San Mateo County

# EMS CAD System Evaluation & Gap Analysis

Final

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Presented by:

The Altavista Group

## Background

The Altavista Group was retained by San Mateo County to conduct an EMS CAD system evaluation and gap analysis to develop a baseline for the Public Safety Communication's (PSC) current EMS CAD dispatching functionality, and then perform a gap analysis to define those gaps between the PSC's current baseline EMS CAD dispatching system, best practices and user requirements.

The consultants were on-site the week of November 5, 2007 to conduct interviews and Public Safety Answering Point (PSAP) walkthroughs. A project kick-off meeting was conducted on Tuesday, November 6, 2007 with the stakeholders and consultants.

Based on the interviews, supplied documents, site visits and PSAP walkthroughs the consultant created an initial draft report on December 3, 2007. On December 12, 2007 the final report of the current PSAP environment, findings and strategic considerations was delivered. The services provided by The Altavista Group for this project were to augment the County EMS operational and technical staff in gathering and analyzing detailed EMS dispatching requirements prior to the County EMS releasing its comprehensive EMS RFP for tender.

This process will assist the County identify current baseline, EMS CAD requirements, gap analysis, and CAD cost data.

## Approach

In assembling this report, The Altavista Group was on-site November 6, 2007 to conduct a project kick-off and delivery of project planning documents with the San Mateo County project manager. Part of data collection activities while on-site was to conduct interviews and a County PSAP walkthrough was conducted during the week of November 5, 2007. In performing our work, we gathered information regarding the existing EMS CAD system through over 25 interviews with stakeholders in the County. To obtain a comprehensive understanding of the current EMS CAD system, we distributed a survey questionnaire to develop the CAD and related PSAP systems baseline. We led interviews with management, dispatchers and supervisors from the PSAP. A list of personnel interviewed is included in Appendix A. Throughout our assessment, we coordinated our work with the San Mateo County Project Manager (see Appendix B). We also reviewed documentation and budget information submitted to the consultants in order

to gain an understanding of the County's EMS dispatching function and process.

The EMS CAD best practices was conducted by the consultants to ensure EMS dispatching requirements were fully identified and compared against other PSAP CAD best practices. We used the baseline, best practices and user requirements to perform a gap analysis to identify disparity between the current EMS CAD. The consultants utilized cost data from previous RFP's and recent work conducted with other consolidated PSAPs evaluating the procurement of a multi-jurisdictional, multi-agency, multi- disciplinary CAD system to develop CAD replacement cost ranges.

The Altavista Group has prepared this draft report for the County to review and provide feedback. The consultants plan to be on-site at San Mateo County, on Wednesday, December 5, 2007 at 1:30 PM to conduct a verbal presentation of the draft report with San Mateo County and its stakeholders.

For the final report, we will incorporate San Mateo County Project Manager's feedback and comments and redistribute the final document on Monday, December 10, 2007. The consultants plan to be on-site at San Mateo County, on Wednesday, December 12, 2007 at 1:30 PM to conduct its final presentation to the County Executive Committee.

## Current Environment

To properly evaluate the current Computer Aided Dispatch (CAD), it was important to understand the Public Safety Answering Point (PSAP) internal environment and dispatch operations. We also assessed the ability of the current CAD system to support a performance based EMS contract. From our on-site review and best practices we have identified gaps with the current CAD system in regards to EMS technology and functionality. In addition, we describe the existence of systemic issues surrounding the delivery, call handling and dispatch technology that are causing enterprise level issues between the PSAP and EMS field units. Some of these are disguised as CAD issues but are in fact gaps in "business process". We now begin our discussion of the internal PSAP environment.

### Internal PSAP Environment:

To properly evaluate the CAD system at San Mateo, it was important to understand the Communication Center's operational environment. We assessed the ability of the communication center to effectively support EMS dispatch operations, and we also identified the potential impacts of external factors like the physical facility, the radio system, telephony and CAD system interfaces. Summarized below is an overview of the San Mateo

Communications Center, along with individual systems that exist at the Communications Center in order to provide EMS 911 dispatching.

## San Mateo Public Safety Communications Center

San Mateo Public Safety Communications Center (San Mateo PSC) is a consolidated Public Safety Answering Point (PSAP) providing 911 managerial, administrative, and operational functions. As a consolidated center, San Mateo PSC is contracted to provide dispatch for five law enforcement agencies and seventeen fire agencies. Emergency Medical Services (EMS) is provided by both fire and American Medical Response (AMR) and San Mateo PSC provides contracted EMS dispatch activities for these agencies. Being a primary PSAP means the communication center receives the initial E9-1-1 call for service for Sheriff, police, fire and emergency medical service (EMS) under its response area and directly dispatches law enforcement, fire and EMS response services.

This PSAP services a 450 square mile area with a resident population of 707,161. In 2006, PSC received 89,730 Fire/EMS emergency (9-1-1 and 7-digit) calls and 128,548 Fire/EMS non-emergency calls for a total of 218,278 calls. Of the 218,278 total calls PSC dispatched 62,283 calls for fire service and 45,136 calls for EMS service. San Mateo PSC is located in Redwood City operating 24 hours a day, 7 days a week, 365 days a year. The PSAP provides regional consolidated operation for five (5) law enforcement and 17 Fire Departments (Municipal and District) and Emergency Medical Service for the majority of San Mateo County.

San Mateo member agencies are:

<u>For Law Enforcement</u>:

- San Mateo County Sheriff's Office,
- Broadmoor Police District,
- East Palo Alto Police Department,
- Half Moon Bay Police Department, and
- Millbrae Police Department.

<u>For Fire and EMS:</u>

- Belmont San Carlos Fire Department
- Central County Fire
  - Burlingame Fire Department
  - Hillsborough Fire Department
- Coastside Fire District

    - Half Moon Bay Fire / Point Montara Protection District
- Colma Fire Protection District
- Foster City Fire Department
- Millbrae Fire Department
- North County Fire Authority
    - Brisbane Fire Department
    - Daly City Fire Department
    - Pacifica Fire Department
- Redwood City Fire Department
- San Bruno Fire Department
- San Mateo Fire Department
- South San Francisco Fire*
- CDF / County Fire
- Menlo Park Fire District
- Woodside Fire Protection District
- AMR/San Mateo 9-1-1 Paramedic Ambulance

***Note: San Mateo PSC dispatches South San Francisco Fire which is the only "201" agency in the County (i.e., State law related to ambulance exclusive operating areas (EOAs) and "201" rights.**

<u>For Other Agencies:</u>

- Court Administrator
- District Attorney's Office
- Investigations
- County Probation
- County Coroner
- San Mateo County Public Works
- Peninsula Humane Society

The Communications Center has the capability to staff thirteen dispatch consoles with fully functional CAD/radio/telephone equipment. The Computer Aided Dispatch (CAD) system provides multi-disciplinary (police, fire, EMS) call taking and dispatching support. The Fire and EMS dispatchers

are cross-trained to provide Emergency Medical Dispatching (EMD) for taking and categorizing medical aid calls.

San Mateo PSC is funded by the member agencies which provides for its own internal 911 Dispatching, Information Technology (IT) and Administrative staff. San Mateo PSC has implemented a PRC/Northrop Grumman CAD which provides mobile data for law enforcement; mobile status heads in the fire units and uses a Motorola Smartzone Simulcast (482-499MHz) radio system for voice communications between dispatch and field units.

San Mateo PSC minimum staffing levels for Fire and EMS - staffing is 4 personnel (three for Fire and one for EMS). For law enforcement San Mateo PSC staffing is 3 personnel (three dispatchers). Rising up to normal staffing includes an additional half time EMD and a half time call-taker for law. After hours, dispatchers make notifications for various agencies including Public Works, Court Administrator, District Attorney's Office, Investigations, County Probation, County Coroner and the Humane Society. San Mateo PSC continues to recruit and train for dispatch positions.

Currently, San Mateo's PSC Communications staff consist of a Director, three Command Staff (one for Fire, one for EMS, one for Law Enforcement), three SMU operations support staff, one QA supervisor, four shift supervisors and forty-four dispatchers.

