Background on the P-25 standard is on © 23-25. The full report is available at: http://www.montgomerycountymd.gov/content/council/pdf/agenda/cm/2009/090723/20090723_PSMFP1-2.pdf.

Montgomery County Computer Aided Dispatch Roadmap Study, March 23, 2009. This report identifies business needs that are not being met by the current CAD system, makes recommendations for replacing the current CAD system, and provides guidance for extending the useful life of the current CAD system until a new CAD is operational. The study recommends that the County begin the process of selecting and implementing a new CAD system immediately. The Executive Summary is attached on © 26. A Future CAD System Cost Analysis and the study Recommendations are attached on © 27-32. The full report is available at: http://www.montgomerycountymd.gov/content/council/pdf/agenda/cm/2009/090723/20090723_PSMFP1-3.pdf.

Committee Review

Although the reports listed above provide a good foundation for undertaking a PSS modernization, they do not provide many specifics about the system to be purchased, related costs, or the overall schedule for the replacement of all the system elements. While the PDF provides an overview of the recommended project and costs, it also does not provide much detail about what will be purchased, or how expenditures will break out.

Council staff is concerned that the Committees do not yet have enough information to develop a recommendation to the Council. The discussion below highlights issues that require further clarification.

Issues

1. **Recommended costs/expenditures:** The Executive is recommending a very costly project, but has provided very little detail about how the money will be expended. The PDF shows how expenditures will be allocated in certain categories over the six-year CIP period, but does not show how the expenditures apply to the three elements of the project. (Council staff would note that the PDF categories, which are generally intended for facility or road construction, are not as helpful for understanding expenditure allocations in technology projects.) The table provided by Executive staff on © 9 shows how the funds will be allocated for the three project elements, but does not indicate what the funds will be used for within each element.

   With the information provided so far, it is difficult to tell which costs are included in the project, and which costs are not. For example, the Executive responses indicate that initial training costs for the CAD have been factored into the implementation costs of the systems, and training costs for the new radios are included in the CIP. For both types of training, it is not clear what amount is budgeted, or in which year it appears in the expenditure schedule.

   Council staff comment: The Committee may want to request that Executive staff provide a more detailed breakout of the yearly expenditures in this project.

2. **Context for this expenditure:** As is noted in the PDF, the FY11-16 project will fund only three elements of a large system. An additional expenditure of $50 million is anticipated to replace radio infrastructure, and it is unclear whether other expenditures will be needed later to replace or upgrade other parts of the system. It would be helpful to understand the total costs involved in modernizing the PSS. Council staff tried to get at this issue by asking Executive staff to complete the table on © 11. Executive staff sent the table on © 9 which deals with the current project but does not provide information about other phases of the modernization.

   Council staff comment: The Committee may want to request that Executive staff complete the table on © 11.

3. **Future replacements:** The PSS includes several types of equipment for individual users or vehicles such as MDTs, ePCR tablets, and Police in-car video equipment. The response to question 8 on © 5 gives best practices life cycles for each type of equipment, but does not show an actual replacement schedule for the equipment. It also says that funding for future replacements will have to be identified.

   Council staff comments: Council staff remains concerned that there is not a replacement schedule or funding plan for this equipment. In the past, funding for replacements has been piecemeal at best using grant monies or departmental funding as it becomes available. Replacement of this equipment will be an ongoing cost, and there should be a multi-year schedule showing the number of units to be replaced each year and the

associated costs. Even if replacements are funded through the operating budget, the Council should have this information to understand the full cost of the PSS.

4. **Operating Budget Impacts:** The operating Budget Impacts in the PDF show that a total of $2.4 million will be required for maintenance of the new system over the six-year CIP period. The Executive staff response on © 6 says that the maintenance cost includes software maintenance with 7x24 support for the CAD system, and that other additional operating costs have not been identified.

   Council staff comments: The Committee may want to discuss with Executive staff whether there are likely to be other additional operating costs, and if so, what they would be for, how much they would be, and when they would be identified.

5. **Radio purchase vs. infrastructure replacement:** Following the recommendations of the Communications Interoperability Plan, the Executive recommends replacing the existing voice radio units with P-25 standard radios before replacing the radio system infrastructure. (Background on the P-25 standard is on © 23-25.) A breakout showing the units to be replaced and their costs is on © 10. The Interoperability Plan recommends this approach because other surrounding jurisdictions are already upgrading to different radio systems, and purchasing P-25 radios will ensure that Montgomery County remains interoperable with the other jurisdictions.

   While this approach is practical from an interoperability standpoint, Council staff is concerned because the factory support period for the radio infrastructure is ending soon, and it is not clear how vulnerable the system will be to service interruptions as factory support is withdrawn. In addition, it is not clear whether radios purchased before the infrastructure is designed and purchased will be compatible with the infrastructure that is delivered.

   Council staff comments: The Committee may want to ask Executive staff to discuss the rationale for purchasing the P-25 radios before purchasing the radio infrastructure, how well the existing infrastructure is expected to perform as factory service is phased out, and whether there are likely to be any compatibility issues between new radios and new infrastructure if the radios are purchased first.

6. **Governance:** This project is a collaborative effort between the key public safety Departments and the Department of Technology Services. Much of the work is being done by the PSSM workgroup whose membership is listed on © 12. From the information provided, it is not clear who has the ultimate decision-making authority if there are conflicts among user departments, or if the program must be adjusted to stay within budget.

   Council staff comments: Another large project, Tech Mods, is managed by the CAO's Office with the advantage that the CAO or his designee can prioritize requests from user departments and make final determinations when issues are in contention. In Council staff's view, the Tech Mods management model would also be appropriate for the PSSM

project. However, the Executive does not intend to use the Tech Mods model for this project. Council staff recommends that the Committees ask Executive staff to discuss the governance model for this project, and clarify who will have final decision-making authority and how conflicts will be resolved.

7. **Input from all users:** PSS users include the major County public safety departments plus some outside agencies including municipal police departments and Park Police. A list of users is attached on © 14. The Executive staff response to a question about input from outside organizations appears to say that they are included in the PSSM Work Group, but no representatives from outside organizations are on the PSSM membership list on © 12.

   Council staff comment: The Committee may want to ask Executive staff to clarify how user organizations outside of County Government will have input into the PSSM project.

8. **Short-term financing:** The Executive recommends short term financing to fund $46.5 million for this project. Although the exact financing mechanism has not been determined yet, the Executive estimates that the interest rate will be 5.0%. The payback would begin in FY12 and continue over six years with the following estimated schedule.

Year	Payback Amount
FY12	$1.1 million
FY13	7.6 million
FY14	14.7 million
FY15	15.8 million
FY16	9.3 million
FY17	2.2 million
Total payback	**$50.7 million**

Council staff comment: The Committee may want to ask when a determination will be made about the short term financing mechanism to be used, and whether the interest rate is likely to change before a financing arrangement is finalized.

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FY11-16
CE Recommendation

Public Safety System Modernization -- No. 340901

Category	**General Government**	Date Last Modified	**January 08, 2010**
Subcategory	**Technology Services**	Required Adequate Public Facility	**No**
Administering Agency	**Technology Services**	Relocation Impact	**None.**
Planning Area	**Countywide**	Status	**On-going**

EXPENDITURE SCHEDULE ($000)

Cost Element	Total	Thru FY09	Est. FY10	Total 6 Years	FY11	FY12	FY13	FY14	FY15	FY16	Beyond 6 Years
Planning, Design, and Supervision	3,266	0	0	3,266	925	945	895	501	0	0	0
Land	0	0	0	0	0	0	0	0	0	0	0
Site Improvements and Utilities	0	0	0	0	0	0	0	0	0	0	0
Construction	3,264	0	0	3,264	125	725	1,345	1,069	0	0	0
Other	47,131	2,947	96	44,088	2,500	16,900	18,828	5,860	0	0	0
Total	**53,661**	**2,947**	**96**	**50,618**	**3,550**	**18,570**	**21,068**	**7,430**	**0**	**0**	**0**

FUNDING SCHEDULE ($000)

Federal Aid	3,343	2,947	96	300	300	0	0	0	0	0	0
G.O. Bonds	3,840	0	0	3,840	200	800	1,420	1,420	0	0	0
Short-Term Financing	46,478	0	0	46,478	3,050	17,770	19,648	6,010	0	0	0
Total	**53,661**	**2,947**	**96**	**50,618**	**3,550**	**18,570**	**21,068**	**7,430**	**0**	**0**	**0**

OPERATING BUDGET IMPACT ($000)

Maintenance				2,408	48	0	680	500	680	500
Net Impact				**2,408**	**48**	**0**	**680**	**500**	**680**	**500**

DESCRIPTION

This project will provide for phased upgrades and modernization of computer aided dispatch (CAD) and voice radio systems used primarily by the County's public safety first responder agencies including Police, Fire and Rescue, Sheriff, Corrections and Rehabilitation and Emergency Management and Homeland Security. The modernization will include replacement of the current CAD system, replacement of mobile and portable radios, and voice radio communications infrastructure. The initial phase includes the CAD replacement, station alerting system replacement and the acquisition of the P-25 standard radio devices. A subsequent phase would include the replacement of the radio infrastructure, estimated at approximately $50M.

The previously approved Fire Station Alerting System Upgrades project (#451000) was transferred to the this project in order to coordinate the upgrades with the new CAD system. The alerting system upgrades will modernize the fire station alerting systems at 32 existing stations, maintaining the ability to notify fire and rescue stations of emergencies. The alerting system, including audible and data signals, is essential for the notification of an emergency and the dispatch of appropriate response units from the county.

As voice, data and video are beginning to converge to a single platform, this project will provide a pathway to a modern public safety support infrastructure that will enable the County to leverage technology advances and provides efficient and reliable systems for first responders. This project will follow the methodologies and strategies presented in the Public Safety Systems Modernization (PSSM) plan completed in July 2009.

