

Worksession

MEMORANDUM

September 29, 2009

TO: Management and Fiscal Policy Committee  
Public Safety Committee

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



SUBJECT: Public Safety Communications System (PSCS)

Expected to participate in the discussion:

Drew Tracy, Assistant Chief, Montgomery County Police Department (MCPD)  
Richard Bowers, Fire Chief, Montgomery County Fire and Rescue Service (MCFRS)  
Chris Voss, Director, Emergency Management and Homeland Security (OEMHS)  
Arthur Wallenstein, Director, Corrections and Rehabilitation  
Steven Emanuel, Chief Information Officer, Department of Technology Services (DTS)

and members from the Public Safety Systems Modernization (PSSM) Work Group:

Mike Knuppel, DTS  
Albert George, MCFRS  
Chris Johnson, MCPD  
Charles Schwab, MCPD  
Dieter Klinger, DTS  
Bobby Johnson, DTS  
Debbie Greenwell, OEMHS  
Mark Wulff, DOCR  
Darren Popkin, Sheriff's Office  
Jo Ann Ricchiuti, Sheriff's Office  
John Cuff, Office of Management and Budget (OMB)

## Issues for the Committees

The Public Safety and the Management & Fiscal Policy Committees have been jointly reviewing the progress made in the effort to strengthen the Public Safety Communications System (PSCS). Most recently, during the worksession on July 23, 2009, the Committees requested that four explicit items be brought back in the next session:

1. Review written answers to staff questions raised on July 23, 2009.
2. Provide cost estimates for the major elements of the PSCS, now scheduled for review on November 19, 2009.
3. Provide a plan to address the perceived delays in MCFRS response times and, more particularly, the relationship with ECC processing times.
4. Provide an update on the State of Maryland's progress on procuring a 700 MHz system for public safety agencies in the state.

### 1. Responses to July 23, 2009 questions

The FY09-14 Capital Improvements Program contains a project entitled ***340901: Public Safety Communication System [PSCS] Upgrade and Mod*** (©1). This project's aim is to "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, Correction and Rehabilitation, and Emergency Management and Homeland Security, as well as other smaller users. 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, and an efficient and reliable system for all users." To date, \$3,043,000 has been appropriated in FY09 for equipment replacement purposes from federal grant sources.

The Executive will have an opportunity to provide his recommendations regarding the strategy, funding, and deployment timetables for this upgrade and modernization during the biannual CIP submission. However, three documents were prepared and transmitted to the Committees in advance of this submission, so that Committee members are more familiar with the elements of the expected CIP project and their requirements:

1. Public Safety Systems Modernization Plan (PSSM)
2. Communications Interoperability Plan
3. Computer Aided Dispatch (CAD) Roadmap Study

Staff raised several questions after reviewing these three documents, and the PSCS working group provided answers found on ©2-8. Of particular importance to the current discussion is the exchange around questions 3, 5, 6 and 8, and they are duplicated here. PSCS work team members will be able to address these issues in more detail during the worksession.

3. The PSSM suggests a multi-year, multiple system approach. What mechanism is being suggested for managing the funding and careful control of such a project across multiple budget years? There is precedent in the County's general Technology Modernization effort currently under way (which includes ERP, MC311 and MCTime) to organize a CIP element across multiple years. Is the Executive expected to recommend such an approach as part of the TechMod project itself? Or as a separate project?

**Response:**

The PSSM team will be working with OMB to develop a PSSM CIP. The CIP is anticipated to be inclusive of all public safety modernization efforts moving forward. The PSSM leadership intends to use the TechMod approach to provide similar coordination, governance and prioritization for this complex effort. The public safety operations and project teams already have an effective governance structure in place. The anticipated outcomes and focus of this program does not directly align with the current technology modernization efforts. However, there will be processes within the program to evaluate any points of intersection and thoroughly evaluate and potential interfaces or workflows. The team will be following County processes and architectures ensuring that the appropriate standards and best practices will be used.

5. The interoperability requirements for the region's public safety agencies are compounded by federal and state requirements as well. What is the current level of compliance, and are there financial impacts for non-compliance?

**Response:**

Federal, State and Local governments each have their own interoperability plans for Public Safety radio communications and given the modern technical capabilities and the needs of First Responders, those plans are shared between all groups that find the need to communicate as events transpire across jurisdictional lines. There are no known federal or state mandated requirements regarding interoperability and consequently, no levels of compliance or financial impacts for non-compliance. However, in a proactive approach methodology, Montgomery County has reviewed and evaluated interoperability strategies from Maryland's Statewide Communication Interoperability Plan (SCIP) to ensure that the County can maximize the benefit from any of its requirements that are planned or implemented by the State. While there are no agreements in place, there is a clear understanding between the State and the County that current solutions could be improved by common communication improvements and capabilities.

6. In the prior joint Committee worksession, Committee members heard from the State Director of Interoperability regarding possible collaborative activities in procurement, design, deployment, and operations of the communications system. What is the current status of those discussions?

**Response:**

This remains a correct statement. However, the original target for the Maryland Statewide Communications solution has slipped from Spring, 2009 to Fall, 2009. Montgomery County resources continue to receive input regarding the state's RFP for a single, enterprise 700MHz solution provider and radio appliance contract negotiation efforts. As of the Committee session, staff has been recently made aware of another series of questions to the State and the associated responses. Given the complexity and the broad expectations that many of the Maryland jurisdictions would have the opportunity to leverage this program, this was not an unexpected delay. Complicating the challenge was the retirement of a long time State employee that was a significant focal point for the communication and collaboration of the State and the dependant jurisdictions. On August 3, 2009, the replacement for this individual was recruited. This information was recently communicated to the local jurisdictions. While the replacement has been identified, it will take time and require additional efforts to stay abreast of the ongoing activities surrounding this program, until all organizations are able to align with the new state interoperability director and his staff. We will continue to monitor State procurement communications and anticipate a worksession in the fall upon the final selection and awards by the State.

8. How can we ensure that the length of procurement and development processes does not negatively impact the expected life of the new systems?

**Response:**

The PSSM team plans to maximize the expected life of a new CAD system by following lessons learned from other County technology projects. These include looking for products that follow industry standards and have a product roadmap that show continued alignment with industry direction. The team also anticipates having vendors participate in an Architectural Proof of Concept (POC) exercise before contract signing to ensure the system is aligned with the County's IT architecture. This is expected to allow the new system to leverage existing County system interfaces and technologies. Further, the team will be looking for a system that uses standard building blocks and is modular in design, allowing for future adaptability. In addition, the team will be working to analyze and align the business processes and outcome requirements with system functionality as much as possible to minimize unique development or customization and leverage built-in system configuration capabilities.