The County's Information Services Department (ISD) provides the County's radio and microwave infrastructure. San Mateo PSC Systems Management Unit (SMU) supports the CAD, CAD interfaces, intranet, voice logger, cabling and 911 telephone system (via internal resources and vendor support contracts).

For additional PSAP baseline information please reference Appendix C.

## External PSAP Environment

### Geography and demographics

San Mateo County is one of nine counties that make up the San Francisco Bay Area. It covers most of the San Francisco Peninsula from the northern end of the cities of Daly City and Brisbane, next to San Francisco International Airport down towards Silicon Valley which begins at its southern end. The County is bordered by the Pacific Ocean, San Francisco, San Francisco Bay, Santa Clara and Santa Cruz counties. San Mateo County covers a land area of 741 square miles. It has a long rugged coast line extending to the Santa Cruz County border. The peninsula is longitudinally divided by the coastal mountain range. The climate is generally mild. Rainfall can be heavy in winter months. Dense fog in coastal areas is common year round.

The County has a population of approximately 712,462. The coast side and mountainous zone has a low population density with the exception of the Half Moon Bay area which has a growing population. The rest of the County population density would be characterized as urban/suburban. There are three major freeways within the County. The San Mateo and Dumbarton bridges pose difficult service issues when heavily congested or blocked. There are a number of active earthquake faults in the area. Densely populated areas are on land fill. The area is also at risk for tsunami, mud slide, and wildfire. San Francisco International Airport is one of the busiest airports in the country processing 39 million passengers per year.

**Local Perceptions**

There is obvious entrenchment and suspicion between EMS field units and San Mateo PSC. The performance based contract can at times create attitudes of mistrust between 'for profit' ambulance services and the employees who provide the dispatching and contractual oversight. A 'team' mentality to do what is best for the patient seems to get lost in the day-to-day workings where blame for late ambulance arrivals has a spiral affect. For dispatch it is the concern they may be blamed by EMS personnel and for EMS crews it is their concern that dispatch does not immediately alert the ambulance and instead will dispatch a fire unit. It was reported that recent meetings between the EMS contractor and San Mateo PSC has been productive and management on both sides were working to bridge the gap on dispatch and CAD issues. There is definitely the desire to understand how to better use technology to resolve current conflicts and improve ambulance crew deployments.

**EMS Dispatch Operations**

A major finding and gap with EMS dispatching is the lack of an automated vehicle location (AVL) tool to assist the dispatcher in providing an accurate CAD EMS unit recommendation for deployment. When San Mateo's PSC receives all calls for fire and medical emergencies the dispatcher uses the Medical Priority Dispatch System (MPDS) that prioritizes calls based on highly developed medical protocols. Dispatchers provide callers with medical instructions and assistance prior to arrival of first responders and Advance Life Support (ALS) care. For medical emergencies, the County is broken into five separate response time compliance zones. The County requires its contractors (both fire agencies and AMR) to maintain monthly response time compliance of at least 90% in each of the five zones for both paramedic first response vehicles and emergency ambulances.

Upon verification of a Fire/Medical call, the initial call taker will simultaneously transfer the caller to both fire dispatch operator and EMS operator. The fire dispatcher will dispatch the appropriate first response, and EMS dispatcher will dispatch for an AMR ambulance. The consultants

observed, while the caller information is distributed simultaneously the unit dispatch are staggered, fire first and then EMS. The EMS dispatcher is allowed to continue with EMD call taking process. If necessary, the PSAP will divert an ambulance from a Priority 3 call to a Priority 1 call. Ambulance Company dispatches its own inter-facility calls. Please reference **Appendix D** for call taking and EMS dispatching workflow.

While the call is being processed in the CAD system, the CAD recommends an EMS unit based on a straight line distance between the incident and the closest unit ("as the crow flies"), with escalation on the extent of the incident to recommend additional units to an event. So while the dispatcher relies on the CAD system information to determine the proper unit recommendation, the CAD system will only be as accurate as the manual (voice radio) update it receives from the field unit. The EMS ambulance can be mobile (in motion or zone posted at a physical location). Since the system only allows the EMS unit to provide status updates via voice radio, this means the ambulance unit is reliant on the dispatcher to provide the manual update into the CAD system. Currently, there is no tool in use (e.g., such as AVL) which provides an accurate method for a dispatcher to determine the actual location of an EMS unit in real-time.

Since there is no current automated tool in use to guarantee an updated status for EMS units (i.e., place the ambulance on-scene, at the hospital, etc.,) this has lead to undue friction between the PSAP and EMS units. Everyone is doing their job, but like any manual process it will be prone to human error and can be inconsistent based on workload and local expertise of the dispatcher about terrain, traffic and environmental conditions. This places a burden on the dispatcher to "supervise" the EMS unit while making the EMS crew defensive. This occurs because the EMS crew hears the CAD recommendation and views the CAD recommendations as incorrect since the crew knows their physical location which may not be the closet ambulance to the incident. The recommendation becomes a decision the EMS supervisor has little control over and directly impacts their EMS resources to meet the County's EMS performance contract.

## Best Practices

In conducting best practices research into performance based EMS CAD system the consultants requested and reviewed data on local and national public safety answer points (PSAP) dispatching systems. We reviewed and assembled CAD requirements regarding dispatching, interfaces, reporting and integration requirements.

We also documented requirements gained from our dispatch focus group meeting. To obtain a comprehensive understanding of EMS CAD needs and identify areas for improvement, we conducted site visits, walkthroughs and interviews with AMR and San Mateo PSC. We also conducted conference calls and received information and data as requested from other agencies to assemble best practices for EMS performance based CAD systems. In addition, we reviewed State of California's "Emergency Medical Services System Quality Improvement Program Model Guidelines" and "Emergency Medical Services Data System Standards".

The best practices uncovered that a performance based CAD system is more dependent upon the contractual terms and conditions negotiated by the EMS authority and the EMS contractor than any unique CAD or technological requirements. For example, performance based contracting requires oversight and continuous monitoring of performance to ensure that the level of clinical skills, response time performance, costs and other contractual objectives are met.

Therefore, the CAD requirements focus more on managing the exclusive operating areas to manage the Contractor's penalties for performance below contract specifications. It is important that the CAD system provide the local EMS contractor System Status Plans and in real time make changes to spontaneously impact unit deployment.

Some other CAD requirements identified were:

## EMS CAD Requirements

### CAD –Operational Requirements

- **Multi-Agency** – The CAD system must be capable of handling multiple agencies regardless of the size of the agency, the technology available to them or their status as paid or volunteer.
- **Multi-Jurisdictional** – The system shall be capable of handling a jurisdiction of any size and accommodate different business rules for the same call types and needs for each separate jurisdiction.
- **Multi-Disciplinary** – DISPATCH operations define a clear need for the system to be multi disciplinary. The same CAD system should be able to handle all of the major disciplines – Law, Fire and EMS as well as various peripheral disciplines such as public works and the prosecutor's office. Requirements for Law and Fire are different and careful consideration must be given to any new system to assure each receive the best possible solution.
- **Geofile** – The Geofile must be Latitude/Longitude based and a true GIS system, not a flat file.

- **Ability to Accept Data** – The system should have the ability to accept "uploads" or data from other sources in an electronic format for entry into and use with the system. For example, it should be able to accept pre fire plans, business contacts, noted hazards, etc.
- **Web Based Viewing** – Any new system must be able to support web based viewing. This functionality should have multiple security levels and be able to accommodate all users from agencies CEOs to the public.
- **System Status Management – Dynamic Deployment**
- **Post-to-Post Moves**
- **Prescheduled & non-emergent Transports**

**CAD – Interfaces**

- **Mobile** – The CAD system will need to interface with Law, Fire and EMS mobiles and possibly different mobile vendors for the same discipline.
- **Paging/Toning** – The system must be capable of activating fire alert tones, pagers, text messages and pagers. This capability should be automatic when the "Dispatch" command is given and not require a separate action by the dispatcher.
- **E9-1-1/ANI/ALI** – The system must be able to populate a call taking mask with data from the E9-1-1 system. This includes the telephone number, the location (even if received in lat/long), the name and any other pertinent information.
- **VoIP** – Voice over Internet Protocol is a rapidly emerging technology. Any new system must be able to accept 9-1-1 information received in this format.
- **Phase II Wireless** – It is vital the new system be immediately compatible with Phase II Wireless requirements and able to display the data in a call takers mask.
- **Pro QA** – The Emergency Medical Dispatch protocol. It is important that any system chosen have the option of incorporating the Pro QA questions into the CAD system. Additionally, quality assurance application (AQUA) are also considered best practices to implement.
- **CAD to CAD Interface** – It is desirable that the new system be able to interface with other CAD systems at other agencies.
- **AVL** – Accurate and real time AVL is another desirable interface. The system should also display best routes for the quickest response. It should also display directionals for the roads.