COST CHANGE

Increase due to inclusion of additional upgrades and modernization of computer aided dispatch (CAD), replacement of mobile and portable radios, and voice radio systems, and addition of Fire Station Alerting project.

JUSTIFICATION

The Public Safety Systems require modernization. The CAD system is reaching the end of useful life and does not meet the County's current operational requirements, impacting the response time of first responders to 9-1-1 calls. The CAD roadmap Study completed in March 2009, recommended replacement of the system to address existing shortcomings and prepare for the next generation 9-1-1 systems. Manufacturer's support for the voice radio system will begin to be phased out December 31, 2009. Beyond that date the manufacturer will only continue to provide system support on an "as available" basis, but will not guarantee the availability of parts or technical resources.

The CAD modernization will initiate with a detailed planning phase that will include the use of industry experts to assist in both business process analysis and developing detailed business and technical requirements for the new CAD system. Utilizing external consultants for this process will allow the County to incorporate lessons learned and best practices from other jurisdictions.

The fire station alerting system upgrades were identified as a need under Section 5 of the MCFRS Master Plan (adopted by the County Council in October 2005) and detailed in the Station Alerting and Public Address (SA/PA) System for Fire/Rescue Stations, Rev 1, 2006. This project allows for the continuous and seamless functioning of the alerting systems within each fire station. A preliminary survey by DTS of existing conditions at all stations revealed system wide

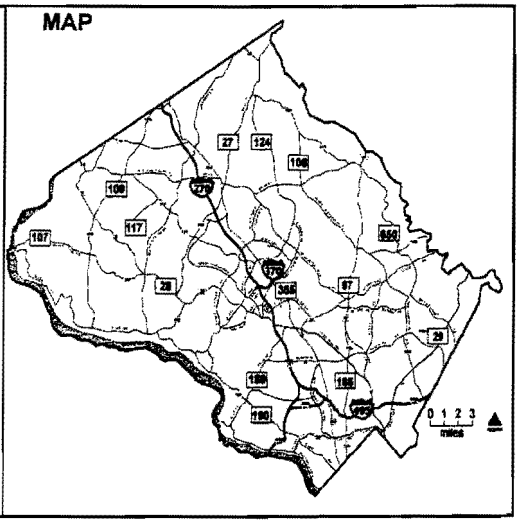
APPROPRIATION AND EXPENDITURE DATA

Date First Appropriation	FY09	($000)
First Cost Estimate Current Scope	FY11	53,661
Last FY's Cost Estimate		6,883
Appropriation Request	FY11	3,550
Appropriation Request Est.	FY12	18,570
Supplemental Appropriation Request		0
Transfer		0
Cumulative Appropriation		3,043
Expenditures / Encumbrances		2,947
Unencumbered Balance		96
Partial Closeout Thru	FY08	0
New Partial Closeout	FY09	0
Total Partial Closeout		0

COORDINATION

Public Safety Steering Group
Department of Technology Services
Department of Police
Montgomery County Department of Fire and Rescue Service
Sheriff's Office
Department of Corrections and Rehabilitation
Office of Emergency Management and Homeland Security
Department of Transportation
Department of Liquor Control
Montgomery County Public Schools (MCPS)
Maryland-National Park and Planning Commission (M-NCPPC) Park Police
Washington Metropolitan Area Transit Authority (WMATA)

MAP



(1)

concerns, including inadequate spare parts inventory and lack of available maintenance support for alerting systems.

As more of the County's regional partners migrate to newer voice technologies, it will affect interoperable voice communications. To ensure that the County maintains reliable and effective Public Safety (voice radio) communications for the operations of its first responders and to sustain communications interoperability for seamless mutual aid among its regional partners, the County needs to commence planning and implementation of a program to upgrade and modernize its portable and mobile radio units and subsequently the communications infrastructure.

OTHER

Coordination with participating departments/agencies and regional partners will continue throughout the project.

FISCAL NOTE

Funding in FY09 includes Urban Area Security Initiative (UASI) grant funding of $2.055 million and Fire Act grant funding of $988,000. Funding in FY11 includes Urban Area Security Initiative (UASI) grant funding of $300,000.

(a)

Questions – Public Safety System Modernization

Please provide responses by Friday, February 12.

Expenditures/Schedule

1. Please complete the attached breakout showing costs for the PSSM project over the six-year CIP period. Please add rows if needed.

Response:
Please reference the attached PSSM CIP budget breakdown.

2. Please provide a timeline showing the anticipated timeframe for the planning, procurement, and implementation (including go-live date) of the CAD, station alerting system, and radio infrastructure replacements.

Response:
Please reference the attached PSSM CIP budget breakdown.

High-level milestones –

CAD go-live sometime in FY13
Station alerting fully implemented in FY14
All radios (handheld and mobile) replaced by FY14

3. Please provide information about the P-25 standard for radios.

Response:
The Montgomery County Communications Interoperability Plan (MCCIP) provides an excellent explanation of the Federal DHS public safety interoperability continuum and the development of the P25 standard (pages 21- 23).

Selected highlights –

- P-25 is a set of standards being developed and implemented in two phases. P-25 Stage 1 began in 1989. It applies to the VHF, UHF, 700 MHz, and 800 MHz frequency bands.

- The P-25 CAI (common air interface) provides a methodology for multiple vendors to provide components of infrastructure and radios.

- The P-25 CSSI (console subsystem interface) defines interactions between an RFSS (radio frequency subsystem) and consoles.

- The P-25 ISSI (inter-subsystem interface) defines interactions between and among various infrastructure subsystem components.

- P-25 Phase 2 adds TDMA (Time Division Multiple Access) for radio spectrum efficiency.

4. Why is it necessary to upgrade to P-25 radios Countywide before replacing the radio system infrastructure?

Response:
The MCCIP defines the phased approach for the deployment of the radios and implementation of the radio infrastructure (pages 2-5). The phased approach timeline is adjusted to reflect available funding. This strategy was corroborated by the industry expert consultant. The consultant provided additional details and explanation at the Council session on July 23, 2009.

Selected highlights –

- Because neighboring jurisdictions (e.g., Prince Georges County, Loudoun County, Arlington County, Alexandria City) are already in the process of fielding P-25 based radio systems, it is necessary to upgrade public safety radios to be P-25 capable. Failure to do so will result in loss of interoperability between Montgomery and those jurisdictions that have upgraded or soon will.

- By replacing the radios first, when the radio infrastructure is updated, all the radios will be ready to take advantage of the new radio infrastructure capabilities.

5. Please provide an update of the "Radio CIP Upgrade and Modernization Schedule" that was included in the budget request to the Executive. Please include information about any P-25 radios that were already purchased and the source of funds for them.

Response:
The schedule has not changed; therefore, the same can be used.

All radios purchased to date are P-25 compatible XTS 5000 Motorola models.
Two Grants provided radios as follows:

Fire Acts Grant	247
UASI Grant	623
Total	**870**

6. It is Council staff's understanding that a cache of radios was purchased with UASI funds a few years ago to assist with interoperability during multi-jurisdictional responses to incidents. How many radios were purchased? Who manages the cache? How is replacement handled? Are the radios P-25 compliant? Under what circumstances are the radios placed in service?

Response:

Montgomery County houses an emergency cache of 500 radios for the National Capital Region (NCR). The NCR radio contact for Montgomery County is John Freeburger who works for Fire & Rescue. The radios that were purchased are housed in a mobile trailer and are P25 compliant. Deployments of the radios are governed by NCR protocol. John Freeburger is available to discuss in more detail.

7. When the Station Alerting System project was added to the CIP last year, an immediate issue was that the old system could not be extended to new fire stations. If the implementation of the Station Alerting System is delayed to coordinate with the CAD replacement, how will station alerting be provided for new stations that become operational before the new system is available?

Response:
Fire & Rescue has secured four units from neighboring Fairfax County that were decommissioned when they replaced their old Station Alerting System. These units will be utilized for the newly constructed Fire stations and provide backup for any units that fail. This is only a short-term stopgap, as this equipment is no longer manufactured. The strategic plan is to focus on the PSSM and implement a CAD replacement with Station Alerting.

8. The Public Safety Communications System includes several types of equipment for individual users or vehicles such as MDTs, ePCR tablets, and Police in-car video equipment. What is the replacement schedule for each type of equipment? How will the replacements be funded?

Response:
The MDTs have a lifespan of 4-5 years, and given the large fleet of MDT's, an ongoing replacement of one fourth or one fifth of the inventory annually makes the most sense. The tablets are expected a 3-4 year lifespan, since they are removed from the vehicles and subject to more physical stress. Given the smaller inventory, tablets could be replaced all at once. The video equipment may last a little longer (5-6 years) as they do not have to keep up with operating system or application software changes. Operating funds and grants have been used previously for MDT replacements. Funding for future replacements will have to be identified.

These are best practice life cycle replacement timeframes. However, based on recent economic conditions funding may not be available to maintain this replacement timeframes. The life cycle and replacement timeframes may differ based on funding availability.

9. How much training will be needed to transition public safety users to the new PSCS? How much will the training cost, and how will it be funded?

Response:
Training can be broken down into the following sub-areas:

CAD (which includes RMS and Station Alerting)

Both Functional and Technical Training will be required at various levels for all systems.

Planned Training Class	Targeted Audience
CAD Administration	PSDS Team and Dept CAD and Mobile Managers
CAD Dispatcher Training	Law Enforcement and Fire Call Takers & Dispatchers
Remote CAD Training	Law Enforcement and Fire Field Users, PSAs, Records Clerks, TRS
Mobile (MDC) CAD Training	Law Enforcement and Fire Field Users
RMS/Field Reporting Administration	PSDS and Law Enforcement RMS and Mobile Data Managers
Field Reporting Training	Law Enforcement Field Users
RMS Overview/Query Training	All Law Enforcement Employees
RMS Module Training	Targeted Training for Law Enforcement Work Units such as; Records, Warrants, Investigations, Domestic Violence, Registered Offenders

The amount of training will vary by user and the extent of their use of the various systems. Initial training costs have been factored into the implementation costs of the systems. On-going training needs will replace classes on current systems and will be absorbed into current operational budgets.