**2. Cost Estimates**

A second item which is a high priority for the Committees is to develop an understanding of the costs and timing for replacing each of the major elements of the Public Safety Communications System. The July 23, 2009 worksession reviewed two tables for which explicit data was requested from the executive branch. These tables are reproduced here.

Table 1. Timing of system review, planning, and replacement (where appropriate)

	2010	2011	2012	2013	2014	2015	2016
Radio Systems	U,P	U,P	U,P	D	D	O	O
CAD							
Data Systems							
Infrastructure			P	D	D	O	O
NextGen 911							

- U Upgrade existing equipment
- P Planning
- D Implementation
- O Operations

Table 2. Financing the PSCS effort

	2010	2011	2012	2013	2014	2015	2016	Total \$
Radio Systems								
CAD								
Data Systems								
Infrastructure								
NextGen 911								
Total cost \$								

A request to the executive branch departments to provide time and cost estimates for each of the major PSCS components (Radio, CAD, Data Systems, Infrastructure, and NextGeneration 911) cannot be accommodated at this time, given time and resource commitments to other projects. A new date of November 17, 2009 has been agreed upon by representatives of OMB and DTS as an acceptable date in which the requested time and cost estimates for replacing each element of PSS will be provided and discussed.

### **3. Reducing call processing times**

Beyond the review of the detailed answers to the questions raised in July, the intent of the worksession is to provide an explicit look at the fire call processing times and ways in which the overall response time can be reduced by looking at reductions in the dispatch time delays. The Executive Branch has provided a PowerPoint presentation on ©9-19 and will be prepared to review it with the Committees.

Given the complexity of Response Time analysis, two additional charts are provided to help organize the information in a graphical format: ©20 provides a total picture of MCFRS Response Time and its constituent parts, while ©21 gives reasonable professional estimates regarding current averages for each of the major response time elements.

In order to assess the materials provided in this submission, Council Staff raised a series of questions, for which the Working Group provided written answers on ©22-26. Of particular importance to the discussion are questions 3, 7, and 8, which are duplicated below:

3. Please provide data or data summaries in tabular form showing CAD system time log information regarding each of the NFPA response time elements. For each call the CAD system captures the various times to the nearest tenth of minute. What is requested is an analysis showing the statistical spread of each response time element; it could be summarized by day, or week or month. What is important is to determine not only the average, but other statistical descriptors that the CAD system provides for each incoming call till a unit is dispatched.

*While we understand the desire and the need to capture data in CAD it is important to realize that CAD is not our primary source for response information. CAD is a temporary storage facility where the information is inputted. Response time data is not collected or analyzed from CAD but rather from the RMS system. Further, CAD data and subsequently RMS data is still subject to data corruption as discussed earlier.*

*What we believe is critical is that our control chart analysis demonstrates that the "system" of processing calls for service is relatively stable, meaning that the process as it current exists has been maximized and is running as best as can be expected given the constraints demonstrated elsewhere in this document.*

*Attached are copies of the daily and monthly response time reports culled from the RMS. We are also in the process of reconfiguring the reports to more accurately depict the response time elements of NFPA 1221.*

7. The CAD Roadmap Study, Section 8.6, says that the County anticipated receiving from Northrop Grumman a number of fixes and enhancements for the current CAD system. What are these fixes and enhancements? When will they be implemented? How will they improve CAD performance?

*The County received and implemented 99 programming changes to CAD in the past year, 33 addressed system problems, 27 improved system usability, 14 addressed data issues, 10 performance issues, 8 increased system diagnostics, and 7 were for new/improved interfaces. The interfaces included station alerting, GIS (ADC map change), and MCFRS RMS. The changes reduced occurrences of system outages and slowdowns.*

8. The CAD Roadmap Study, Section 8.7, recommends separating the database service from the CAD application server and purchasing new servers for both functions. Would this change help improve call processing times? If so, by how much?

*The primary objective for the server replacement and separation of the CAD application and database is to improve the stability, serviceability and extend the life of the current CAD system. While some performance gains can be anticipated from faster hardware, they are not anticipated to have a major impact on response times.*

#### **4. Update on State 700 MHz system**

Finally, an update on the State of Maryland's 700 MHz system design, procurement, and deployment will be provided. The migration of public safety agencies to 700 MHz is a current topic of interest at the FCC, given the D-block auction possibilities and the ongoing discussion about the role of the Public Safety Spectrum. Information about the latest House subcommittee discussions on this topic is provided on ©27-28, which is abstracted from the Urgent Communications blog (previously known as Mobile Radio Technology) at <http://urgentcomm.com> .

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

Category                    General Government  
 Subcategory              Technology Services  
 Administering Agency  
 Planning Area              Countywide

Date Last Modified            January 20, 2009  
 Required Adequate Public Facility    No  
 Relocation Impact            None.  
 Status                            On-going

### EXPENDITURE SCHEDULE (\$000)

Cost Element	Total	Thru FY08	Rem. 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	3,043	0	0	3,043	3,043	0	0	0	0	0	0
<b>Total</b>	<b>3,043</b>	<b>0</b>	<b>0</b>	<b>3,043</b>	<b>3,043</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

### FUNDING SCHEDULE (\$000)

Federal Aid	3,043	0	0	3,043	3,043	0	0	0	0	0	0
<b>Total</b>	<b>3,043</b>	<b>0</b>	<b>0</b>	<b>3,043</b>	<b>3,043</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**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 an 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**

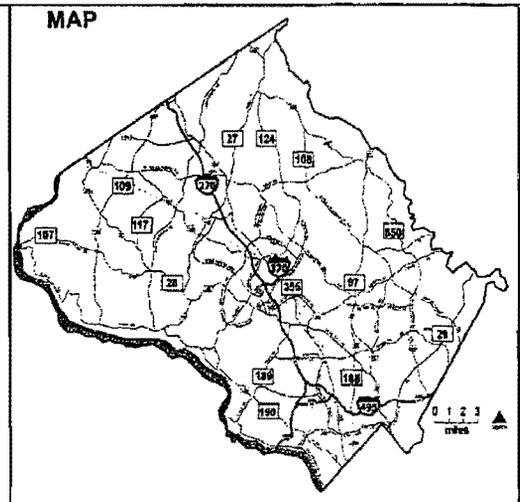
Future years will include an assessment of the current radio system infrastructure to determine the feasibility of using portions of the existing infrastructure along with software upgrades and new networking equipment to permit full integration with the IP-based architecture of the newer technologies. 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 \$2.055 million and Fire Act grant funding of \$988,000.