- **Radio Panic Button** – The CAD system should interface with the radio in a way to allow for the use of a radio panic button and a display on the CAD screen indicating which unit is assigned that radio and the units last known location.

**Mobile Operational Requirements**

- **Hardware** – The laptops used in the vehicles, must be hardened laptops with integrated communications solutions.
- **Communication Method** – Transaction speed is a priority; therefore, the new system should have a broadband solution with adequate bandwidth.
- **Silent Dispatching** – The mobile environment should support "silent dispatching" for those agencies who would like to use it.
- **Internet Access** – First responders should have internet access in their vehicles with the new system.
- **Voice Recognition** – Voice recognition would be a big advantage on the new system and allow crews to keep their hands free from the keyboard.
- **Data Standards** – There should be data standards, particularly in regards to the CAD database (normalized) and Mapping/GIS. The Master Street Address Guide (MSAG), Centerline data and ALI data should be verified for accuracy as the County moves to implement a mapping solution. GIS and NENA data standards will need to be adopted to ensure coordinate and address information is updated and correct.
- **Ease of Use** – The system must be user friendly, easy to learn and very fast.
- **Redundancy** – The new system must be dependable and function the majority of the time. In addition, users should be able to work off line when the system is down. There should be mechanisms in place to assure no data is lost if communications is lost.
- **Data Entry** – Data entry on the new system must be easy and each piece of data should only need to be entered once and duplicated by the system as necessary.
- **Ability to Accept Data** – The system should have the ability to accept "uploads" or data from other sources in an electronic format for entry into and use with the system.
- **Report Transfer** – The new system should have the ability to transfer reports from the vehicle (wireless or RF bandwidth). Negating the need to return to a specific location and physically dock the laptop.
- **Agency Specific** - Any mobile solution must be equally effective for both Law, Fire & EMS users.

- **Messaging** – Unit to Unit messaging.

**Mobile Interfaces**

- **AVL** - Accurate and real time AVL is as desirable in the vehicle as it is in the comm. center and is a requested interface. The system should also display best routes for the quickest response. It should also display directional's for the roads. Integrated digital video is also a requested interface with any new mobile solution.
- **GIS/Mapping** – The new mobile solution should interface with the GIS/Mapping system to provide timely, accurate information to officers on the street.

**MIS Requirements**

- **Standard Reports** – The system(s) must have an extensive library of standard or canned reports that can be requested by each agency without an impact on the center. These reports must be detailed, easy to read and available in an electronic format.
- **Crystal Reports** – The system(s) must interface with Crystal Reports and be able to provide the data for already designed reports that are currently in use.
- **Data Mining** – The new system(s) must have improved data mining and retrieval capabilities when compared to the old system. It must have flexible methods of data mining to accommodate different agency and jurisdiction needs.
- **Locations** – Locations across systems should be validated so like data in one system can be matched up with like data in another.
- **Data Validation** – The new system should contain a mechanism for data validation to assure accurate and complete data.
- **Combined Calls** – The ability to accurately capture and separate individual agency and/or jurisdiction data on combined calls is an important aspect of the system.
- **User Configurable Reports –** Any system must allow for user configurable reports on the fly.
- **Before & After Analysis – Deployed Unit Hours, Effective Unit Hours, Incidents, Post Moves**
- **Real Time Analysis**
- **Fractile Analysis**

- **Resource Allocation**
- **Patient Billing –** CAD interface

## Gap Analysis

Summarized below is an overview of the current EMS operational and EMS technological gaps based on our review and assessment of EMS PSAP operations and the current computer aided dispatch EMS functionality. We divided the gap analysis into the following categories:

- EMS Call-taking/Dispatching
- EMS CAD Functionality
- EMS CAD Interfaces
- EMS CAD Reports
- Out-of-Scope (with this report, but documented as part of our findings)

### EMS Call-taking/Dispatching

- **Over Reliance On Voice Radio Communication** – Ambulance crews are provided alpha numeric paging and an audio tone signal when the crew is dispatched from CAD system and for post moves. This only provides one-way communication, so the primary two-way communications between dispatch and the Ambulance crews require verbal radio communications. Current best practices for PSAPs are voiceless dispatching where technology is deployed such as a mobile data interface to CAD to reduce the need for voice radio transmissions. This would also allow the crews the ability to provide automatic status updates to the CAD system, text message dispatch and view map and location data.

### EMS CAD Functionality

- **No CAD Integration with Mapping/GIS** – The GEOFILE in the current CAD is not integrated with the county GIS system and cannot take advantage of county assembled data. In fact, there are no real-time mapping capabilities of any kind integrated with the current CAD system. The flat file, XY coordinate GEOFILE native to the CAD system does not lend itself to integration with layered mapping systems such as ESRI which is the government mapping standard used today. It is problematical to place a map layer over a flat file which will make it more difficult to use information already captured by the county's GIS division.

This lack of integration can also negatively impact the interaction with any future AVL system. We understand with the purchase of the new 911 phone system from Positron, that San Mateo PSC will also be purchasing the Positron mapping solution. At the time of this report it is not clear the extent of integration between the CAD system and the proposed mapping solution.

- **Additional Restricted CAD Functional Capabilities –**
  - **Limited Unit Recommendation** – users reported limited capability in defining unit recommendation. The first problem mentioned was the immediate placement of a unit at the location when it is actually only enroute. This makes it impossible for dispatchers to know if a unit is actually at the location displayed on the status screen or merely traveling between the two locations. The second problem is the lack of consideration for routing and geography when CAD makes recommendations. As a result, while the unit recommended may be the closest unit in a straight line (as the crow flies), it may not be the unit in position to make the fastest response.
  - **No Live (real-time) CAD Access** - Field users report they do not have adequate access to live CAD information. PCS staff stated reservations about allowing this access due to past issues with use of the data when it was available. In addition to access to active calls, users mentioned the desire to have access to the CAD "INFO" tool. EMS users reported a definite need for access to real time CAD data so they can effectively deploy their assets to meet citizen needs as well as the performance measures set by the county.
  - **Live (real-time) CAD Access –** AMR field users report they do not have adequate access to live CAD information. PCS staff stated AMR Field Supervisors and some of the JPA Coordinators have live CAD in their vehicles. AMR requires access to active calls, users mentioned the desire to have access to the CAD "INFO" tool. EMS users reported a definite need for access to real time CAD data so they can effectively deploy their assets to meet citizen needs as well as the performance measures set by the county. PCS reported that AMR has access to a couple of live CAD terminals at their offices and could be provided additional workstations but would have to purchase additional CAD licenses to accomplish this.
  - **Status Timer -** The CAD has the ability to display a timer in minutes and seconds during each status change and is displayed on the CAD monitor. The timer changes color (reverse red) to indicate to the dispatcher that the allotted time for the particular status change has been reached. It would assist the dispatchers to know how long a unit has been enroute to a location and which unit has been idle the

longest without a call. We understand this functionality has not been requested by AMR, but the CAD system could provide such timer data.