Public Safety Radio System

Basic functional training will be required for the end-users of the new Mobile and Portable Radios.

Given that both new software and new business processes will be implemented, rigorous training will be needed. The CIP includes funding for training.

10. The Operating Budget Impacts in the PDF show that a total of $2.4 million will be required for maintenance of the new system over the six-year CIP period. What is included in these costs? Will there be any other costs related to the operation of the new system?

Response
The maintenance cost includes software maintenance with 7x24 support for the CAD system. Other additional operating costs have not been identified.

Funding

11. Which short term financing mechanism will be used to fund this project?

Response:
The best estimate at this time is that Finance would issue Certificates of Participation or some other form of short-term lease to finance the project. This is subject to change since it is hard to predict early on what form of debt will be used since the actual cash needs may change over time.

12. What is the schedule for payback of the short term financing? What will be the carrying cost of the debt?

Response

The scheduled payback begins in FY12 and continues over 6 years. The estimated interest rate is approximately 5.0% on the $46.5 million of short-term financing. The estimated debt service payments are: FY12 - $1.1 million; FY13 - $7.6 million; FY14 - $14.7 million; FY15 - $15.8 million; FY16 - $9.3 million; and FY17 - $2.2 million.

13. What will the bond funding be used for? What is the justification for using bonds as opposed to current revenue or short term financing?

Response

The Bond funding will be used for the Fire Station Alerting upgrades that are included in the project. The reason Bonds are being used is that the alerting system includes IT hardware components and computer systems, which are Bond eligible.

Planning

14. Which planning activities will be funded with the $3.2 million that is scheduled for Planning, Design, and Supervision for the six-year CIP period?

Response:

This project will follow the methodologies and strategies presented in the Public Safety Systems Modernization (PSSM) plan completed in July 2009. The CAD study and the PSSM plan can be found on the DTS Department website http://www.montgomerycountymd.gov/dts under the Strategic Plan tab.

The CAD modernization will initiate with a detailed planning phase that will include the use of industry experts to assist in both business process analysis and developing detailed business and technical requirements for the new CAD system.

In conjunction with system requirements development will be a Business Process Review. This review will look at business processes in the Emergency Communications Center to determine the optimal processes, how they can be improved by leveraging capabilities in a new system, and what design considerations may be required of a new system in order to meet the business needs.

15. A study of MCFRS communications processes is currently underway and is expected to be completed by mid to late April. Will a study of Police communications processes be conducted? If so, when? If not, why not?

Response:

No, a study of the Police Communications Process within the 9-1-1 Emergency Communication Center will not be undertaken. The MCFRS study was commissioned to

address MCFRS specific response times as compared to national standards. The MCFRS study will touch upon Police Emergency call taking operations as they relate to the hand off of 9-1-1 calls for Fire/EMS to MCFRS and the potential for unifying call taking operations under a Common Call Taker Model.

16. To what extent do municipal police departments and Park Police use the County's Public Safety Communications System? How will they have input into the County's planning for the PSSM?

Response:
The local municipal police departments and MNCPPC integration with the County are documented in the PSSM and MCCIP documents. Both are active members of the PSSM workgroup. The PSSM workgroup will continue to leverage the strong governance model. The CAD Roadmap study listed "best practices" and "lessons learned from PS200" and relevant recommendations will be incorporated in the PSSM workgroup processes.

DEPARTMENT OF TECHNOLOGY SERVICES - FY11 - 16 CIP SUBMISSION REQUESTS

Project Name:	Public Safety System Modernization (PSSM) - 341101 ($000's) (incl. Fire Station Alerting)									
	Total	Thru FY10	6 Years	FY11	FY12	FY13	FY14	FY15	FY16	Beyond 6 Years
CAD System	23,340	-	23,340	550	11,420	11,370	-	-	-	-
Station Alerting	3,340	-	3,340	500	500	1,420	920	-	-	-
Radio Units	25,131	3,043	22,088	2,200	6,200	7,828	5,860	-	-	-
Radio Infra. Plng	1,850	-	1,850	300	450	450	650	-	-	-
Radio Infrastructure	-	-	-	-	-	-	-	-	-	-
Total PSSM	**53,661**	**3,043**	**50,618**	**3,550**	**18,570**	**21,068**	**7,430**	**-**	**-**	**-**

Radio CIP Upgrade and Modernization Schedule

	Total Inventory	Upgrade # units		FY11 Units	FY11 $	FY12 Units	FY12 $	FY13 Units	FY13 $	FY14 Units	FY14 $	FY15 Units	FY15 $
RADIOS													
Portable Radios:			$ 4										
Montgomery County Police	1256	956	$ 3,824	335	$ 1,340	310	$ 1,240	311	$ 1,244	0		0	
Montgomery County Fire and Rescue	1566	1,119	$ 4,476	335	$ 1,340	390	$ 1,560	394	$ 1,576	0		0	
Sheriff	147	147	$ 588	75	$ 300	72	$ 288		$ -				
Correction and Rehabilitation	152	152	$ 608		$ -		$ -	152	$ 608				
Park Police ***	123	0	$ -		$ -		$ -		$ -				
Public Works & Transportation	343	343	$ 1,372		$ -		$ -	343	$ 1,372	0		0	
Homeland Security	10	10	$ 40		$ -		$ -	10	$ 40				
Security	24	24	$ 96		$ -		$ -	24	$ 96	0		0	
Other ****	53	53	$ 212		$ -		$ -	53	$ 212	0		0	
Enterprise Coordination Stock *****	0	100	$ 400	20	$ 80	20	$ 80	20	$ 80	40	$160	0	
Total Portable Radio Upgrades	**3674**	**2,804**	**$ 11,616**	**765**	**$ 3,060**	**792**	**$ 3,168**	**1,307**	**$ 5,228**	**40**	**$ 160**		**$ -**
Mobile Radios:			$ 4										
Montgomery County Police	1745	1,745	$ 6,980	100	$ 400	545	$ 2,180	550	$ 2,200	550	$ 2,200		$ -
Montgomery County Fire and Rescue	437	437	$ 1,748	100	$ 400	100	$ 400	100	$ 400	137	$ 548		$ -
Sheriff	73	73	$ 292	35	$ 140	38	$ 152		$ -		$ -		$ -
ection and Rehabilitation	9	9	$ 36		$ -		$ -	0	$ -	9	$ 36		$ -
ic Works & Transportation	312	312	$ 1,248		$ -		$ -	0	$ -	312	$ 1,248		$ -
Park Police ***	80	0	$ -		$ -		$ -		$ -		$ -		$ -
Homeland Security	0	0	$ -		$ -		$ -		$ -		$ -		$ -
Security	2	2	$ 8		$ -		$ -	0	$ -	2	$ 8		$ -
Other ****	40	40	$ 160		$ -		$ -	0	$ -	40	$ 160		$ -
Total Mobile Radio Upgrades		**2,618**	**$ 10,472**	**235**	**$ 940**	**683**	**$ 2,732**	**650**	**$ 2,600**	**1050**	**$ 4,200**		
Total System Radios		**5,422**	**$ 22,088**	**1000**	**$ 4,000**	**1475**	**$ 5,900**	**1957**	**$ 7,828**	**1090**	**$ 4,360**		**$ -**
Consulting Services:			$ 1,350		$ 300		$ 450		$ 450		$150		$0
Radio Infrastructure Modernization:			$ 50,000		$ -		$ -		$ -		$30,000		$20,000
TOTAL CIP EXPENDITURE REQUEST:			**$ 73,438**		**$ 4,300**		**$ 6,350**		**$ 8,278**		**$ 34,510**		**$ 20,000**

Radio Assumptions

All Portable and Mobile Radios must be XTS5000s, XTL5000s or equivalent (P-25 compatible) and upgraded by year 2014 as infrastructure build-out begin

Radio unit costs are based upon current average cost of $4000 each

The total radio unit upgrades are front loaded during the first 3 years because Montgomery County must coordinate with system upgrades in other jurisdictions to asure continued interoperability

*** Note that Park Police has approximately 123 Portable and 80 Mobile Radios (All are already P-25 compatable)

**** Other include: Radio Shop, Liquor License Board, School Board, CEO, CAO

***** Systemwide Portable and Mobile maintenance spares needed for rollover coordination, and/or Emergency On-Hand Stock

Infrastructure Assumptions

a. 2010 is end of Motorola formal support for current radio system.

b. System replacement must be coordinated with system upgrades in other jurisdictions to assure continued regional interoperability.

c. Estimated replacement cost for the radio infrastructure is $40 - $50 million.System replacement must be coordinated

		2011	2012	2013	2014	2015	2016	TOTALS
CIP 2011-2016 ($53m)								
Radio	Radios (P25 compliant)							
CAD	CAD Planning							
	CAD Procurement							
	CAD Deployment							
Stations	Station Alerting							
TOTALS		$3,550	$18,570	$21,068	$7,430	$0	$0	$53,661
Future CIP add-on ($50m)								
Radio Infrastructure								
	Software							
	3 additional towers							
	Computer Boards							
TOTALS								$50,000
Other								
Data, devices	MDTs, EPCR,							
Infrastructure	eJustice, FireHouse, VoicePrint							
NextGen911	NextGen911							
TOTALS								$
Grand Totals		$	$	$	$	$	$	$