APPROPRIATION AND EXPENDITURE DATA		
Date First Appropriation	FY09	(\$000)
First Cost Estimate	FY09	3,043
Current Scope		3,043
Last FY's Cost Estimate		3,043
Appropriation Request	FY10	0
Supplemental Appropriation Request		55
Transfer		0
Cumulative Appropriation		2,988
Expenditures / Encumbrances		0
Unencumbered Balance		2,988
Partial Closeout Thru	FY07	0
New Partial Closeout	FY08	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)





DEPARTMENT OF TECHNOLOGY SERVICES

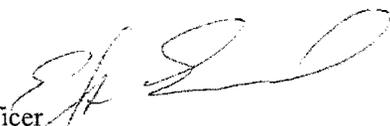
*Isiah Leggett*  
County Executive

*E. Steven Emanuel*  
Chief Information Officer

MEMORANDUM

August 14, 2009

TO: Minna Davidson, Legislative Analyst  
Dr. Costis Toregas, Council IT Advisor

FROM: E. Steven Emanuel, Chief Information Officer 

ON  
BEHALF OF: Richard Bowers, Fire Chief  
Thomas Manger, Chief of Police  
Chris Voss, Director, Office of Emergency Management & Homeland Security  
Arthur Wallenstein, Director, Dept of Corrections  
PSSM Workgroup Members

SUBJECT: Public Safety Systems Modernization – Responses to Committee Questions

Pursuant to the discussion and commitment on July 23, 2009, at the joint Public Safety / Management and Fiscal Policy, the Department Directors from the Executive Branch are pleased to provide the detailed responses to the questions included in the session packet.

The responses, included in the attachment provided, have been developed by the members and subject matter experts participating in the Public Safety Systems Modernization effort.

If there are any additional questions or clarification required, please don't hesitate to ask.

Cc: D. Tracy

Attachment

**Policy issues**

1. Although there are no financial elements to the plan yet, it is evident that the magnitude of the required investment will be significant. Are there federal, state, or National Capital Region (NCR) commitments which can provide support in this undertaking? And what is the expected role of the Council in garnering such support?

**Response:**

**At the present time, we are looking at all funding opportunities that are potentially available to support any portions of the different efforts. Grant opportunities that align with the modernization requirements are being sought as well as leveraging any initiatives that are complimentary to the Montgomery County plan including any work in progress or existing contract vehicles. There are no known, approved or available funding sources that have the ability to significantly reduce the costs that will be proposed to meet these modernization initiatives. At least one grant request has been declined that would have provided some hardware funding in this effort.**

**With the ARRA Stimulus funding opportunities coming to fruition, there may be opportunities to leverage Federal funding. Unfortunately, at the present time, Public Safety Systems are not directly addressed as direct grant streams. However, there are other public sector entities that are providing mandates for the direction of Public Safety solutions and there are possible opportunities for Council leadership to assist in directing attention to the actual capability of meeting new mandates. As stated in the committee session, the new communications methodologies that need to be in place have a finite completion date, but funding options to achieve these mandates have not been explored or addressed. Given the fiscal constraints across the nation, there will be the need for financial support from our elected officials to make State and Federal agencies aware of the fiscal impacts of these deadlines.**

2. Are the surrounding Counties and the District of Columbia facing similar issues of system replacement? And will our design and procurement processes be coordinated with theirs?

**Response:**

**As noted in the CAD Replacement study, the County needs to take advantage of new hardware and database technology. The rapid pace of technological change and the need to implement reliable and redundant systems for critical public safety operations have profound impacts on the lifecycle of CAD data systems. This is an industry-wide issue that is affecting the surrounding Counties and the District of Columbia. As one example, Fairfax County is scheduled to implement a new CAD System in September 2009. Their current legacy CAD system will be decommissioned after an operational lifecycle of five years. At this time, Montgomery County's current CAD operational lifecycle is just over six years.**

**The County's design and procurement processes will take into account a strong desire for CAD-to-CAD interoperability while recognizing that the area jurisdictions will also be undertaking CAD replacement projects. Thus, as outlined in the CAD Replacement study, the County will be looking toward Industry Best Practices by adopting common data and architecture standards. These standards are detailed in the Public Safety**

**Modernization Plan.** The current NCR funded CAD-to-CAD Interoperability and the MD PSIC funded Data Exchange Hub projects will serve as springboards for this type of design and integration.

### **Management issues**

3. The PSSM suggests a multi-year, multiple system approach. What mechanism is being suggested for managing the funding and careful control of such a project across multiple budget years? There is precedent in the County's general Technology Modernization effort currently under way (which includes ERP, MC311 and MCTime) to organize a CIP element across multiple years. Is the Executive expected to recommend such an approach as part of the TechMod project itself? Or as a separate project?

#### **Response:**

**The PSSM team will be working with OMB to develop a PSSM CIP. The CIP is anticipated to be inclusive of all public safety modernization efforts moving forward. The PSSM leadership intends to use the TechMod approach to provide similar coordination, governance and prioritization for this complex effort.**

**The public safety operations and project teams already have an effective governance structure in place. The anticipated outcomes and focus of this program does not directly align with the current technology modernization efforts. However, there will be processes within the program to evaluate any points of intersection and thoroughly evaluate and potential interfaces or workflows. The team will be following County processes and architectures ensuring that the appropriate standards and best practices will be used.**

4. There are several grants under the UASI program recently secured by the Executive for planning purposes in the public safety communications area. They are:
  - \$60,000 for Interoperable Communications Planning
  - \$70,000 for CAD Upgrade/Transition Planning
  - \$25,000 for Public Safety Systems Strategic Planning for Modernization

What are the targets for these grants, and how do they relate to the PSSM?

#### **Response:**

**The three grants will be used by the PSSM team to initiate the next stage of the modernization process. They will be used to engage industry experts in the detailed analysis of current workflows, in the business re-engineering process, system specification development, and project planning and coordination.**

**The PSSM team is already working on the first effort to conduct analysis focusing on the operational processes, business work space and technologies at the public safety communications center. The team expects to have a contractor begin work this fall. It is anticipated that the results should provide both immediate business process improvement recommendations and provide a basis for a new CAD system selection and implementation.**

5. The interoperability requirements for the region's public safety agencies are compounded by federal and state requirements as well. What is the current level of compliance, and are there financial impacts for non-compliance?