- **Inter-agency Systems Training and Coordination** – Many of those interviewed appeared to be unaware of existing capabilities or unclear about how to access CAD information. Several indicated better training for AMR staff about the CAD as well as a simple, easy to use manual for field users and a complete data dictionary for data users would be helpful. There also appeared to be some confusion about which agency's IT staff to call if there is a question or problem. Many also were hesitant about requesting help with CAD functions. Improved training and coordination could help AMR in their quest to better define the specific reports they are lacking and would like to have developed.
- **Mass Casualty Incident (MCI) Response** – Users expressed concern about CAD's ability to handle an MCI response effectively especially when coupled with the need to continue regular EMS service in the county during the event.
- **EMS/Fire Separation** – Concern was expressed that fire and EMS units on the same call do not display on each others' status screens. There is no single display that will list all units on a call, dispatchers must look at each call separately and field units may not be able to visually view the information.
- **MIS Time Stamp** – It was reported the time stamp used by the CAD report documents up to the nearest minute. This makes it difficult to accurately assess any time interval from these output reports because each status change can be off by up to 59 seconds. We understand from PSC this time stamp (view) can changed so viewing the seconds can be the default time stamp.
- **Limited Screen Space** – Limited screen real estate requires the Emergency Medical Protocol (EMD) software (pop up window) to appear over the call data forcing dispatchers to toggle between the two screens while working. In addition, dispatchers sometimes choose to view only partial information in order to save screen space.

**EMS CAD Interfaces**

- **Mobile Data Interface** – While there are Mobile Data Terminals or Mobile Status Terminals deployed in some police and fire vehicles, neither are available in EMS vehicles. Deployment of mobile units (status terminals, data terminals or ideally mobile computers) would alleviate some of the voice congestion on the EMS radio channel. It would also clear up some ambiguity around EMS unit status changes by allowing responders to change their status from their vehicle. Depending upon the model deployed, they could have access to premise history, call

narratives, info files and other vital CAD data that would enhance their response. There is also the possibility of CAD messaging between dispatch and the field units as well as between units themselves. Depending upon the mapping solution and its integration with CAD, maps and routing could also be displayed on these units.

- **Automatic Vehicle Location (AVL)** – CAD does not have an AVL component. The major advantages for procuring a new AVL system would be the integration with CAD to improve the coordination of incidents and unit locations. AVL can also reduce the voice radio traffic by providing voiceless unit status and visual location information now performed over voice radio. AVL can enhance the CAD system status plan by determining if units are properly or improperly placed, and allow the agencies to modify and improve the plan as needed. AVL can also improve dispatch efficiency by enhancing CAD's ability to generate nearest unit recommendations.
- **Voice Logger** - Voice Logging equipment records all telephone and radio conversations to be archived. These conversations can be used in a Court of Law as evidence. Currently dispatchers cannot play back an audio recording off the radio frequency at the dispatch console. We understand San Mateo PSC is going to be replacing the current voice logging equipment. PSC has informed the consultants that the Viper telephone system will provide integrated phone and radio instant call record at the dispatch console and not the voice logger.
- **CAD to CAD interface** – Some users felt it would be useful if the Northrop Grumman CAD had an interface to the CAD systems used at the other primary PSAPs.

**EMS CAD Reports**

- **Reporting Capabilities** – Users reported issues in retrieving information from the CAD database. The current CAD system was upgraded replacing the MIS database from Oracle to Microsoft SQL. This should now improve data transfers to MEDS from the prior 30-day archive. PSC reports that data transfer to MEDS will now occur at unit dispatch, at hospital, and close of incident. A contributing factor of limited EMS reports is that AMR may not have been unable to clearly define report parameters to the level needed by PSC IT staff. Due to the nature of a CAD system where a large portion of the information is entered free form in the narrative, it is important that end users have data mining options that connect with the narrative. It was reported to the consultants that as of November 19, 2007 AMR now has access to information contained in the narrative via web query.

- **Need Ad Hoc Reports in a Usable Format** – Users requested the ability to build their own reports from data elements as needed. Users stated it is important these reports be exportable to Excel, ACCESS, SPSS, SAS or some other format where they can manipulate the data and join it to tables and databases from other sources. We understand with the recent CAD upgrade that users will be able to generate output reports using a report writer tool (Crystal Reports)
- **No Graphical User Interface (GUI)** - The current CAD provides a command line driven structure which is difficult to use. Those users unfamiliar with the system complained the screens are not intuitive. Users have difficulty both using the system and understanding the print outs. According to PSC SMU staff, the CAD has been recently upgraded to include the option to deploy a GUI interface. This software upgrade is still in testing at the IT level. We were not able to determine if a formal written plan or timeline for deployment has been developed for distribution.
- **Report Generation is Time Consuming** – MIS reports run slowly and must often be run over night for use the next day. We are aware that San Mateo PSC has upgraded the CAD system and replaced the MIS with its own report database. This should improve report generation and data export capabilities.
- **Dynamic Web Access to CAD Reports –** Many users told us this would help them manage their resources, remain aware of what was happening in the field and facilitate their understanding of the EMS system as a whole. Supervisors and managers who could follow the EMS calls would better be able to anticipate staffing needs based on the number and severity of the calls visible on a web site. On coming staff could avail themselves of the information to better prepare for work. Finally, it would alleviate some of the dispatch workload because administrative personnel, supervisors and other staff members could look up historical data without having to bother the dispatchers or those few staff members with remote access to the live CAD system. The overall result is better informed, better prepared field staff that does not have to rely on PSC for their information. We understand from PSC that there is a tool "Web Monitor" to provide CAD data. That feature was enabled and then disabled to AMR field units. The Web monitor has been re-activated and we have been informed is being used by the AMR Managers.

## Out-of-Scope

As part of this report, additional items were brought to the consultant's attention which are considered out-of-scope. These items are documented and presented to

San Mateo County so the agency is made aware of the participants' feedback and can determine a course of action. The following is a list of these findings:

- **Heavy Reliance On One Individual For CAD System** – Although there are three resources assigned to the PSC SMU division and all are familiar with the CAD system, the majority of the agency specific CAD knowledge is vested in one individual. Even detailed documentation of program changes as they occur does not alleviate this concern for a high availability, mission-critical CAD system.
- **Project Plans and Change Management Procedures** – It appears there is no formal project plan or user involved prioritization of the CAD "to do" list. In addition, if the EMS contractor has a change procedure for EMS deployment or system status plan updates, the deployment of the plan can be difficult. A formal change management plan between PSC and the EMS contractor is necessary to effectively plan for reconfigurations or updates to the CAD system so necessary and requested changes are provided to all resources and employees.
- **PSAP Facility** – The 911 dispatch work area has poor lighting levels, lacks a good HVAC system and proper acoustical treatments. Due to the nature of the building the general office and management offices experience poor indoor and environmental quality lighting (e.g., no windows, natural light or skylights exists) and poor HVAC throughout the building. Separate fans and heaters are used throughout the offices and in the dispatch area. There should be separate air filtration and venting for emergency communications facilities. The National Fire Protection Association (NFPA) 1221 Standard for the Installation, Maintenance, and Use of Emergency Services Communication Systems is an essential resource for planning and operating public safety facilities and communication systems. One of the more significant changes in the NFPA 1221 Standard is that call centers no longer have to be built below grade. While below grade facilities do offer optimal physical protection, they have the disadvantages of lack of natural lighting, limited equipment access, exposure to heavy gases such as carbon dioxide, and vulnerability to flooding.
- **Ergonomics** – in mission-critical environments, employees cannot walk away from their workstations with great frequency. The use of ergonomically efficient workstations that accommodate various body types and work styles which allow for standing, stretching, and moving around should be considered. The primary benefits of working in a durable yet functional environment include: relieving the strain on existing employees and reducing the time spent by administrators coping with staffing shortages and training new employees. Current work consoles do adjust but were reported that because the consoles require manual adjustments are rarely used. Newer consoles allow both the

keyboard and monitor surface to have their own lifting columns which are adjusted by power controls.