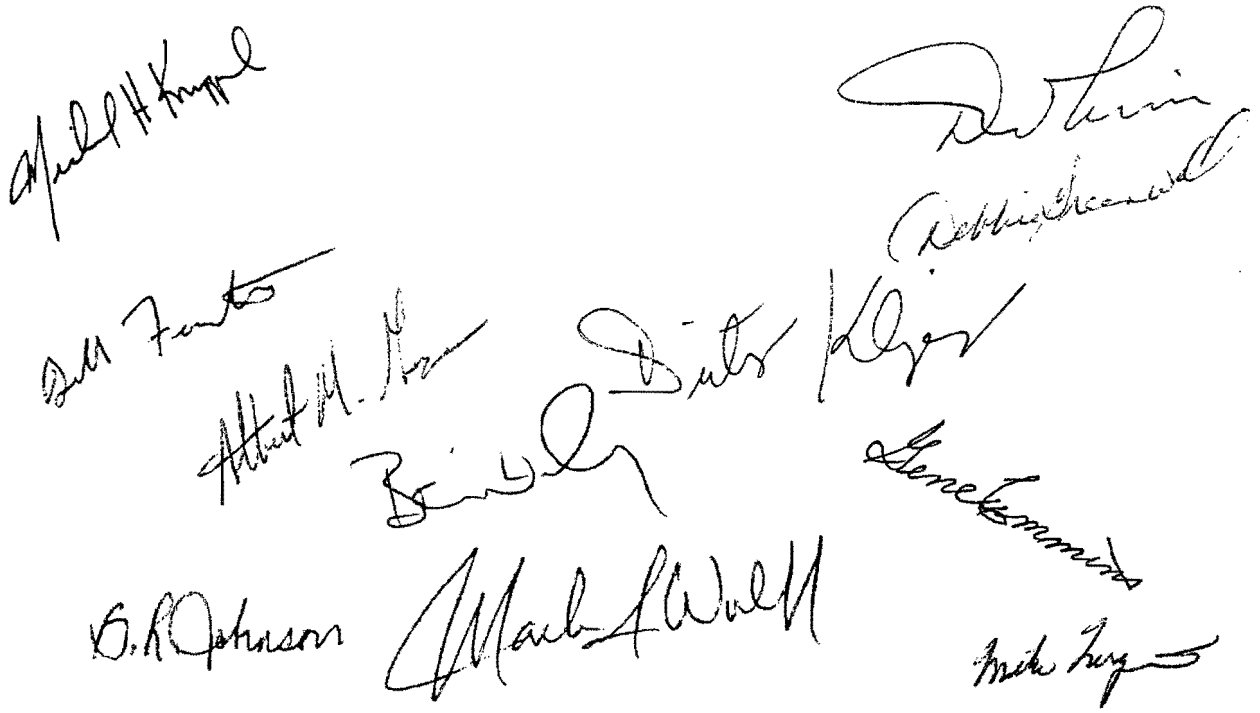
Figures in $000s

Message from the Public Safety Systems Modernization Workgroup

Montgomery County Government (MCG) Public Safety Departments have made significant advances by embracing technology solutions that improve business response to its citizens as well as streamlining the internal business processes. To continue the positive contributions from our investment in Information Technology (IT) solutions and innovations, it is essential to articulate our interpretation of Executive guidance as well as business mission objectives to prepare for future technology choices.

The purpose of this Public Safety Systems Modernization plan (PSSM) is to describe and document Public Safety's interpretation of the direction of technical issues and to set the baseline for how information technology solutions are approached. While the PSSM is a point-in-time assessment of current processes and methods, it also illustrates the significant achievements and streamlining from previous efforts. PSSM sets a definitive road map for new objectives and methods.

This is a "living" document that will be reviewed on a periodic basis both internally as well as through the MCG Executive Leadership to ensure that it continues to support the Public Safety business mission and strategies. The use of the PSSM to guide our Information Technology investments and activities will allow us to maintain a sustainable alignment between our corporate mission and technology improvement expectations.



The members of the Public Safety Systems Modernization Workgroup are: Charles Bailey, Gene Cummins, Bill Ferretti, Albert George, Debbie Greenwell, Bobby Johnson, John Kinsley, Dieter Klinger, Michael Knuppel, David Linn, Brian Melby, David Scibelli, Michael Tarquinio, and Mark Wulff.

1 Introduction

Montgomery County takes advantage of mature technologies in areas of data, voice and radio networking, datacenter operations and monitoring, hardware and software systems deployment, and application development. The purpose of this Public Safety Systems Modernization (PSSM) plan is to set the course for fully defining the Montgomery County objectives surrounding how the organization will approach public safety systems and technology from an enterprise perspective. The outcome of this effort will aid in the development of a long term systems strategy guiding pubic safety agencies. The strategy should determine what the organization's capabilities are today, where the public safety and other county leaders want to be tomorrow and, most importantly, how as an organization we can achieve the most desirable and sustainable enterprise public safety solutions.

In early 2009, Montgomery County was introduced to a new, enterprise technology strategic plan. This plan endeavors to create a more sustained focus on the development of business driven dynamics as the key starting point for introducing new technologies that support the enterprise as a whole, or at the very least, provide opportunities that cross departmental boundaries. This "theming" approach is at the forefront of the teaming process that has been undertaken with the development of the Public Safety Systems Modernization effort.

Public Safety Executives, in concert with Technology Services are at the core of this effort to ensure an outcome that is representative of the continued leadership that Montgomery County exemplifies in many areas. With the concerns over life/safety systems that are quickly reaching obsolescence, the significant costs involved with upgrade and/or replacement, and the increasingly important trend of interoperability, Montgomery County leaders have made the commitment to develop and support a modernization plan that will result in the most viable approach to modernizing these critical systems.

Public Safety as a theme encompasses numerous County departments. The keystone departments for County public safety immediately include the Montgomery County Police Department (MCPD) and Montgomery County Fire and Rescue Service (MCFRS). However, given the significant change in the past decade, other departments have joined as equally crucial members of the Public Safety community. Included in this new model, the Office of Emergency Management and Homeland Security (OEMHS), the Department of Corrections and Rehabilitation (DOCR) and the Department of Technology Services (DTS) play a role in citizen and community safety.

Montgomery County Police Department
The Montgomery County Department of Police is committed to providing the highest quality of police services to the people who live, work and visit our County. The MCPD pledges to constantly evaluate and improve efforts to enhance public safety with the goal of improving the quality of life within Montgomery County, while at the same time maintaining respect for individual rights and human dignity.

Montgomery County Fire and Rescue Service
The vision of the Montgomery County Fire and Rescue Service is to keep Montgomery County communities safe and healthy by providing the best fire, rescue, and emergency medical services, utilizing career and volunteer resources.

Department of Emergency Management and Homeland Security
The Office of Emergency Management and Homeland Security plans, prevents, prepares and protects against major threats that may harm, disrupt or destroy our communities, commerce and institutions.

Department of Corrections and Rehabilitation
The Montgomery County Department of Correction and Rehabilitation is a civilian agency managed by professionals in the correctional field. Established in 1972, it provides progressive and comprehensive correctional services through the use of pre-trial supervision, secure incarceration and community treatment and reintegration programs. The Montgomery County Correctional Facility (MCCF), Montgomery County Detention Center (MCDC) and Pre-Release Center (PRC) achieved 100% compliance with the Maryland Commission on Correctional Standards (MCCS) during the last audit cycle in 2007.

Department of Technology Services
The mission of the Department of Technology Services is to ensure that Montgomery County Government is a fully integrated enterprise in which all Montgomery County Government Departments and Offices have the ability to utilize reliable, accurate and secure information to perform the government services and functions essential to the citizens of Montgomery County.

1.1 Users

There are Federal, Local Jurisdictional and County Government users of the Public Safety System. These users include:

- Montgomery County Police Department (MCPD)
- Montgomery County Fire and Rescue Service (MCFRS)
- Office of Emergency Management and Homeland Security (OEMHS)
- Department of Correction and Rehabilitation (DOCR)
- Department of Technology Services (DTS)
- Montgomery County Sheriff's Office (MCSO)
- Department of Health and Human Services (DHHS), Public Health
- Department of General Services (DGS), Facilities
- Chevy Chase Village Police Department
- City of Gaithersburg Police Department
- City of Rockville Police Department
- City of Takoma Park Police Department
- National Naval Medical Center Fire Department
- National Institutes of Health (NIH) Fire Department
- National Institute of Standards and Technology (NIST) Fire Department
- Walter Reed Army Medical Center Fire Department
- David Taylor Model Basin Fire Department
- Maryland State Police (MSP)
- Maryland National Capital Park Police (MNCPPC)

7 Next Steps

Montgomery County will continue to be a technology leader in Public Safety Systems. The immediate next steps in the Public Safety Systems Modernization Plan focus on the implementation of recommendations from the MCCIP Plan and the CAD Study, both designed to help establish roadmaps for modernization. The Public Safety Systems Workgroup will collaborate to identify funding sources for these initiatives.

7.1 MCCIP Plan Overview

The County engaged an independent public safety system's consultant to survey the state of the current Public Safety 800MHz voice and data radio systems and report on recommendations for moving forward.

The main areas of focus were:

1. Analyzing and reviewing the State of Maryland Communications Interoperability Plan (SCIP) and the Montgomery County Communications Modernization Plan to identify synergistic opportunities and any voice or data interoperability advantages the State system might provide.

2. Reviewing and documenting the current state of the 800 MHz Public Safety Radio, voice and data systems (PSRS) and documenting staff and users opinions of these systems.

3. Conducting an objective study of the future of Public Safety radio (voice and data) systems; discussing trends and best practices in 800 MHz and 700 MHz system deployments; discussing suitable transition plans from the current Public Safety radio systems to a new replacement system(s), all with a focus on interoperability in the National Capitol Region..

7.2 CAD Study Overview

The County engaged an independent public safety system's consultant to evaluate the current Computer Aided Dispatch (CAD) system and provide a roadmap for moving forward. A final report was delivered in February 2009.

The analysis and report had three major points of focus.

1. Identifying and documenting business needs that are not being met by the current system,
2. Making recommendations for replacing the current CAD system and enumerating the best practices for implementing a new CAD system, and
3. Providing guidance for extending the useful life of the current CAD system until a new CAD system is operational.