**Response:**

**Federal, State and Local governments each have their own interoperability plans for Public Safety radio communications and given the modern technical capabilities and the needs of First Responders, those plans are shared between all groups that find the need to communicate as events transpire across jurisdictional lines.**

**There are no known federal or state mandated requirements regarding interoperability and consequently, no levels of compliance or financial impacts for non-compliance. However, in a proactive approach methodology, Montgomery County has reviewed and evaluated interoperability strategies from Maryland's Statewide Communication Interoperability Plan (SCIP) to ensure that the County can maximize the benefit from any of its requirements that are planned or implemented by the State. While there are no agreements in place, there is a clear understanding between the State and the County that current solutions could be improved by common communication improvements and capabilities.**

6. In the prior joint Committee worksession, Committee members heard from the State Director of Interoperability regarding possible collaborative activities in procurement, design, deployment, and operations of the communications system. What is the current status of those discussions?

**Response:**

**This remains a correct statement. However, the original target for the Maryland Statewide Communications solution has slipped from Spring, 2009 to Fall, 2009. Montgomery County resources continue to receive input regarding the state's RFP for a single, enterprise 700MHz solution provider and radio appliance contract negotiation efforts. As of the Committee session, staff has been recently made aware of another series of questions to the State and the associated responses. Given the complexity and the broad expectations that many of the Maryland jurisdictions would have the opportunity to leverage this program, this was not an unexpected delay.**

**Complicating the challenge was the retirement of a long time State employee that was a significant focal point for the communication and collaboration of the State and the dependant jurisdictions. On August 3, 2009, the replacement for this individual was recruited. This information was recently communicated to the local jurisdictions. While the replacement has been identified, it will take time and require additional efforts to stay abreast of the ongoing activities surrounding this program, until all organizations are able to align with the new state interoperability director and his staff. We will continue to monitor State procurement communications and anticipate a work sessions in the fall upon the final selection and awards by the State.**

7. The CAD roadmap report suggests that the CAD system must be replaced immediately. If so, is the Fire department prepared to review the dispatching process itself, compare it with the NFPA 1221 standards, and modify current business practices to reduce delays?

**Response:**

The Fire/Rescue Service is aware of the constraints of NFPA1221 and its companion document NFPA1710 and is not only prepared to but actively engaged in critical evaluation of all parts of the emergency call processing system to determine the most effective mechanisms for pushing the system closer to the consensus standards outlined in those documents.

8. How can we ensure that the length of procurement and development processes does not negatively impact the expected life of the new systems?

**Response:**

The PSSM team plans to maximize the expected life of a new CAD system by following lessons learned from other County technology projects. These include looking for products that follow industry standards and have a product roadmap that show continued alignment with industry direction. The team also anticipates having vendors participate in an Architectural Proof of Concept (POC) exercise before contract signing to ensure the system is aligned with the County's IT architecture. This is expected to allow the new system to leverage existing County system interfaces and technologies. Further, the team will be looking for a system that uses standard building blocks and is modular in design, allowing for future adaptability. In addition, the team will be working to analyze and align the business processes and outcome requirements with system functionality as much as possible to minimize unique development or customization and leverage built-in system configuration capabilities.

**Technology issues**

9. The documents provided for the Committees are not clear on the issue of system integration; although easy to support, the ability to integrate systems at the detail level can be an expensive undertaking with low chances of success. What are the current strategies to ensure integrated systems?

**Response:**

The County strategy for integrating its public safety systems is to employ a combination of methods with all designed to reduce the cost of supporting integrations and improving the ability to update component systems. The County deals with integration via the following methods:

- Definition of a Data Architecture
- Use of an Enterprise Service Bus for Information Transfers
- Use of Industry standard data formats such as GJXML or NIEM

**Data Architecture**

**Data Architecture creates a logical data model for the Public Safety Domain and is designed to promote common vocabulary and data definition.**

**The guiding principles for the Data Architecture are:**

- **Data is an asset, accessible and shared for decision support and interoperability**
- **Data is secure, and protected from unauthorized use and disclosure**
- **Data is stored and accessible with technology independent methods**
- **Data has an owner and an established system of record**
- **Data has a data retention policy**

**The purpose of the Data Architecture is to build a platform which enables rapid development of distributed, multi-tiered applications. It is designed to identify the County's common data structures in XML or database schema definition, and to associate those data structures to their source platforms.**

### **Enterprise Service Bus**

**All Enterprise Data Exchanges are targeted to pass over the Public Safety Enterprise Service Bus, which is defined as a "middleware or interoperable" technology that allows information data exchanges in a more flexible or common method between systems/applications. The Public Safety Enterprise Service Bus decouples the source and target systems in the data transfer and allows one-to-many or many-to-many system communications. It provides the ability to remove unique system interface designs taking place in data exchanges and allows system interfaces to be more generic and flexible. By moving to a more common Data Exchange model solution, it reduces the cost of future system enhancements.**

### **Industry Standard Data Formats**

**Montgomery County uses solution standards and guidelines being developed by the Federal Government such as GJXML and NIEM. Where the County can use such data standards, it does. Like with the Enterprise Service Bus, the use of Industry Data Standards helps remove "hard wired" connections to the systems requiring a data exchange from each other and allows systems to be more flexible in information exchanges. It allows for more cost effective upgrades to components of a system rather than the whole system and should drive help down the total cost of ownership.**

10. There is a major technology shift to an IP (Internet Protocol) based system, and yet very little description and justification is provided. What are the benefits and potential risks of such a shift, and how will it enhance our position as a leader in telecommunications applications?

**Response:**

**There is a major technology shift to IP based systems. However, this technological shift is driven primarily by the manufacturers in their engineering design concepts and the push for standardization and common interface requirements within the telecommunications industry.**

**As a user of technology products it is inherent upon the County to stay cognizant of new innovations and offerings and to take advantage of technology that will be cost effective, technologically up to date and beneficial to the Public Safety user community. As IP based technology continues to expand, it should allow for the reduction in the amount of equipment required in a network. It should enable ease of expansion and flexibility on the networks.**

**An IP-based infrastructure should also allow flexible centralized management and common interfaces that will allow a variety of equipment, programs and products to operate efficiently and effectively between diverse manufacturers of goods and services. Given the fact that communications (both data and voice) are moving to IP capabilities, while all solutions have not implemented an IP standardized solution, the long term implications are that IP will be a common technology foundation and this is touted in the industry as the basis for voice and data convergence.**

11. Cell phone photos and videos are commonplace; the notion of using such citizen-provided information in the public safety communications system is no longer considered a fringe idea, but an effective and efficient additional input. Are there plans to integrate such reporting data?