- **Patient Information** – County and AMR users discussed the requirement to track patients from initial CAD call to the end of patient care. This requirement would require more comprehensive cross referencing between the Fire and EMS responses and interactions with the patient. They would prefer a single patient identifier within the CAD incident. A Patient Information System (PIS) would require a major redesign effort of the current CAD product. The business users would like to have a means to be provided information from CAD incident through patient discharge from the hospital.
- **Customer Premise Equipment (CPE)** - the County is in the process of replacing the current 911 telephone system with a Positron VIPER system. Besides receiving new phone equipment and features, this will allow the utilization of the State's "Format 04" which allows the PSAP to receive the new format for ANI/ALI required for handling wireless 911 calls. Management should review the IT plan to determine adequate support and maintenance of the new CPE system. 911 CPE equipment replacement is typically funded by the State so costs should be preapproved by the State's 911 Office.
- **EMS Quality Assurance** - during call center peaks when the PSAP has its busy call period, EMD may be suspended for a period of time. This raises a quality management issue with EMD compliance and accreditation. Also, while quality assurance can be done using 'manual' processes for capturing and analyzing the EMD data, the use of tools from Medical Priority Dispatch (e.g., AQUA) which provides quality management analytics (turning raw data into meaningful EMD performance) should not be overlooked. In addition, the CAD is not currently capable of validating unit times with location data to provide reliable quality assurance reports for EMS compliance. There needs to be some type of reliable playback of a contested incident so the parties can mutually agree to late emergency ambulance responses.

## Replacement CAD System Cost Data & Assumptions

Due to the short timeframe to complete this project The Altavista Group utilized cost data from previous RFP's and recent work conducted with other consolidated PSAPs evaluating the procurement of a multi-jurisdictional, multi-agency, multi-disciplinary CAD system. The following cost assumptions and ranges are presented:

### COST ASSUMPTIONS

The following assumptions and configurations were used to develop a standard for costing purposes:

- 15 CAD positions
- Required hardware and network systems in support of the vendors solution
- Full Turn-Key Implementation and Support Services
- Complete list of potential interfaces
- Backup, redundancy and fault tolerant solutions

The cost range includes any vendor system software required to support in running its application software. This includes, for example, network operating system and report writing software.

### INITIAL ONE-TIME COSTS

Based on CAD vendor responses an initial one-time cost estimates for a CAD System ranged from $566,508 to $4,244,546 with an average cost of $1,656,944.

| | Low | High | Average |
|---|---|---|---|
| **Hardware** | $33,990 | $246,816 | $103,880 |
| **Network** | $5,120 | $8,000 | $6,560 |
| **CAD Application** | $88,400 | $388,750 | $175,608 |
| **3rd Party Software** | $4,475 | $843,014 | $126,923 |
| **Implementation Services** | $172,600 | $1,622,748 | $595,475 |
| **Interfaces** | $145,500 | $791,000 | $400,466 |
| **Annual Maintenance Fee** | $116,423 | $344,218 | $248,032 |

Next, we conducted a review of the initial one-time cost by segregating costs into seven (7) cost segments, these are – hardware, network, CAD, 3rd party software, implementation services, interfaces and annual maintenance fee. Each segment is explained below:

- **Hardware** – represents any hardware required to operate the proposed vendor application.

**Note**: All vendors proposed implementing Microsoft platform for both workstations and servers. For workstations the Windows XP Professional operating system was preferred and for the servers the vendors varied from Windows 2000 server edition to Windows 2003 server enterprise edition.

- **Network** – represents any cabling, switching, and accessories required to operate the proposed vendor application.
- **CAD Application** – represents the Computer Aided Dispatch application; both server and workstation licenses.
- **3rd Party Software** – represents any 3rd party software required as part of implementation to fully operate the vendor applications.
- **Implementation Services** – represents all support services required to implement vendor's application and provide adequate user training to operate the application. Service offerings include project management, implementation, business analyst, technical analyst, network engineer, GIS, conversion and trainer. Each vendor varies in its implementation model, ranging from hands-off (out of the box approach) to hands-on; full implementation of support services and costs directly reflecting the vendors' involvement.
- **Interfaces** – represents all 3rd party related applications that interface to CAD, RMS and Mobile.
- **Annual Maintenance Fee** – represents the first full year of license and support fees. The recurring cost includes vendor software license fees, 3rd party software license fees, hardware license fees and software support services.

#### CONTINGENCY COST ASSUMPTION

In addition to the initial cost estimates, we included an adjustment to these cost estimates to account for unforeseen costs in procuring products and services. This is done by including a contingency. The contingency cost is calculated by totaling initial software, hardware and services, and then multiplying the total sum by eighteen (18) percent.

#### POTENTIAL HIDDEN COSTS & ASSUMPTIONS

It is important to note that the cost estimates do not reflect Interface Development, Integration Services, and Professional Services. As a rule of thumb the following ranges should be considered for each of the four areas listed below to properly identify all the costs that could impact San Mateo:

- **Interface Development** – Based on the requirements and product compatibility of the disparate systems the cost per interface could range from little as $225 to $94,900.
- **Integration Services** – In order to optimize Commercial Off-The-Shelf (COTS) solutions within an organization a certain level of integration activities are

typically required. The level of integration will vary according to the business workflow and applications procured for the organization, which will impact the overall cost and project duration. For costing purposes a good rule of thumb in estimating the cost of integration should be calculated from 50 percent to 60 percent of the initial one-time cost estimates. This percentage can be calculated at a lower percentage if San Mateo actually procures an integrated enterprise solution from a Tier-1 CAD vendor.

- **Contractual Terms and Conditions** – In a potential procurement of this size and complexity the agency will typically issue an RFP with its stated terms and condition (T's & C's). These terms and conditions will require various contractual and financial commitments to the vendor and San Mateo. These include providing bid bonds, performance bonds, holdbacks and/or liquidated damages. Depending on the contractual requirements of the final terms and conditions the overall project costs to the vendor and San Mateo can be impacted.
- **Professional Services** – Aside from the vendor's project management costs associated with implementation services, San Mateo may choose to consider the use of an independent Quality Management (QM) service to assist the agency with the development of specifications, selection of contractors, contract negotiations and project oversight. A good rule of thumb in developing the cost estimates for Quality Management services for a project of this nature is to use a factor of 1,040 hours (part-time over an estimated eight month period), with an hourly rate ranging from $125 to $175 with an average rate of $150 per hour.

#### ADJUSTED INITIAL COST ESTIMATE WITH PROPOSED INTERFACE COSTS

The table below shows the cost range for CAD from a low of $647,523 to a high of $4,946,605, with an average cost of $1,892,837. This includes contingency and annual maintenance costs.

| | Low | High | Average |
|---|---|---|---|
| **Hardware, Software & Services** | $450,085 | $3,900,328 | **$1,408,912** |
| **Annual Maintenance Fee** | $116,423 | $344,218 | **$230,321** |
| **Contingency Cost (18%)** | $81,015 | $702,059 | **$253,604** |
| **Adjusted One-Time Cost** | **$647,523** | **$4,946,605** | **$1,892,837** |

# Recommendations

The recommendations contained in this report are intended to provide for enhanced public safety systems for San Mateo EMS stakeholders, including San Mateo PSC, while improving EMS CAD access to real-time data. The recommendations presented by The Altavista Group are critical for San Mateo County to improve EMS monitoring, compliance, and EMS quality assurance while planning for its future.

Furthermore, because the current CAD system is a "custom" system and it provides dispatching functionality for law enforcement, fire, EMS and other public safety disciplines, implementing the recommendations will be a long and arduous undertaking. The first step in adopting the recommendations will require stakeholder buy-in, planning, funding, resources, training and time. Because this Communications' project involves multiple stakeholders, there will be different views for replacing and providing new systems and technology. It is always people who make the project work. If the people are not committed to the project, to getting the right things done and working together, no amount of new technology can make the project succeed. Therefore, at this juncture proposing the replacement of the current CAD system would not be prudent. This would only be detrimental to the County and create friction among the public safety agencies.

The purpose of our recommendations is to provide a phased approach to enable San Mateo County the greatest opportunity for success while leveraging its internal and member agencies resources (physical, monetary and technical infrastructure).

Our recommendations are presented in two phases. Phase I describes those high priority systems which require immediate upgrading to the existing CAD system. It is estimated the systems can be implemented within six to twelve months. Based on the outcome of Phase I tasks, then Phase II projects are focused on adopting new PSAP governance and assembling an oversight Board to undertake a strategic planning process on future public safety technology direction.