The study determined that the current CAD system (Altaris CAD) does not meet several current business needs and is not capable of meeting emerging business needs stemming from advances in 9-1-1 and consumer communications. The county must begin the process of

selecting and implementing a next generation CAD immediately. Later sections of the CAD Study report detail the steps that need to be followed and an estimated timeline.

The current CAD system is based on out-dated software technologies and is running on hardware that is near, and in some cases already reached the end of its useful life. The county has begun planning and acquiring replacement hardware. It is imperative that the county follow through with these plans to ensure continued operations of the current CAD system until a next generation CAD system can be implemented. Later sections of the CAD Study report describe the steps necessary to maximize the usefulness of the current system.

The county should look for a modular, standards-based solution in a new CAD system to be able to adopt and implement new technologies as needed. The county also needs to dedicate the resources to ensure that the replacement selection and implementation process is completed in a timely manner, to maximize the expected useful life of the next system.

The public safety workgroup will use the findings of this study, aligning requirements with the other systems comprising the PSCS identified in this modernization document and the MCCIP plan, and develop a Capital Improvement Plan for the design, selection and implementation of a next generation CAD system.

I. Executive Overview

Strategic Situation

For over seven years the existing Motorola ASTRO SmartZone public safety trunked radio system has served Montgomery County ("the County") well, eliminating many deficiencies that existed in the previous conventional radio systems used by public safety agencies including the Department of Corrections and Rehabilitation (DOCR), Montgomery County Fire and Rescue Service (MCFRS), Montgomery County Police Department (MCPD), and the Montgomery County Sheriff's Office (MCSO). All County public safety agencies are now on a common radio platform, can and do communicate with one another on a routine basis, have better coverage than in the past, and have interoperability with most public safety agencies in the National Capitol Region (NCR) and beyond. That the County has benefitted from the existing system is beyond question, and its value has been demonstrated time and again when the public safety agencies have been on the front line of response to incidents as diverse as the Beltway sniper incidents, railway accidents, and a plethora of less publicized, but nonetheless urgent events.

Planning of the County's existing 800 MHz trunked radio system commenced in 1994, and a contract award for the network was signed with Motorola in December 1999. The trunked radio system was ready for operations in the spring of 2002, but owing to issues with the Computer Aided Dispatch (CAD) system and the Mobile Data Computer System (MDC), full operation was deferred until July, 20, 2003. At the time of implementation the system represented the current state of the art in public safety radio communications.

In the rapidly evolving telecommunications industry, generational changes in technology, standards, and electronic components tend to shorten the expected usable lifespan of network investments. Convergence between telecommunications and information technologies has rendered obsolete proprietary networking technologies and vestiges of circuit-switched telephony on which many mobile radio communications systems were based, including that of the County. Standards for digital public safety communications systems intended to improve interoperability and to stimulate competition among multiple suppliers have evolved since the County embarked on its system implementation. While beneficial in the long term, in the short term, these standards have introduced new incompatibilities that challenge the continuity of effective interoperability among public safety first responders and have hastened the obsolescence of existing systems, including that of the County. At present, the County radio communications system is nearing the end of the continuum of factory support, and little flexibility is provided for system infrastructure upgrade short of replacement.

Urbanization of segments of the County combined with increased noise levels in the 800 MHz radio frequency band has degraded the coverage performance of the existing radio system. Additional base station sites are needed in built-up areas to restore the level of coverage of the system to its original reliability. Obsolescence of the trunked radio system prohibits the needed increase in base station sites to upgrade performance of the system.

Other counties and cities in the National Capital Region with which the County public safety agencies interoperate on a routine basis have commenced system planning or implementation of radio system upgrades. To avoid incompatibilities that will affect public safety operations, it is necessary that interoperability partners make certain upgrades in, or nearly in, unison.

Montgomery County must commence planning and funding upgrades to its existing trunked radio system before factory support of the network deteriorates in the years beginning with 2012. Such upgrades will serve the dual role of maintaining the acclaimed interoperability that exists in the National Capital Region and correcting degradation of the reliability of the existing County system.

Goals and Objectives of the Montgomery County Communications Interoperability Plan

Goal

It is the goal of the Montgomery County Communications Interoperability Plan to ensure that the public safety first responders of Montgomery County can fulfill their missions safely and can respond promptly to the needs of the public in emergencies through the use of reliable, interoperable, and flexible voice and data radio communications to provide dispatch, coordination, and information in the mobile environment.

Objectives

Objectives of the Montgomery County Communications Interoperability Plan are to:

Provide reliable radio communications system performance in terms of coverage, network availability, and quality of service to public safety first responders.

Maintain and expand the highest level of interoperability between the County's public safety first responders and their mutual aid partners from within and outside of the National Capital Region to coordinate daily and emergency events by employing subscriber radios compatible with legacy and future digital technologies.

Provide access to and transmission/reception of data and video, and to permit access to dispatch, database, collaboration, and operational applications in the mobile environment with speed and reliability comparable to a wired office connection.

Ensure that system upgrades will meet the needs of the County for a decade and that the technology selected is in keeping with the overall trend of the telecommunications and information technology industry toward open architecture, data security, quality of service metrics, and interoperability.

Strategy

It is the strategy of the interoperability plan to continue the provision of a current technology trunked radio communications system that meets the current and future needs of the County public safety first responders while optimizing the utilization of current resources and through cooperation with interoperability partners. To the extent practical the County will employ resources made available by the Federal broadband initiative and other sources of interoperability funds.

Phased Implementation

A multi-phased implementation schedule is proposed over a minimum five year period. A three phase schedule permits expenses to be spread over multiple funding cycles and will allow certain industry standards and regulations to be that are in development to be finalized.

In the first phase, that spans three years, short term improvements will be made by upgrading portable and mobile radios assigned to public safety first responders to more capable software-defined radios. Such radios have the ability to operate in multiple modes, thereby bridging the generations of technology that will exist in the region without loss of interoperability. Such radios enable communications with new generation P25 Phase I and Phase II standard radio systems that are in deployment in the region and are also backward compatible with legacy systems.

Work on plans and specifications for the upgrade of the trunked radio communications system also must commence in the first phase. The objective of these plans is the development of goals and objectives for a system to meet the tactical voice radio communications needs of the first responders and to plan for the eventual use of broadband wireless network for data and video communications. Options for system sharing and/or participation in a network of networks will be explored in the planning process. A detailed implementation plan and budget for network infrastructure upgrades will be produced along with a procurement document for the upgraded voice radio system.

In the second, interim, phase beginning in the fourth year the procurement and installation of voice radio system infrastructure upgrades will commence. These upgrades will affect the radio system, its interconnecting network, and the public safety communications center console equipment. At the conclusion of the installation of the improved voice communications system, some legacy subscriber equipment will be passed on to non-public safety governmental radio system users. The second phase is estimated to take two years, with a projected completion date of 2014.

The third phase is a long term action plan for the implementation of wireless data and video applications on a broadband network. Such applications and the networks themselves are still only loosely defined and final regulations have not been promulgated. It is expected that clarity will emerge over the next two years from the extensive effort being expended by public safety and the private sector to jointly or singly develop a national broadband infrastructure for public safety. As presently defined, such a broadband network will reflect some of the convergence of voice, data, and video access to and from the mobile environment. An eventual progression to the provision of tactical push-to-talk voice communications over such networks may evolve over the next decade, but is not the primary driver of this technology.

Initiative	Short Term (Years 1-3)	Interim Phase (Years 3-5)	Long Term (> 5 Years)
Interoperability	Purchase subscriber units compatible with both legacy and next generation systems to maintain interoperability in NCR and to prepare for system replacement in Montgomery County	Transition subscriber units to next generation trunked system being installed by Montgomery County; cross programming or system of systems to provide interoperability with mutual aid partners	Continuing programming and networking to maintain interoperability with mutual aid partners.
Operability	Begin planning and specification of next generation trunked radio system for Montgomery County	Procurement and implementation of next generation trunked radio system	System in full operation and add subscriber units to reflect County growth
Data and video	Follow national	Definition of	Participate in

access and transmission	broadband initiative, FCC filings if necessary	advanced data and video applications to enhance public safety operations	shared national broadband network or buy services from operator

Funding

Phase I budget requirements are to fund portable radio upgrades for public safety first responders in years one through three and to commence preparation of detailed system plans and procurement documents for an upgraded network infrastructure, and to seek grants and other sources of funding for the upgrades.

Phase II budget requirements will be established in the first year of Phase I based on a detailed system design and that will be completed during the year. This design and budget will provide two years lead time to identify sources of funding before the procurement of the network upgrade commences.

Phase III funding requirements will be known by year five of the project. This phase of the project is dedicated to the provision of wireless broadband access by public safety agencies. It is likely that such service will be provided by some partnership between a wireless network operator and a regional or national public safety consortium. The form of such a consortium and the ratio of capital versus operating expenses will be determinable by year five.

Immediate Actions Required

Plans and specifications must be developed to ensure that any replacement system will meet the needs of the County for another decade and that the technology selected is in keeping with the overall trend of the telecommunications and information technology industry toward open architecture, data security, quality of service metrics, and interoperability. These plans will examine the network options available to the County, including a stand-alone system, a system that is a participant in a system of systems that permits resource sharing while avoiding the centralization of failures, and sharing of certain resources, such as antenna sites and backhaul networks with other governmental entities such as the State or adjoining counties and cities.

In the short term, the process of replacing subscriber units (mobile and portable radios used by first responders) with units capable of operating on legacy Motorola trunking technology and P25 Phase I and II systems, supporting roaming technology, operable on the 700 MHz frequency band and compatible with conventional analog operation.