**Response:**

**As presented in the Public Safety Modernization Plan, Montgomery County's 9-1-1 Phone Systems have been positioned to connect to Next Generation 9-1-1 Networks once they become available. Later this year, the 9-1-1 Phone Systems within the PSCC and the AECC will be Internet Protocol (IP) enabled and capable of receiving and passing the NG9-1-1 data types including images and video. These data types will have to be incorporated into future CAD and Records Management Systems.**

# **MCFRS-ECC Call Processing Times**

Emergency Communications Center

# ECC Workload

## The ECC

- processes over 100,000 calls for service per year
- answers more than 10,000 administrative phone calls per/month
- is the focal point for FRS notifications

# Call Processing Complexity

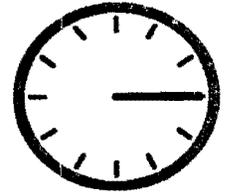
Call processing is a complex system and by definition the individual parts, examined alone, cannot account for the aggregate behavior of the system.

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*The complexity can be described by the interaction between:*

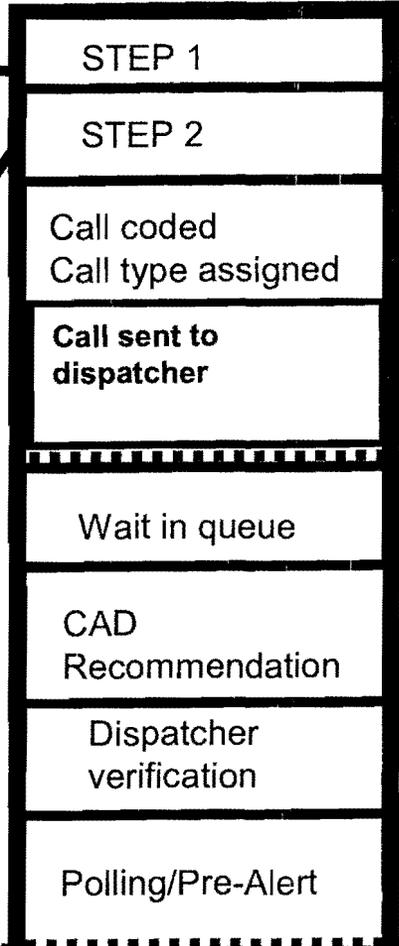
- HARDWARE  
Example: the MDC radio modem and its inherent delay- corrected with Sprint CDMA...
- SOFTWARE  
Example: the ACD fails to transfer call data to CAD event form 40% of the time...
- PEOPLE  
Example: An engine officer arriving on the scene of a house fire with people trapped on upper floors forgets to press the on scene button...

# Call Processing Sequence



FRS receives the call  
Must determine incident location  
-Cell Phones  
-Foreign languages  
-VOIP  
-CAD/GIS interface

Must determine incident type  
-EMD  
-Special Operations  
-Resource allocation complexity



Call to Pending

111 sec

Pending to Dispatch

54 sec

Dispatch & Clock Stops

Emergency Communications Center

# Call Processing Parameters

Standard/ Recommendation	Processing Time	Time in Excess of Standard	Time Type
NFPA 1221 <i>(does not consider EMD, MD Law COMAR 30 requires EMD)</i>	60 s	n/a	Fractile *
ASTM F1220 ** <i>(Does consider EMD)</i>	120 s	n/a	Arithmetic
<b>MCFRS-FIRE</b>	<b>165s</b>	<b>+ 105s</b>	<i>Arithmetic measure of fractile standard</i>
<b>MCFRS-ALS<sup>+</sup></b>	<b>162 s</b>	<b>+ 42 s</b>	Arithmetic
<b>MCFRS- ALS2 **</b>	<b>148s</b>	<b>+28 s</b>	Arithmetic
<p>* A fractile is a measure of a given time parameter for a given percentage of time</p> <p>** The American Society for Testing and Materials (ASTM) standard is titled <i>Standard Guide for Emergency Medical System Telecommunications</i>, which underlies its EMS focus and subsequently its allocation of twice the time for call processing.</p> <p>+ This ALS is inclusive of all ALS time, even the less serious ones. Uses ASTM F1220.</p> <p>++ This ALS only includes the most critical patients. This is a new measurement. Uses ASTM F1220.</p>			

Emergency Communications Center

# Underlying Assumptions

The consensus standards/recommendations assume:

1. Static action domains
2. Urban environments
3. Linear call distribution
4. Some require fractile averages and others straight arithmetic averages

# 9-1-1 Call Processing Times

Time Measurement	ALS	FIRE
<b>Phone to Pending</b> <i>(from the time Fire/Rescue picks up the phone until the "call" is sent to the dispatcher for resource allocation.)</i>	<b>111s</b> <i>The majority of time for EMS calls is spent prior to call reaching dispatcher, EMD takes time</i>  <b>(+ national average 110s)</b>	<b>56s</b>  <b>(+ national average 45s)</b>
<b>Pending to Dispatch</b> <i>(from the time the dispatcher receives the call in his/her queue until they push the dispatch button)</i>	<b>54s</b>	<b>106s</b> <i>The majority of time for Fire calls is spent at the dispatcher</i>
<p>*Mclure, N. and Loomis, S. (2009). <i>Using Workload Analysis in the Design of Critical Communications Facilities</i>. Emergency Numbers Professional. Vol. 27, No. 6, pp 45- 49</p>		

# Change History

- **Previous**
  - ANI/ALI work-around → address verification
  - AVL work-around → Polling
  - Pager Tones → Pre-Alert
  - EMD Vendor (MPDS only electronic version)
  - Suggest & Plan Button
  - Procedural work-arounds
- **Current**
  - Update EMD software
  - Pre-Alert changes
  - Polling elimination
  - New VESTA hardware & Software
  - Performance Measures in-line with NFPA 1221 metrics
- **Future**
  - New EMD vendor (PowerPhone)
  - New Server & Database
  - CAD Display changes
  - New CAD
  - CAD-2-CAD