### PHASE I RECOMMENDATIONS – HIGH PRIORITY SYSTEMS REQUIRING IMMEDIATE UPGRADE

Computer Aided Dispatch (CAD) not only supports the PSAPs mission-critical function, it also serves as the communications hub for all of the other public safety systems. The existing CAD system will need to be enhanced and interfaced with the following new technologies:

- **Mobile Data** - An interface with CAD is essential to allow two way communications with dispatch and EMS crews
- **GPS/AVL** - This will allow the location of EMS ambulances to be tracked on computer maps in the dispatch center
- **Mapping** - The CAD should be capable of interfacing with an AVL system to display unit locations on real-time electronic maps. Our understanding

is that the County is currently in the process of providing a mapping solution through the Positron VIPER Customer Premise Equipment (CPE) procurement

- **Central Premise Equipment** – Our understanding is the County is working with Positron to install the VIPER CPE equipment
- **Digital Voice Logger** – A new voice logger should interface with the radio and telephone audio. New system have the ability for quick and easy retrieval of communications audio from each dispatch console
- **Relational Database** – In order to provide real-time data the CAD system will need to upgrade from ISAM to a relational database. Users will continue to demand more access to live CAD data and the industry is moving toward web and real-time data analysis.

### PHASE II RECOMMENDATIONS – LONG RANGE PLANNING AND PSAP GOVERNANCE

- **Develop PSAP Oversight and Governance** - Given the current level of automation and internal support requirements, County PSC is overly reliant on individual SMU support staff. The unavailability or departure of the current SMU programmer, for any reason, would leave a critical void in support, maintenance, training, reporting, and various other areas.

  It would be prudent for the County to create a PSAP oversight and governance structure where the participating public safety agencies (law enforcement, fire, EMS) would become more involved in the delivery of PSAP services, including CAD, AVL, Mobil, etc. This Oversight Board should consist of San Mateo PSC member agencies.

  The committee would assist in providing the following:

  - Participate in the technology procurement and selection process
  - Assist with deploying selected solutions and products
  - Have the Communications Director report to the Board on PSAP tasks, progress and performance

- **Develop Strategy To Bridge The Digital Divide With EMS and Other Public Safety Disciplines** - Current law enforcement, fire and EMS systems are not fully integrated with the CAD system which will limit the software applications from seamlessly sharing data. Users require the ability to analyze data in real-time and generate ad-hoc reports. The County and the participating agencies need to agree to fund and support service level agreement which:

  - Promotes distribution of IT resources and solutions across all agencies to eliminate the digital divide between disciplines

(law enforcement / Fire, EMS), thus ensuring the ability to share information and guaranteeing the quality of the information

- Promote technology interoperability among information technology systems

- **Determine Long Range Plan Of Current CAD System Meeting Performance Based EMS Contract** – if the current CAD is not able to utilize a relational database, then the County will have to develop a plan to eventually replace the current CAD system. Strategic plans usually look out five years into the future to assist organizations develop the building blocks and associated costs for the replacement of technology systems. It will take the county extensive planning and coordination to replace the current CAD system and this process should not be delayed.
- **Define Business Process Re-engineering For Any Proposed Changes** – Agencies going from a custom system to a Commercial-off-the-Shelf (COTS) solution will need to understand the impact change will have on the organization. COTS solutions are not necessarily less expensive if the organization cannot absorb the change in moving toward a COTS application.

# Appendices

Appendix A: List Of Interviewees

Appendix B: Project Team Members For This Study

Appendix C: Survey Questionnaire

Appendix D: Calltaker & EMS Dispatcher Work-Flow

## Appendix A: List of Interviewees

Interviewees:

**AMR – November 6, 2007**

Jennifer Arkoosh
Mark Spangler

**Fire JPA – November 6, 2007**

Armando Muela
Larry Olson

**San Mateo County IT – November 6, 2007**

Chris Flatmoe
Leon Rich

**San Mateo County Radio – November 6, 2007**

Steve Dupre

**San Mateo Public Safety Communications – November 6, 2007**

Jaime Young

**San Mateo County Manager's Office – November 6, 2007**

David Boesch
Peggy Jensen

**San Mateo EMS – November 6, 2007**

Barbara Pletz

**San Mateo EMS – November 7, 2007**

Jan Ogar

**AMR – November 7, 2007**

Yolanda Musquez
Mike Marsh
Tom Wagner

**EMS Coordinator – November 7, 2007**

Emil Picchi
Matt Powers
Jamie Norton

**San Mateo Public Safety Communications – November 7, 2007**

Sue Anderson
Patty Jewett
Jackie Pace
Dave Whisman
Don Maynard

**San Mateo Public Safety Communications – November 8, 2007**

Robert Bustichi
Lisa Lucett
Brian Sasaki

**San Mateo EMS – November 8, 2007**

Michael Leach

## Appendix B: Project Team Members

| | |
|---|---|
| **Project Sponsor:** | San Mateo County |
| **Project Managers:** | Barbara Pletz & Peggy Jensen |
| **Consultants:** | Robert Negrete |
| | Hank Kim |
| | Lorri Ericson |
| | Martin Jones |

## Appendix C: Survey Questionnaire

| | |
|---|---|
| **PSAP Name:** | San Mateo Public Safety Communications |
| **PSAP Address:** | 400 County Center-PSC100 |
| | Redwood City, CA 94063 |
| **Contact:** | Sue Anderson |

sma@smc911dispatch.org

650-363-4900 (Office)

650-366-5773 (FAX)

**Agencies and Departments Served:**

AMR, SMCO Sheriff's Office, Half Moon bay Police, Broadmoor Police, East Palo Alto Police Millbrae Police and all of the Fire Departments in SMCO (not enough room to list them all. Several On-Call Agencies

| **Service Area** | **PSAP Response** | |
|---|---|---|
| | Current Level | Projected Growth - 2008 through 2012 |
| Population Served | 707,161 | 775,900 in 2015 |
| Area Served (Sq. Miles) | 450 sq miles | |
| Number of Agencies Served | 5 Law, EMS Dispatch, | |
| | 14 Fire, several on-call agencies | |
| **Communications Facility** | **PSAP Response** | |
| | Current Level | Projected Growth - 2008 through 2012 |
| Current PSAP Budget (Dispatch Only) | 8,244,429 | |
| Annual Operating Budget | 8,244,429 | |
| Approved Capital Expenditures (CAD,MDT,Interfaces) | depends on the year | 06-07 390,00 for Wireless 911 |
| Number of Employees | 57 | |
| | | |
| Facility Age | 50 years | |
| Dispatch Center Size (sq ft) | 1100 sq feet | |
| Structural/Environmental Issues | unhealthy basement environment in aging building | |
| Planned Facility Upgrades | zero | |
| Planned Upgrades Reflected in Budget (Yes or No) | depends on the year | |
| **Please provide copies of any documents containing plans to consolidate and/or Interagency Contracts** | | |

| Workload | PSAP Response |
|---|---|
| | **2006** |
| Total annual call volume | |
| Emergency call volume (9-1-1) | Fire/EMS only 29,440 |
| Number of 9-1-1 Hang-ups & Incident Overflow Calls (multiple calls for one incident) | 5,727 |
| Emergency call volume (7-digit) | Fire/EMS only 54,563 |
| Field initiated call volume | |
| Non-emergency call volume (9-1-1 & 7-digit) | Fire/EMS only 128,548 |
| Wireless call volume | n/a |
| Total annual dispatched call volume | 270,838 |
| Dispatched calls for law enforcement | 157,513 |
| Dispatched calls for fire service | 62,283 |
| Dispatched calls for emergency medical service | 45,136 |
| Dispatched calls for "other" local govt agencies | 5906 |
| How many annual dispatched calls are mutual aids? | 14,683 |
| Total annual call transfers | |
| Fire transfers | unknown |
| Law enforcement transfers | unknown |
| Emergency medical transfers | unknown |
| Peak # of dispatches per hour | 2,419 (1300 hours) |
| Peak # of dispatches per day | 6,555 (Saturday) |
| Peak # of calls for service per hour | 2,482 (1300 hours) |
| Peak # of calls for service per day | 6,712 (Saturday) |
| Average answering time for emergency call | Fire/EMS 3.25 Sec |
| Average processing time for emergency call (Call answer to dispatch) | EMS 40 seconds |
| Average processing time for emergency call (Call dispatched to unit) | EMS 14 seconds |
| Average incident response time (Call dispatch to en-route) | EMS 51Sec |
| Average incident response time (Call dispatch to on-scene) | EMS 9 minutes 4 sec |