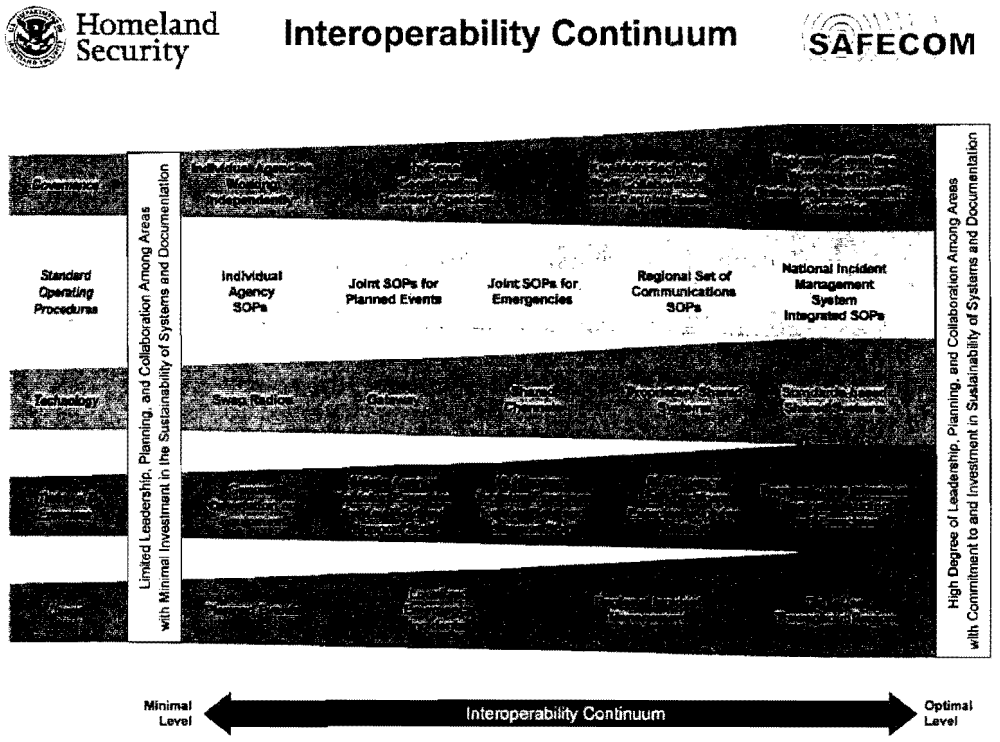
E. Project Planning

The plan to replace the County's radio communications infrastructure requires that, first, the subscriber units (the mobile and the portable radios) be replaced. The subscriber units which form the overwhelming bulk of the County s inventory, the Astro Spectra mobile radios and the XTS3000 family of portable radios, are of the generation which predates the P25 technology systems. They are incompatible with the newer technology infrastructures. Therefore the subscriber units must be replaced before the infrastructure. The plan to spread the purchase of the replacement radios out over a three-year period is meant to provide a reasonable approach to the high budgetary impact of the equipment replacement cost. (The expectation is that, with a three-year procurement plan, the radio budget will be about $10 million per year for those three years.)

In the fourth year of the planned procurement, the infrastructure replacement should begin. This includes a new zone controller and network management controller, new simulcast and prime site controllers, new base stations and comparator equipment, and more. The Gold Elite console equipment currently in use with the present system can be used with the new infrastructure, but will require significant software upgrades and new networking equipment to permit them to integrate into the IP-based architecture of the newer technology systems. The cost of the infrastructure replacement will be on the order of $30 to $40 million, depending on many design factors and deployment decisions.

communications center to interoperate with first responders from throughout the country who might be called into Montgomery County in the event of a disaster. This was the acute first responder communications deficiency identified after Hurricane Katrina.

Advancement of interoperability is reflected in the SCIP when it states, "One of Governor O'Malley's top Homeland Security objectives is to achieve Level-4 interoperability in the near term, with the longer-range goal of achieving Level-6 radio interoperability within the first responder community throughout Maryland". As indicated in the SCIP, "State wide Level-4 attainment, simply put, is when fire fighters, emergency medical responders, police officers, deputy sheriffs, state troopers, public works and transportation officials and others can go anywhere in the state and have immediate radio communications with each other using their own equipment on designated channels. Ultimately, a Level-6 attainment will achieve seamless interoperability statewide by using standards-based shared-systems technologies".



DHS public safety interoperability continuum – the right column contains the definitions of Level 6 interoperability

The goal of Level-6 interoperability relates to the adoption of a standard that permits users that have purchased radio equipment from different manufacturers to interoperate seamlessly. Such a protocol has been developed and it is known as the "P25" standard. The P25 standard was adopted by the Association of

Public Safety Communications Officials (APCO) several years ago. The purpose of P25 is to overcome the lack of interoperability inherent with the proprietary radio systems that permeate the country, including the NCR. The Level-4 communications protocol limits interoperability to the users of a specific radio technology, such as Motorola's SmartZone 3.X Frequency Division Multiple Access (FDMA) architecture used in the NCR or requires the use of a communications bridge to facilitate communications between disparate radio technologies.

There are two varieties of P25 known as Phase I and Phase II. All technical standards for Phase I have been adopted and users can purchase P25 Phase I products from a number of manufacturers now. A national certification process has been adopted by the DHS and beginning in the summer of 2009, different manufacturers will be invited to test their products on the P25 land mobile radio systems of competitors. As an example, Motorola has invited competitors to its headquarters in July to test non-Motorola radios on the Motorola communications infrastructure to ensure proper operation pursuant to the adopted P25 standards. Once a radio demonstrates that it can meet all operational requirements of the P25 standard, the device will be certified as compliant.

P25 Phase II is still evolving as a finalized set of standards. It is widely believed that the P25 Phase II standards will be completely adopted by the Telecommunications Industry Association (TIA) in 2009 with equipment manufactured and sold using this technology in 2011. P25 Phase II is entirely different from Phase I; however, as part of the Phase II standard, a Phase II radio must be "backwards" compatible with Phase I standards. Through this backwards compatibility, a Phase II radio will be able to interoperate with either a Phase I or Phase II system.

The differences in the P25 phases are technically profound; however, easy to understand. Both technologies utilize a 12.5 KHz bandwidth. P25 Phase I uses the frequency to transmit or receive one talkpath (or conversation) at a time. Conversely, P25 Phase II typically permits two different talkgroups to be transmitted or received simultaneously on the frequency. Phase II accomplishes this task by dividing the digital transmissions into two "time slots" through a technology called Time Division Multiple Access or TDMA. TDMA has been utilized successfully in the cellular telephone world for many years. By combining two conversations or talkgroups on the same channel an "effective" bandwidth of 6.25 kHz is achieved. As noted earlier, the P25 Phase II standard is "backwards compatible" and if a non-TDMA P25 Phase I user affiliates (joins) with an active talkgroup, the entire talkgroup will maintain communications through the older technology used in P25 Phase I (FDMA). FDMA is the technology used in Montgomery County's current Motorola system. However, the current County radio system technology predates, and is not based on, the P25 Phase I standard.

Maryland's state government is reinforcing the Governor's call for Level-6 interoperability by issuing a Request for Proposals (RFP) for a new statewide communications system based upon the DHS adopted P25 Phase II standard. Additionally, most contemporary public safety communications systems are designed to support the P25 standard. As an example, Prince George's County is implementing a new Motorola ASTRO25 system in 700 MHz that will support P25 Phase I at the onset of operations and subsequently P25 Phase II. Both Loudoun County and the City of Alexandria, Virginia have also contracted with Motorola to upgrade their first responder communications systems to the P25 Phase I standard initially with an upgrade to Phase II in the future. Arlington County now operates a P25 Phase I system. Frederick County is considering procurement for a P25 Phase II radio system. Officials in the District of Columbia are also exploring the acquisition of a new public safety communications system for the Metropolitan Police in the 700 MHz frequency band based upon the P25 technologies. (Washington, D.C. Metropolitan Police currently operate on a system in the 490 MHz band). With respect to the users of 700 MHz equipment, these radios are designed to work in both the 700 and 800 MHz bands.

In any new land mobile radio system contemplated by the County, the P25 Phase II standard should be specified to reflect the most contemporary radio architecture. This is amplified in the SCIP when it states, "To ensure the long-term viability of this network, sufficient capacity must be maintained, open standards must be embraced, and maintenance programs must be established. Technologies that enhance the efficiency and value of existing radio/frequency channels (i.e., provide more than one talk path per channel) must be evaluated and, if deemed of value, utilized".

P25 Phase II addresses the "sufficient capacity" issue identified in the report as it doubles the number of talkpaths (simultaneous conversations) available without increasing the number of frequencies used. To put this in the simplest terms, today Montgomery County has an 800 MHz radio system with twenty frequencies permitting nineteen (19) simultaneous conversations (one frequency is used for network traffic management, not voice communications). With P25 Phase II, the same twenty frequencies could support thirty-eight (38) simultaneous conversations doubling capacity without adding to spectrum demand. Use of the P25 Phase II standard also addresses the "open standards" comment in the above paragraph. With respect to "maintenance" programs, RCC understands that the County has maintained an active maintenance program through Motorola and is satisfied with the results of that effort.

The Maryland SCIP was crafted to be a living document with continual revisions as needed. Updates to the Plan are made through the SIEC as noted in the Report when it states, "This plan promotes a collaborative approach with local jurisdictions, leveraging existing radio systems and builds on the existing public safety radio infrastructure in Maryland". This is an extremely important sentence in the SCIP as it acknowledges the importance of working with the State's local

1. Executive Summary

The Department of Technology Services (DTS), Montgomery County retained Tetra Tech to evaluate the current Computer Aided Dispatch (CAD) system and provide a roadmap for moving forward.

This analysis had three major points of focus.

1. Identifying and documenting business needs that are not being met by the current system,
2. Making recommendations for replacing the current CAD system and enumerating the best practices for implementing a new CAD system, and
3. Providing guidance for extending the useful life of the current CAD system until a new CAD system is operational.

This study has determined that the current CAD system (Altaris CAD) does not meet several current business needs and is not capable of meeting emerging business needs stemming from advances in 9-1-1 and consumer communications. The county must begin the process of selecting and implementing a next generation CAD immediately. Later sections of this report detail the steps that need to be followed and an estimated timeline.