# Next Steps

1. Refine data collection,
2. Refine data management,
3. Refine data analysis
4. For EMS focus is on the call intake primarily (*new protocols*)
5. For Fire calls, limited to full assignments, focus is on dispatch primarily (*new processes*)

# New CAD: Areas Where it Can Help

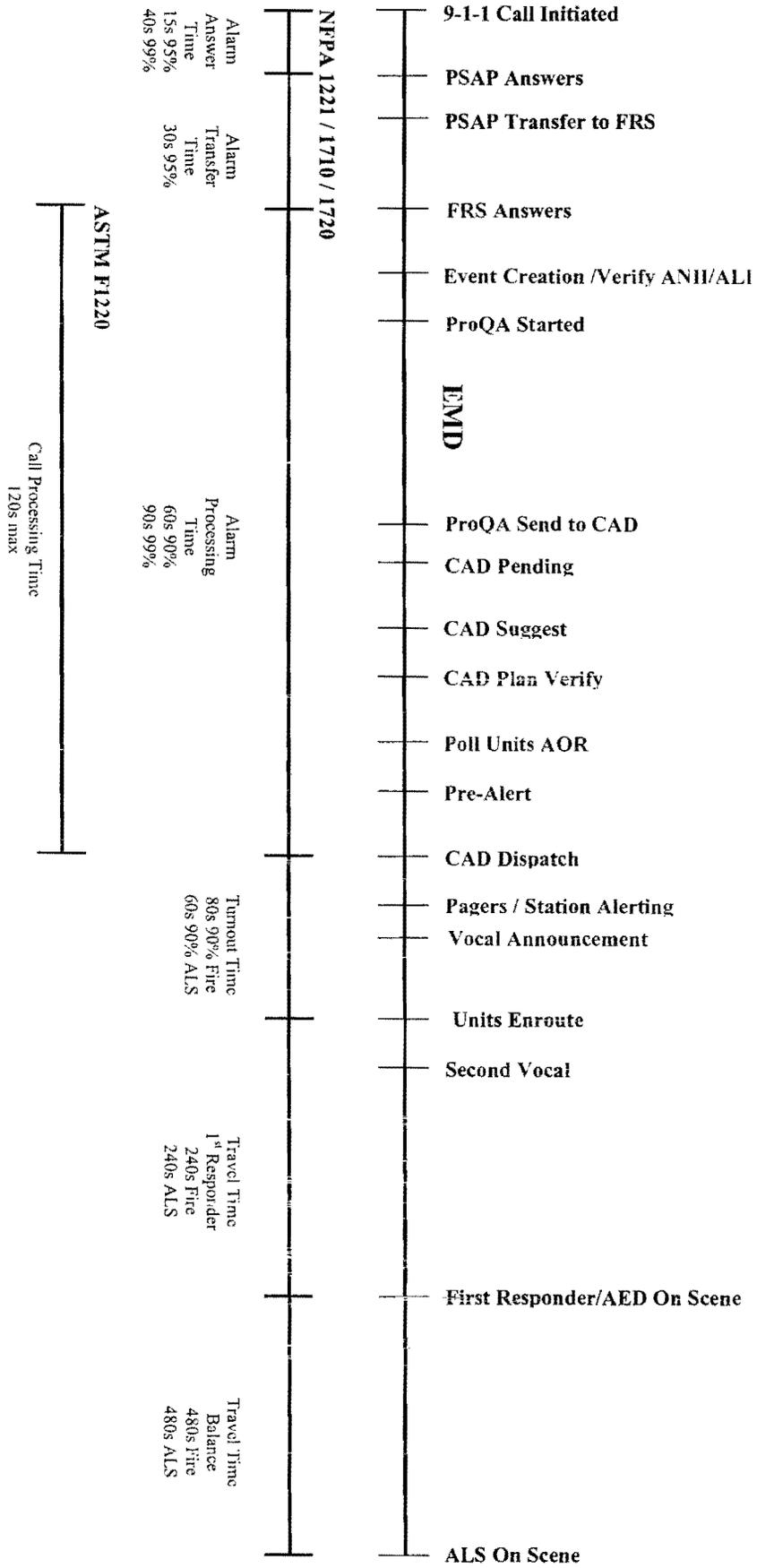
- Rapid decision making is an on-going process that relies on collective intelligence
- Rapid decision making requires flexible governance
- People in nested social cognitive networks make effective rapid decisions
- Power is **SHARED** among the contributors

# Possible Time Savings<sup>+</sup>

Standard	Current Processing Time	No Polling	Pre-Alert Reduction	Not Questioning Unit Status	New CAD Assumptions	New Time Over Standard
MCFRS-FIRE	165s (+ 105s)	n/a	-20s	-10	-13	62s
MCFRS-ALS2	148s (+28 s)	-15s	n/a	n/a	-13	0s
<b>+ this is truly a rough, rough guess</b>						



# MCFRS Total Response Time



### MCFRS Total Response Time Metrics

	Notification <sup>1</sup>	Call Processing	Turnout	Travel Time 1 <sup>st</sup> Arriving	Travel Time Full Assignment <sup>2</sup>	Total <sup>3</sup>
MCFRS Average						
Fire <sup>4</sup>		182s <sup>5</sup>	43s <sup>6</sup>	93s <sup>7</sup>		
ALS-2		152s <sup>8,9</sup>	73s	215s <sup>10</sup>		
BLS		187s	82s	284s		
NFPA Targets						
Fire	45s 95%	60s 90%	80s 90%	240s 90% <sup>11</sup>	480s 90% <sup>12</sup>	12m 5s
ALS-2	45s 95%	60s 90%	60s 90%	240s 90% <sup>13</sup>	480s 90% <sup>14</sup>	11m 45s
BLS	N/A	N/A	N/A	N/A	N/A	N/A
ASTM Targets						
ALS-2	N/A	120s <sup>15</sup>	N/A	N/A	N/A	N/A

<sup>1</sup> Notifications Times are a function of the PSAP, which is the Montgomery County Police.

<sup>2</sup> Data not currently analyzed on monthly basis.

<sup>3</sup> Data not currently analyzed on monthly basis.

<sup>4</sup> NFPA considers the dispatch time stamp when verbal or electronic notification is given. Therefore, MCFRS actual dispatch time should be calculated based on the timing of the pre-alert for full assignments, rather than the delayed dispatch via CAD. CAD cannot capture the pre-alert time.

<sup>5</sup> Call processing for structure fires – caller interrogation 56s, while dispatch is lengthy at 109s.