| | |
|---|---|
| Average incident response time (Transport) | EMS<br>26 minutes 1 sec |
| Other requests (reports, call information, etc.) | |

| **9-1-1 and Telephone Systems** | **PSAP Response** | |
|---|---|---|
| | **Type** | **Number/Quantity** |
| 9-1-1 Lines | CAMA | 25 |
| Incoming DID Trunks | | None |
| Outgoing Trunks | | 10 |
| Incoming CO Trunks | | 88 |
| Tie Trunks | | None |
| Station Ports | | 14 |
| Recorded Announcement | | N/A |
| Paging Ports | | N/A |
| Voice Mail | | Provided by County Telephone Services |
| Positions Equipped for 9-1-1 Call Answering | | 14 |
| Remote Site Lines/Circuits (Fire Halls, Detachments, Training sites) | | None |
| Data Circuits | T1 and Frame-Relay | Several |
| Point-to-Point Configurations | | None |
| Multi-drop Configurations | | None |
| Digital telephones/model | Meridan 2616 (used by Admin Staff, not by dispatchers) | 14 |
| Digital telephones/model | | |
| Analog telephones/model | Standard analog telephones that can be setup in case of full telephone system failure | 10 |
| IP telephones/model | | None |
| IP telephones/model | | None |
| Headsets | Plantronics, plug prong | 50+ (each dispatcher has their own headset) |
| Bells, Chimes | Buzzer for intercom between dispatch workstations | 14 |
| Back-up Facility or Overflow PSAP Information | Yes. 5 Position backup Fire/EMS communications dispatch center. Has the ability to run independently of the primary dispatch center (i.e. has its own radio console system, telephone system, etc) | |

| | | |
|---|---|---|
| Miscellaneous | The County Telephone Services manages the PBX utilized by the entire County. The 911 phone system is independent. Most of the emergency 10 digit lines are POTS lines directly from the Central Office and not trunks from the PBX. | |

| 9-1-1 and Telephone Systems | PSAP Response |
|---|---|
| | **Response** |
| PBX Manufacturer/Type | Nortel Networks/Option 81C |
| PBX age | Two years |
| PBX Calling Line ID | No |
| PBX Software Release | 25.4 |
| PBX Last Updated | 12/27/2005 |
| PBX Future Upgrade Timeframe | 2008 |
| ANI/ALI Controller Manufacturer | Positron |
| ANI/ALI Age | 8 years |
| ANI/ALI Trunking (CAMA, Central Office, Tie) | CAMA |
| ANI/ALI Number of 9-1-1 Lines (Are there more than one supplier? If so, please list) | 25 |
| ANI/ALI Calling Line ID | Need info on what this is |
| ANI/ALI Software Release | 2.10 & 2.20 |
| ANI/ALI Last Upgraded | 1999 |
| ANI/ALI Future Upgrade Timeline | January-08 |
| ANI/ALI Problems (headsets, etc.) | None |
| Serving Central Office Manufacturer | Unknown |
| Serving Central Office Address | Jefferson & Franklin, Redwood City |
| Switch maintenance Provider | Unknown |
| 9-1-1 Tandem - Primary Tandem Location | Millbrae and Santa Clara |
| 9-1-1 Tandem - Primary Tandem Manufacturer | Unknown |
| 9-1-1 Tandem - Secondary Tandem Location | None |
| 9-1-1 Tandem - Secondary Tandem Manufacturer | None |
| 9-1-1 Calls: | |
| Who do you answer 9-1-1 calls for? | Sheriff's Office, Half Moon Bay Police, Broadmoor Police, Millbrae Police, East Palo Police, All Fire Departments, and EMS |

| | |
|---|---|
| Who do you dispatch for? | Sheriff's Office, Half Moon Bay Police, Broadmoor Police, Millbrae Police, East Palo Police, All Fire Departments, and EMS |
| Who do you transfer 911 calls to? | Any city within the County, CHP, Coast Guard, Poison Control are among the most common. |
| If there is a problem at the downstream agency what do you do with the 9-1-1 call? | We have the ability to re-route 911 calls. Our 911 calls are rerouted to South San Francisco Police and Menlo Park Police via a switch that is located at the two PSAP's. |
| How do you answer 10 digit emergency numbers? | Same as we do for 911 |
| 9-1-1 Backup: | |
| Who is your backup? | South San Francisco Police and Menlo Park Police have the ability to accept our 911 calls. |
| Are you a backup center to another agency? | Yes, several within the County. Activated by switches located at our PSAP. |
| How do you go into backup? | South San Francisco Police and Menlo Park Police have a switch at their PSAP that will activate the 911 alternate routing. |
| Have you gone into a backup? | Yes, upon installation of our current equipment. 911 trunks had to be routed to replace the 911 controller. |
| Do you test backup? If so, how often do you perform this test? | Yes. Monthly on the 15th. |
| Do you send Call Takers to backup site? | Yes |
| TDD: | |
| Do you receive TDD calls? | Yes |
| How many TDD calls do you receive in a given year? | Very few. I don't have an exact number. |
| Does the California Relay Center make test calls? | No, not that I'm aware of. |
| Language Line - Provider | Via State Contract through DGS |
| Call Center: | |
| Air Conditioning | Yes |
| Outlets for UPS/Generator | Yes. Separate UPS and Non-UPS outlets |

| | |
|---|---|
| Layout | Console layout attached (paper) |
| Workstations: | |
| Number of Call Takers Position | 13 In Dispatch Center<br>1 In Training Room |
| Design of workstations | Touch screen, keypad, and mouse |
| Chairs | Yes, numerous makes & models |
| Screens and configuration | 1 17" touch screen per position |
| UPS #1: | |
| UPS Age | Installed August 2001 |
| UPS Manufacturer | Best FE18KVA |
| UPS Maintenance | Yes. Batteries replaced every 4 years |
| UPS #2: | |
| UPS Age | Installed December 2006 |
| UPS Manufacturer | Best FD12KVA |
| UPS Maintenance | Yes. Batteries replaced every 4 years |
| UPS Individual Units - number and manufacturer | Several brands and type used on the existing telephone system (was a requirement by AT&T). The new phone system being installed in Jan 2008 will utilize the two existing UPS's. |
| Generator #3 (Primary): | |
| Generator Age | Installed 1967 |
| Generator Manufacturer | Cummins |
| Generator Maintenance | Yes. Fluids, amps, volts, cycles, block heater, etc. |
| Generator Run Times | 1 hour monthly test and run as needed |
| Generator Type | Diesel, 150Kw |
| Generator Location | HOJ Basement Tunnel |
| Generator Outlets | All Non UPS outlets are powered by the generator. |
| Generator #4 (Backup): | |
| Generator Age | Installed 1970 |
| Generator Manufacturer | Cummins |
| Generator Maintenance | Yes. Fluids, amps, volts, cycles, block heater, etc. |
| Generator Run Times | 1 hour monthly test and run as needed |
| Generator Type | Diesel, 150Kw |
| Generator Location | HOJ Basement Tunnel |

| | |
|---|---|
| Generator Outlets | All Non UPS outlets are powered by the generator. |
| Wireless: | |
| Wireless Providers | None. Scheduled for February 2008 |
| Wireless Phase (0, 1 or 2) | 0 |
| Do the wireless calls come from different 9-1-1 Tandems? | Unknown |
| Who answers the initial wireless call? | CHP currently |
| Does the transferring agency stay on the line until all information is passed? | That is the procedure. |
| Voice over Internet Protocol (VoIP) | |
| Are you implementing i2? | Not at this point |
| When is your implementation timeframe? | Unknown |
| Over all Problems with 9-1-1 System & Telephone | None |
| Improvements required for 9-1-1 System & Telephone | Upgrading for Wireless |
| Future plans for 9-1-1 System & Telephone | Replacement in January 2008 |