The Tetra Tech team, through numerous interviews and review of the system documentation has compiled a comprehensive list of the deficiencies inherent in the current CAD system. This system is based on out-dated software technologies and is running on hardware that is near, and in some cases already reached the end of its useful life.

The current CAD system was proposed and designed in the late 1990's, but was not put into service until July 2003. Some of the user expectations of the system have never been realized. Contributing to the systems' limitations and issues identified since its implementation is the fact that the system is based on old technology that has not kept pace with changes in the industry. The study also found that the ability of the current CAD support vendor, Northrop Grumman, as evidenced by the long development cycles for software bug-fixes, upgrades necessitated by changes in legal requirements, and the requirement to maintain interoperability with inter-dependant systems,, does not meet the needs of the county in providing this mission critical public safety service. This further increases the importance of the county moving expeditiously to a new CAD system.

The county should look for a modular (plug & play), standards-based solution to establish the capability to adopt and implement new technologies as needed. The county also needs to dedicate the resources to ensure that the replacement selection and implementation process is completed in a timely manner, to maximize its Return on Investment (ROI) across the full useful life cycle of the new system.

The county has already begun planning and acquiring replacement hardware. It is imperative that the county follow through with these plans to ensure continued operations of the current CAD system until a next generation CAD system can be implemented. Later sections of this report describe the steps necessary to maximize the usefulness of the current system. An in-depth review of the original system architecture was also done, and recommendations are made to rectify single points of failure. Finally, through research and information gathered from four of the top CAD vendors, this report presents the latest features offered in state-of-the-art CAD systems.

Information was gathered through a brief Request for Information (RFI) that was sent to four of the top CAD vendors. The RFI responses along with the information contained on their respective Web sites demonstrates that they all provide advanced features to assist in making the call-taking and dispatch functions more efficient. A rigorous Request for Proposal (RFP) process will be required to determine which approach to these features best meets the county's needs.

- Chat Service—The administrator can assign chat privilege levels that define the actions the users are allowed to perform after signing on to the PremierOne CAD client. Once logged in, users can view the chat rooms of which they are members.

  Users with appropriate privileges can create, modify, or delete chat rooms. Users can join chat rooms, and invite other users and groups to chat rooms. Authorized users can remove users or groups from chat rooms. All conversations are tracked, and reports can be run on chat room activity.

  PremierOne CAD supports the following types of Chat Rooms.

  a. Temporary Public Chat Rooms are available to all authorized users of the chat service. The chat rooms are automatically deleted when the last member of the chat leaves.

  b. Permanent Public Chat Rooms are available to all authorized users of the chat service. This type of chat rooms persists even if no users are in the chat.

  c. Private Chat Rooms are created by an authorized user to have private conversation with other users that can only join the chat through invitation. Users can send chat invitations by selecting any of the following items: User ID, Unit ID in Unit Status, Unit ID in Incident Summary list, or the source or destination list of a message. They can also select an area on a map and initiate a chat. All users in the selected area can be invited to the chat.

- The PremierOne CAD can be configured to automatically send pages as part of dispatching an incident, and when notifications are issued. The administrator can define the specific data elements that can be sent in auto- or manually generated pages.

7. Future CAD System Cost Analysis

While it is difficult to estimate the cost of acquiring, implementing, and maintaining a new CAD system without providing very specific and detailed information in an RFP, Tetra Tech can look at the cost estimates for comparable systems as a starting point. From the four RFIs sent out, three vendors provided estimated cost information. Two of the vendors (Tiburon and Intergraph) provided estimates that are based on recent similar projects, while TriTech provided an estimate that is based on the information in the RFI. The fourth vendor (Motorola) refused to provide any pricing information. The initial acquisition estimates (including the first year's maintenance) ranged from an aggressive $8 million to a conservative $16 million with the subsequent maintenance ranging from $500,000 to $800,000 per year on an escalating scale (Appendix C).

8. Recommendations

The county should immediately begin the process of defining, finding, and implementing a new CAD system. Because this process will take some time to complete, the county must also continue with its planned server hardware and mobile replacement programs and continue to address issues with the current system as they arise.

8.1 Requirements for the Next CAD System

One lesson was repeatedly driven home in the interviews and discussions with those that worked through the implementation of the current CAD system. The contract with the vendor must very specifically detail all the requirements for the new system and have performance penalties if the vendor does not meet those requirements. An excellent example of system requirements is provided under separate cover (from Fairfax County, Virginia). This document demonstrates the time and involvement necessary to create a comprehensive list of requirements for the new system. The county should expect to spend 6 months and commit resources from every affected department and unit to ensure that the requirements are detailed and

complete. The county must also involve the county attorneys from the outset to guarantee that its interests are well represented in the contract.

8.2 New CAD System Project Change Management

The PS2000 project brought forth such sweeping changes that managing change became a lesser issue. The importance of change management in this project cannot be over emphasized. It is imperative that *ownership* of a new CAD project be established early and that change management becomes an integral part from the outset.

The *ADKAR* change management model (below) has been developed over time and has been very influential in the field. In this model, there are five specific stages that must be realized for an organization to successfully change. They include the following:

Awareness—An individual or organization must know why a specific change or series of changes are needed.

Desire—Either the individual or organizational members must have the motivation and desire to participate in the called for change or changes.

Knowledge—Knowing why one must change is not enough; an individual or organization must know how to change.

Ability—Every individual and organization that truly wants to change must implement new skills and behaviors to make the necessary changes happen.

Reinforcement—Individuals and organizations must be reinforced to sustain any changes making them the new behavior; if not; an individual or organization will probably revert back to their old behavior.

8.3 New CAD System Project Management and Timing

Project durations for CAD replacements vary widely according to the system, type of training selected, number and complexity of interfaces, and so on.

The experience of departments throughout the country suggests that 24 to 28 months will be required from conception to go-live.

Using a standard project management methodology will provide a solid road map to ensure that all mission requirements are satisfied.

The time span for performance of one phase can actually overlap activities identified in the next phase and beyond. The completion of a phase is not intended to be a prerequisite for all the activities of the subsequent phases. The following are the five phases of the project methodology:

- *Phase I—Define System*

  The definition phase of the project includes writing a comprehensive RFP and selecting the vendor (after an in-depth review of responses, reference checks, and site visits).

  The county must then negotiate a strong contract with the assistance of the county attorney's office, after a thorough review of the proposal, the SOW, and the contract in general with the chosen vendor.

This phase can take from 20 to 24 weeks.

- *Phase II—Business Process Review*

  During this phase, the county should work closely with the vendor to review business processes in the ECC and design any software customization specified in the contract as well as the interfaces to peripheral systems. Business processes and SOPs that would benefit from the new technology should be codified and promulgated during this time.

  Depending on the depth of the BPR, this phase can take from 4 to 6 weeks.

- *Phase III—Design & Build System*

  This phase includes system staging and testing, system configuration, interface development, and various data collection activities in preparation for installation at the county's site. County site logistics are finalized with all items of the core system being readied for delivery.

  In addition, during this phase, Acceptance Test Plans for the system (CAD and the interfaces) and the Cutover Plan are mutually derived to map a closure to the implementation of the system.

  This phase can take 50 to 60 weeks.

- *Phase IV—Deliver System*

  During this phase, the core system is delivered and set up. Once the system is tested and accepted, the users should be trained. The county should dedicate in-house technical staff to work closely with the vendor during system setup and testing. This will provide them with the hands-on experience necessary to do first level troubleshooting going forward. Cutover to live operations and successful completion of the 30-day operational test complete this phase.

  Depending on how aggressive the training schedule is, this phase can take between 12 and 14 weeks.

- *Phase V—Project Closure & Maintain System*

  This phase ties up any loose ends and begins the vendor's warranty period (usually one year).

  This phase usually takes about 4 weeks.

8.4 New CAD System Architecture

Public safety agencies today depend on an ever-growing amount of critical data. This information ranges from fairly static data, such as street addresses and personnel records to highly dynamic data such as the status of events and the locations of hundreds of units. All this information is stored in a central database.

This database allows CAD applications to provide an impressive array of sophisticated functionality such as automatically recommending units using the shortest distance from the caller's location and automatically searching for other incidents that have occurred near a new event.

The newest database systems can be configured to be high-availability systems with various approaches including distributed, replicated, and clustered environments. Solution vendors proposed will be dependent on the requirements developed by the county.

8.5 County Resources Necessary for a New CAD Project

Assigning competent resources in sufficient numbers is the key to a successful implementation. A project of this magnitude and import cannot afford part time attention or the rotation of key personnel. Too much information and too many decisions exist to allow for effective personnel transfers. The minimum resources for this project should consist of the following:

- County project manager
  - Acts as the single point of contact for working with the vendor
  - Must have sufficient authority and responsibility to make decisions daily about the project
  - Coordinates the activities of dedicated personnel and resources
  - Provides sufficient resources to implement the system
  - Secures contract change approvals as required
- County IT architect
- User department lead coordinators
- County map/GIS lead maintains the master GIS database and graphics
- County system administrators
  - Work side by side with the vendor in system design and implementation
  - Collaborate with the vendor for system-specific training and implementing backup, recovery, archiving, and general system activities
  - Monitor and configure the servers, workstations, and other interface systems
  - Monitor the database daily
  - Main point for contact for user questions and problems
  - Run and design reports as needed
  - Troubleshoot system problems
  - Maintain and upgrade all system configuration and forms
  - Install software upgrades
  - Serve as liaisons for vendor's field service personnel
  - Become a knowledge base for system and interface information to aid end users
- County agency trainer becomes a system expert for ongoing training of new personnel and refresher training as needed. Each supported agency should have a designated trainer to support ongoing user needs.
- County subject matter experts provide the vendor's team with any required customer information, such as specifications, workflow, and data definitions. The subject matter experts will be available to support design discussions and field questions regarding interfaces, data conversion/data fields, and workflows.