<sup>6</sup> Turnout time for structure fires is significantly quicker due to the pre-alert given prior to dispatch.

<sup>7</sup> MCFRS travel time accurately reports the arrival of the first engine company to structure fires.

<sup>8</sup> Call processing for ALS-2 events – caller interrogation lengthened due to EMD (111s), dispatched quickly (54s).

<sup>9</sup> EMD is designed to send a time-critical, life-threatening call to dispatch rapidly. EMD is also designed to ask more questions when the call is not time-critical, in order to prioritize the call and dispatch appropriate resources.

<sup>10</sup> MCFRS travel time calculations stop at the arrival of the first unit, which always has an AED. However, with the 1+1 deployment strategy, this first responder is often an engine with a paramedic on board which provides a paramedic to the scene quicker than the later arriving ALS transport unit.

<sup>11</sup> For structure fires, this is the first arriving engine company. The first engine company has 240s travel time.

<sup>12</sup> For structure fires, this is the complete alarm assignment. The complete assignment must be on scene within 480s of travel time.

<sup>13</sup> The first responder with an AED has 240s of travel time.

<sup>14</sup> The ALS transport unit has 480s of travel time.

<sup>15</sup> ASTM considers EMD as part of the call processing time interval, while NFPA does not.

## Questions-CAD Performance

1. NFPA Standard 1221 requires that 95% of alarms received on emergency telephone lines be answered within 15 seconds and 99 percent of alarms be answered within 40 seconds. It also requires that emergency call processing and dispatching be completed within 60 seconds, 95 percent of the time and emergency call processing and dispatching be completed within 90 seconds 99 % of the time. A transfer of an alarm from primary PSAP to a secondary answering point must not exceed 30 seconds for 95% of all alarms processed.

Does the County use these standards as a benchmark for its call processing time?

If not, how does the County determine whether the CAD is performing at an appropriate level?

*MCFRS does not currently use the NFPA 1221 Standard in its entirety, primarily because the configuration of our PSAP places aspects of the standard out of our control. While MCFRS does consider NFPA 1221 when determining response time effectiveness it is becoming increasingly clear that other standards such as the ASTM F1220 and the requirements of the Center for Public Safety Excellence (CPSE) accreditation process are more realistic time intervals.*

*The issues of call processing times and CAD performance while interrelated are essentially two different issues.*

2. What call processing data does MCFRS routinely collect from CAD system?  
How does MCFRS use that data for ongoing management decision-making?

*MCFRS routinely collects a multitude of time stamped information from CAD and various other interfaces and uses that data to measure system performance and other aspects of the emergency call processing continuum. There are two primary restrictions to using that data:*

- A. *Both data mining and data representation are primitive in that most of the discussion centers around averages and raw times, essentially denying the impact of the interrelationship of various systems and perhaps more importantly diminishing notions of citizen service that cannot be reflected in quantitative measurements.*
- B. *Time stamping of unit status, enroute, onscene, etc. are not intervals that CAD can automatically capture. Field responders have to either status an MDC or verbally advise a dispatcher who then types the information into CAD, but element of human intervention is unaccounted for via the CAD data..*

3. Please provide data or data summaries in tabular form showing CAD system time log information regarding each of the NFPA response time elements. For each call the CAD system captures the various times to the nearest tenth of minute. What is requested is an analysis showing the statistical spread of each response time element; it could be summarized by day, or week or month. What is important is to determine not only the average, but other statistical descriptors that the CAD system provides for each incoming call till a unit is dispatched.

*While we understand the desire and the need to capture data in CAD it is important to realize that CAD is not our primary source for response information. CAD is a temporary storage facility where the information is inputted. Response time data is not collected or analyzed from CAD but rather from the RMS system. Further, CAD data and subsequently RMS data is still subject to data corruption as discussed earlier.*

*What we believe is critical is that our control chart analysis demonstrates that the "system" of processing calls for service is relatively stable, meaning that the process as it current exists has been maximized and is running as best as can be expected given the constraints demonstrated elsewhere in this document.*

*Attached are copies of the daily and monthly response time reports culled from the RMS. We are also in the process of reconfiguring the reports to more accurately depict the response time elements of NFPA 1221.*

4. The CAD Roadmap Study's list of business and operational requirements suggests that the current CAD falls short in several areas which affect call processing times. Relevant requirements are listed in brief below. Please refer to the study for the full text of each requirement.

Please discuss the impact of each issue on the current system, and provide supporting data where possible. Could adjustments be made to the current hardware, software, or business process for these issues to improve call processing time until the CAD is replaced? If so, what would the adjustments involve, and how much would they improve the call processing time?

Section 4.1, PSCC Requirements (Questions 1, 2 and 4-6 are answered as a group below)

1. Dispatch complement recommendations must be processed accurately and efficiently.
2. The CAD system must take into account and be able to dynamically adjust personnel and assets assigned to units to ensure that automated unit recommendations are accurate without the need to manual check.
3. The CAD system must efficiently interface with many sub-systems which are themselves subject to technological changes, for example, fire station alerting.

*The current CAD system has proprietary point-to-point interfaces. This increases cost and time to implement new or upgraded sub-systems. The County will be looking for a CAD system with more standards based interfacing capabilities to improve ongoing flexibility and reduce costs. The proprietary interfaces do not have a direct impact on call processing time.*

4. The CAD system should allow the operator to sort events and units in the display windows in various ways.

5. The CAD system must be capable of tracking times (and providing reports) for every stage of a call from the time it comes into the ECC until it is closed, from various sources, both in the ECC and from fields units.
6. Interoperability of CAD systems in the region is vital... There is currently no method for Montgomery County to efficiently (or automatically) share resources (mutual aid) with surrounding jurisdictions.