8.6 Disposition of the Current CAD System

The county anticipates receiving from Northrop Grumman a number of fixes and enhancements for the current CAD system. Given the age and limitations of the system and the length of time required to implement updates, the county should continue to focus on software issues as they are identified and replacing the server infrastructure.

There is no argument that the current CAD system must be upgraded to ensure critical functionality for the next 2 to 3 years. The county should continue to follow best practices adopted for the enterprise systems and the ancillary public safety systems, employing commodity hardware and open standards-based software (i.e., Linux) where possible.

8.7 Strategies for Keeping the Current CAD System Functional Until It Is Replaced

Recommendations for prolonging the life of the current CAD system while awaiting replacement are based on achieving the following goals:

- Increase system performance
- Increase system reliability
- Build a reporting architecture that is flexible so it can support the CAD replacement
- Leverage the county's architecture and expertise to reduce learning curve
- Leverage the county's hardware purchasing power to reduce cost
- Extend the useful life of the CAD system

To achieve these goals, the following upgrades are recommended. These suggestions are possible approaches, and should not be considered as the only options.

Separate the database server from the CAD application server and have both running on up-to-date hardware. The goal of increased system performance would be achieved by implementing newer more powerful servers, as well as separating the application from the database. Because of numerous scheduled processes on the Oracle database servers—which include "cron" jobs, Oracle stored procedures, and miscellaneous Linux scripts—the database/application servers are heavily taxed. Moving these database activities to dedicated database servers would help with CAD application performance.

The CAD system can be recompiled to connect to an external Oracle database server decoupled from the new CAD application server. The CAD system is written in C for the HP UNIX environment. If it is moved to a different server, it would need to be recompiled and retested. Because the existing HP server is at the end of its life cycle and is no longer stable, the best solution for the CAD application is to have Northrop Grumman recompile it to run on a new server. Northrop Grumman would need to certify which operating systems support the CAD database and application. Using this recommendation, DTS can determine which type of servers to purchase. This would ensure application operations' consistency and vendor support. It would also reduce the risk to CAD system reliability and enable the database migration.

An additional benefit of taking the database and application off the existing HP UNIX servers is to lessen the load on older hardware. The HP UNIX servers are 6–7 years old, which puts CAD data at risk. The CAD system is overloading the hardware, which is aging rapidly. Many of the parts for HP systems are no longer manufactured or kept in stock by HP. Replacing hardware on the older system is very costly and with uncertain results.

The file storage could have RAID configured to allow maintenance of individual disks without downtime. Having multiple disks would improve input/output throughput for the entire database cluster. Dual fiber channels would ensure connectivity in case of a controller fault, and it would improve performance.

Relocating the database on a new file storage would reduce the risk of CAD data being exposed to a disk failure. Depending on the chosen file storage type, the hardware can provide a multitude of RAID

configuration options and hot pluggable disks in the event of a failure. This would provide the best reliability and performance for CAD and replacement for CAD. The selected file storage for the CAD environment should have a backup-to-disk option. This would speed data recovery from either a data corruption or disk failure. It would also extend the life of the other existing systems by reducing system load, thus reducing costs and providing time to evaluate replacements.

By making the CAD system more reliable, system administrators, database administrators, and other technical personnel would be freed up to conduct evaluations of CAD replacements. This would allow expediting the evaluations of CAD software packages and would reduce the amount of time, money, and resources the ECC would invest in the CAD replacement system.

The county should implement the similar, scaled-down configuration in the AECC immediately after it completes the replacements in the PSCC. This would aid in operating both centers and in maintaining spare parts for the servers and simplify the logistics of tracking the system's replacement parts for the EEC staff.

At the AECC site, a new CAD server should be purchased to support the backup CAD application. An additional new server and file storage would constitute the decoupled Oracle database for the CAD application at AECC. Because this is a backup site, redundant cluster database and application servers are not necessary.

The PSCC database and the AECC database would be kept permanently in sync (near real-time) using a Multi-Master Replication solution such as Oracle Streams included in the database. Oracle Streams is an ideal solution for systems that are geographically distributed and have a high-speed connection (e.g., a T1 line) between servers. As long as the server interconnect can keep up with the changes, the implemented system would provide failover and disaster recovery simply and reliably.
Oracle Streams would provide near real-time replication of important information, and if a server outage occurs, updates are automatically stored in update queues and applied automatically when service is restored to the crashed Oracle server.

Setting up the new ECC and AECC databases should be done in phases while keeping the existing system running. Extensive tests can be conducted on the new database before flipping the switch by connecting the CAD backup system to the new database after the former has been set up to test the stability of the system.

By extending the useful life of the CAD system, the county would be in a better position from which to issue RFPs for the best price/performance solution with less urgency to replace the incumbent.

9. Best Practices

For years agencies nationwide have broached the topic of *Best Practices* for CAD systems in various venues such as APCO and IACP (International Association of Chiefs of Police). These inquiries were the impetus for APCO 36, which was ultimately published by the National Institute of Justice (NIJ) as *Standard Functional Specifications for Law Enforcement Computer Aided Dispatch Systems*. The inherent differences between agencies preclude these documents from being very specific. An agency can no more adopt another agency's CAD practices than it can their policy and procedure manual. The implementation of a CAD system must be accompanied by an extensive business practice review to integrate software functionality and practices rather than simply automating practices that might not be the most effective. The Department of Homeland Security also published a document on CAD interoperability, *Computer-Aided Dispatch Interoperability Project Documentation of Regional Efforts* in August 2008. Although this document details efforts in the western United States, it contains some basic best practices that will assist the county in its CAD replacement efforts. The following examples were gleaned from these two documents. DTS staff should consider these along with

FY09-14
Approved

Public Safety Communication System Upgrade and Mod -- No. 340901

Category	General Government	Date Last Modified	June 17, 2008
Subcategory	Technology Services	Required Adequate Public Facility	No
Administering Agency		Relocation Impact	None.
Planning Area	Countywide	Status	
Service Area	Countywide		

EXPENDITURE SCHEDULE ($000)

Cost Element	Total	Thru FY07	Est. FY08	Total 6 Years	FY09	FY10	FY11	FY12	FY13	FY14	Beyond 6 Years
Planning, Design, and Supervision	0	0	0	0	0	0	0	0	0	0	0
Land	0	0	0	0	0	0	0	0	0	0	0
Site Improvements and Utilities	0	0	0	0	0	0	0	0	0	0	0
Construction	0	0	0	0	0	0	0	0	0	0	0
Other	2,988	0	0	2,988	2,988	0	0	0	0	0	0
Total	**2,988**	**0**	**0**	**2,988**	**2,988**	**0**	**0**	**0**	**0**	**0**	**0**

FUNDING SCHEDULE ($000)

Federal Aid	2,988	0	0	2,988	2,988	0	0	0	0	0	0
Total	**2,988**	**0**	**0**	**2,988**	**2,988**	**0**	**0**	**0**	**0**	**0**	**0**

DESCRIPTION

This project will provide for an upgrade and modernization of voice radio equipment used primarily by the County's public safety first responder agencies consisting of Police, Montgomery County Fire and Rescue, Sheriff, Corrections and Rehabilitation and Emergency Management and Homeland Security. Upgrades will be made to the subscriber equipment by replacement of mobile and portable radios, which will also include a enterprise telecommunications management and service tracking system to properly manage communications inventory and assets. As voice, data and video are beginning to converge to a single platform, this project will provide a pathway to a modern PSCS which reflects the potential technology advances as well as provides efficient and reliable systems for all users.

JUSTIFICATION

The Public Safety Communications System (PSCS) requires modernization, replacement and upgrades to apply current state of the art technologies. Manufacturer's support of parts and the existing public radio system is scheduled to be phased out December 31, 2009. Beyond that date the manufacturer will only continue to provide system support on an "as available" basis, but will not guarantee the availability of parts or technical resources.

In addition, as more of the County's regional partners migrate to newer technologies, it will affect not only interoperable voice communications, but will also diminish the critical mass for the vendor to sustain technical and equipment support in this area. To ensure that the County maintains reliable and effective Public Safety (voice radio) communications for the operations of its first responders and to sustain communications interoperability for seamless mutual aid among its regional partners, the County should commence planning and implementation of a program to upgrade and modernize its portable and mobile radio units and subsequently the PSCS communications infrastructure.

OTHER

Future years will include an assessment of the current radio system infrastructure to determine the feasibility of using portions of the existing infrastructure along with software upgrades and new networking equipment to permit full integration with the IP-based architecture of the newer technologies. Modernization of zone controllers, network management, simulcast and prime site controllers along with new base stations and comparator equipment may be necessary. Coordination with participating departments/agencies and regional partners will continue throughout the project.

FISCAL NOTE

Funding in FY09 includes Urban Area Security Initiative (UASI) grant funding of $2.0 million and Fire Act grant funding of $988,000. Fire Act grant funding requires a County match of $247,000 to be funded in the FY09 Operating Budget.

APPROPRIATION AND EXPENDITURE DATA

Date First Appropriation	FY09	($000)
First Cost Estimate Current Scope	FY09	2,988
Last FY's Cost Estimate		0
Appropriation Request	FY09	2,988
Appropriation Request Est.	FY10	0
Supplemental Appropriation Request		0
Transfer		0
Cumulative Appropriation		0
Expenditures / Encumbrances		0
Unencumbered Balance		0
Partial Closeout Thru	FY06	0
New Partial Closeout	FY07	0
Total Partial Closeout		0

COORDINATION

Public Safety Steering Group
Department of Technology Services
Department of Police
Montgomery County Department of Fire and Rescue Service
Sheriff's Office
Department of Corrections and Rehabilitation
Office of Emergency Management and Homeland Security
Department of Transportation
Department of Liquor Control
Montgomery County Public Schools (MCPS)
Maryland-National Park and Planning Commission (M-NCPPC) Park Police
Washington Metropolitan Area Transit Authority (WMATA)

MAP