*While we can go into great detail about the discussed requirements of the CAD Roadmap Study we cannot provide hard statistical data to support each of the requirements. It is intuitive to say that if the CAD can better track unit assets and unit location, and is able to compare those assets and that location against a pending call for service, it will take less time to dispatch a call. However it is not possible at this moment to offer more than rudimentary guesses as to how much actual time will be saved.*

*When processing a call for service CAD must provide a recommendation. The logic limitations of current CAD coupled with the complexities of the response schema means that a dispatcher cannot take what he/she sees at face value. The need to have human intervention is critical and is expected to remain critical for the foreseeable future. New CAD technology can and should provide the human dispatcher with graphical interfaces that increase situational and spatial awareness.*

*CAD is a decision support tool, not a decision making tool and is subject, by design and necessity, to human intervention. As such there will also be a "human factor" that impacts the ability of CAD data to be an accurate representation of system performance. For CAD to know when a unit has arrived at an incident the unit officer must tell CAD, either with a data or voice transmission. If the end-user fails to push the right button at the right time, the numbers are skewed.*

*Further savings in call processing times can be achieved via simplification of apparatus allocation strategies; however those sorts of changes come at a cost. The business of sending the right help in the shortest time interval to a given address is not a linear process because the emergency response system is inherently dynamic. It is important to balance rigid empirical observation against the perceptions of the citizen base we serve.*

*As far as interoperability, the backbone of interoperability regionally is the voice radio system and that has performed well. While CAD interoperability is desirable, its absence is not related to call processing times.*

7. The CAD Roadmap Study, Section 8.6, says that the County anticipated receiving from Northrop Grumman a number of fixes and enhancements for the current CAD system. What are these fixes and enhancements? When will they be implemented? How will they improve CAD performance?

*The County received and implemented 99 programming changes to CAD in the past year, 33 addressed system problems, 27 improved system usability, 14 addressed data issues, 10 performance issues, 8 increased system diagnostics, and 7 were for new/improved interfaces. The interfaces included station alerting, GIS (ADC map change), and MCFRS RMS. The changes reduced occurrences of system outages and slowdowns.*

8. The CAD Roadmap Study, Section 8.7, recommends separating the database service from the CAD application server and purchasing new servers for both functions. Would this change help improve call processing times? If so, by how much?

*The primary objective for the server replacement and separation of the CAD application and database is to improve the stability, serviceability and extend the life of the current CAD system. While some performance gains can be anticipated from faster hardware, they are not anticipated to have a major impact on response times.*

9. If additional servers are contemplated, are there ways to use the County's virtualization technique to reduce capital acquisition costs and time to implement?

*Virtualization provides cost savings when multiple standard servers can be combined. Since the CAD servers are proprietary and there are only 1 or 2 in each location, virtualization would not be appropriate. The County also does not virtualize database servers for performance considerations. The County has already virtualized most of the other public safety including the address servers, communications servers, etc.*

10. Are there issues other than CAD performance that affect call processing times, for example, Emergency Medical Dispatch, or other dispatch protocols? If so, what are they? Please provide data showing how much they affect call processing times. Could the protocols be modified to improve call processing times?

*There are certainly issues other than CAD performance that affect call processing times. Among them are the competing imperatives of processing calls quickly and processing them properly. There is a balance to be struck between sending the right compliment of apparatus the first time based on a rigorous, standards based interview and simply sending a call quickly so that the call processing times meet a consensus standard.*

*Another issue is the ProQA emergency medical dispatch system. Comparison between MCFRS and other agencies suggests that we are using the product well, we are generally using the product well, and we are generally (though we cannot substantiate it) providing citizens with a higher level of care faster than we were before EMD. The side effect is that EMD takes longer to differentiate between various levels of need. However, of all the standards and protocols in use, the EMD process is science based*

*and provides immediate medical intervention by trained personnel, before the first fire engine or ambulance can start moving.*

# Hearing offers light at the end of the 700 MHz tunnel

Sep 24, 2009 4:57 PM, By Donny Jackson

During a House subcommittee hearing today, elected officials and panelists representing the public-safety and commercial sectors provided frank assessments of the prospects for making a nationwide 700 MHz broadband network for public safety something that can be used, not just a pipe dream that is discussed at trade shows.

The bad news is that elected officials essentially shot down all of the existing plans being proposed today as not being economically viable. The good news — along with the growing consensus that the network needs 20 MHz of spectrum — is that at least some of the same elected officials suggested that Congress should provide funding support that could make the much-debated network a reality.

Finally.

Mind you, the notion of federal funding for this proposed network is nothing new. It's been discussed by members of the public-safety community and commercial-sector wireless industry observers almost from day Morgan O'Brien outlined his concept for the network. Most have felt that some sort of federal aid would be needed to bridge the economic gap between building a commercial network and building a network that would meet public-safety standards while being within affordable to first-responder agencies.

But federal funding was conspicuously absent from most public conversations on Capitol Hill until today, when subcommittee chairman Rep. Rick Boucher (D-Va.) and ranking member Rep. Cliff Stearns (R-Fla.) were among those mentioning the possibility.

Such statements caused me to flash back to the end of last year, when the Public Safety Spectrum Trust (PSST) proposed that \$15 billion for the public-safety network be included in the stimulus package. Almost as soon as the word got out, I quickly received a call from representative of commercial carrier asking for any details I had on the proposal, because such an infusion of federal dollars would be "game changer" in the economics of the proposed public-private partnership that was on the table at the time.

Of course, there's a huge difference between a few individual congressmen tossing out an idea and having Congress actually appropriate money for a project, but at least it's a step in the right direction.

Without federal funds, it appears that broadband-network buildouts could be done in pockets of the country where certain first-responder entities and/or commercial operators have resources and see opportunities. But such deployments would not be nationwide in

the near term, and it could be a long time before broadband capabilities reach many locations, particularly those in rural areas.

Rep. Henry Waxman (D-Calif.) said he wants the broadband network to be built quickly, to be nationwide and to have minimal impact on the commercial wireless sector. For all of these goals to be met, some sort of federal funding mechanism almost has to be part of the equation, particularly in the current economy that is woefully short on speculative capital.

What is needed is greater data about the cost of the network, so Congress has an educated idea how much it would need to fund — up front and possibly on an ongoing basis. Today, PSST Chairman Harlin McEwen estimated the network could cost between \$20 billion and \$40 billion. Last year, Congress heard FCC commissioners give a \$6 billion estimate, and I've heard estimates that were 10 times that amount. Obviously, more precision is needed.

The fact is, the ultimate cost will depend largely on public-safety requirements and how much existing infrastructure from the public-safety and commercial sectors can be leveraged. What Congress needs are reasonable estimates under the various scenarios, so it can even consider making appropriations for the cause.

Meanwhile, public-safety officials must be careful of not falling into the trap of thinking Congress is going to provide even a dime until the money is appropriated (even votes to authorize money do not mean funding will be made available, as the 911 community has learned in recent years). Instead, public-safety representatives and the FCC should continue to pursue funding options that do not rely on federal dollars, while noting areas where federal funding could transform questionable proposals into economically viable plans.