| **LAN/WAN** | **PSAP Response** |
|---|---|
| | Number/Quantity |
| Local Area Network | 1 - PSC has its own segment |
| Remote Data Lines/Circuits | Several |
| Data Circuits | Several |
| Point-to-Point Configurations | None |
| Multi-drop Configurations | None |
| Broadband Provider | Provided by County IT |
| | |
| **Please provide the following Local Area Network information:** | **Description** |
| | |
| Network Diagram | |
| Protocols being utilized on the network | IP, DECNet, IPX, LAT, MOP are among the most common, and IP being the dominant protocol. |
| Network Speed - Gigabyte, 100mb, 10mb | Gigabyte, 100mb, and 10mb are used. The most common is 100mb. |
| How is the network supported | PSC IT Staff |
| Which Jurisdictions co-exist on the LAN | None |
| Are separate jurisdictions segregated on the LAN | Yes. Outside the County Network |

| Please provide the following information about the Wide Area Network: | Description |
|---|---|
| Network Diagram | |
| Agencies connected | Sheriff's Office |
| Connectivity between the networks - FDDI, T-1, T-3, Frame Relay, 56kb | Between the PSC and County Network is 100MB Ethernet. |
| Protocols being utilized on the networks | IP (other protocols are not bridged or routed to the WAN) |
| Network Speed - Gigabyte, 100mb, 10mb | Mix, depending upon the location. I.e. Remote Sheriff's Office sites are T1, where local facilities are 100MB. |
| How is the network supported | County IT Department |
| Which Jurisdictions co-exist on the WAN | Sheriff's Office |
| Are separate jurisdictions segregated on the WAN | No |
| **SECURITY** | **PSAP RESPONSE** |
| Network Operating System (NOS) in use | Windows 2000 Sever, Windows 2003 Server, Novell Netware |
| Plans to change NOS | Yes, migrating from Novell to Windows AD |
| Two factor authentication system | No |
| Remote authentication method | County IT provided VPN |
| Encryption employed on local network | No |
| Encryption employed on wide area network | No |
| Describe restrictions in place for access to secure networks such as CBI/NCIC | None. Not in compliance with CLETS due to County IT resistance to the installation of a firewall between PSC and County. PSC has had the hardware to install, but County IT continues to resist. This is a long outstanding unresolved issue dating back to 1999. |
| Do you currently have Security Policies & Procedures | Yes. |
| If so, please list the standards they conform to | County IT policies |

| Personnel | PSAP Response | | | |
|---|---|---|---|---|
| | Full-time | Part-time | Civilian | Sworn |
| Calltaker/Phone Personnel | 3 | | | |
| Dispatch/Radio Personnel | 42 | | | |
| Dispatch Supervisor Personnel | 9 | | | |
| Communications Manager Personnel | 2 | | | |

| | | | | |
|---|---|---|---|---|
| Law Enforcement Dispatchers | 20 | | | |
| Fire Dispatchers | 14 | | | |
| EMS Dispatchers | 14 | | | |
| Public Works Dispatchers | 14 | | | |
| System Administrator Personnel | 3 | | | |
| Information Technology Personnel | N/A | | | |
| Network Personnel | N/A | | | |
| Trainer Personnel | 2 | | | |
| Administrative Personnel | 7 | | | |
| Other (finance, reception, records custodian, etc. - please specify) | 1 | | | |

| Personnel | PSAP Response |
|---|---|
| Shift Schedule | 0600-1800/1800-0600 4 separate teams trading off every other Saturday |
| Shift Staffing (Day, Evening, Night Shifts) | Minimum of 7 at all times, maximum 10 |
| Other Tasks Performed by Dispatchers and % of Time Spent Please specify the task(s) | EMD, Alarm Monitoring, overflow of calls from Law |

| Training | PSAP Response | |
|---|---|---|
| | Training/Certifications Utilized | Annual Cost Per Person |
| Dispatcher | POST, EMD, CLETS | |
| Supervisor | POST, EMD, CLETS, Supve Training | |
| Communications Manager | POST, EMD, CLETS, Supve Training, Management Courses* | |
| System Administrator | All course from above for Dispatcher & specialized IT classes | |
| IT Staff | Same | |
| Network Support Staff | | |
| Other (Please Specify) | All disciplines are required to attend monthly CE for 3 hours | |
| | The County Provides a variety of classes for all employees | |

| Training | PSAP Response |
|---|---|
| Is there a dedicated trainer? | Yes |
| What area is the trainer responsible for? | Entry Level Law Enforcement Training Fire/EMS training Conducted by Operations Managers & shift SME's |
| Which Medical Dispatch Priority Reference System does the agency utilize? | Priority Dispatch |
| What level of EMD training does the agency provide its dispatchers? (Level I, II, or III) | Not Sure, at least level 2, not sure what level 3 is |

| | |
|---|---|
| Who provides the EMD training and certification? | Priority Dispatch |
| Is there a dedicated training facility? | There is a training room dedicated to PSC |
| What type of workstations exists in the training facility? | Portable workstations X 4 with 1 stationary console |
| What number of workstations is there? | 5 |
| Is the training facility connected to the production network? | yes |
| Can the training environment access the real database for timely updates, etc. or is it separate from the production environment? | yes |
| Is the training facility setup to be converted as an emergency dispatch center? | no, but is next to the County EOC. PSC has a dedicated automated Fire/EMS Back-up Center |

| CAD System | PSAP Response |
|---|---|
| | Description |
| **List Hardware Manufacturer/Type/Age** | |
| Software Vendor Name | Northrop Grumman (PRC) Cobol CAD. The CAD was installed in 1992 and a full hardware replacement was completed in March 2007. CAD software is constantly updated to meet the needs of the dispatchers and customer agencies. |
| Terminals/CRT's | None, have all been replaced by PC several years ago |
| PC's | Dell / GX280 / June 2007 |
| Printers | HP / Several Models / Varying age 1 to 5 years |
| **CAD System Interfaces** | |
| E-911 | Yes, to the Positron Lifeline 100 controller |
| Time Synchronization | Yes, to the Spectracom NetClock/GPS |
| TTY | No, integrated into the Positron Power 911 phones |
| Mapping | Yes, Lynx maps |
| Radio System (i.e. PTT) | Yes. Interface includes PTT, emergency button activation, call alert, DTMF, aux i/o control and state change. |
| Voice Logging System | Not interfaced with CAD |
| CTI | No |
| CAD - CAD Link | Yes |
| Records Management System | No. Several interfaces to transfer CAD data to agency RMS. PSC is not a responder agency and does not have an RMS. |
| Data Warehouse System | Yes, MS SQL database |
| **Law Enforcement Interfaces** | |
| CBI/NCIC | NCIC, CLETS, AWS (Bay Area warrant system), and CJIS (Local County booking), and RIMS (7 local PD systems) |
| AVL | No |

| | |
|---|---|
| MDT/Laptop | Yes, utilizing the Northrop Grumman PSI Mobile Client. |
| NIBRS - RMS Interface | Yes to RIMS and Tiburon systems. |
| Is RMS separate CPU/System | The CAD is a CAD, not an RMS. PSC does not host an RMS system. Individual agencies will have their own system and PSC will transfer data to that system. |
| List Manufacturer/Vendor | |
| **CAD System** | **PSAP Response** |
| | Number/Quantity |
| **Fire Interfaces** | |
| Station Alerting | 60 Fire Stations, divided into 5 zones, which each zone uses an independent Zetron Model 26. Backup alerting via Zetron M25 (DTMF). Full bi-directional CAD interface. If the primary alert fails (i.e. station unit not working), CAD will revert automatically to secondary alerting. System is fully ISO compliant. |
| Digital Paging | Yes. 1,695 users. |
| AVL | No |
| Encoder | See above. |
| Status Head | Yes, Motorola MST (MODAT) in every fire apparatus. 90+ units |
| NFIRS Reports | Yes, CAD data transfer to SunPro, FireHouse, and FirstOnscene fire RMS systems |
| | |
| EMS Interfaces | |
| AVL | No |
| Encoder | Yes. Trunking Call Alert used via automated CAD interface. |
| Status Head | Three ambulance are equipped with the Motorola MST (MODAT) units. These are the two South San Francisco Ambulances and the one ambulance utilized by Woodside Fire. |
| Digital Paging | Yes. 182 AMR users. |
| Station Alerting | Yes. Trunking Call Alert used via automated CAD interface at 4 ambulance posts. |
| MCT/MDT | Yes. The AMR supervisor vehicle is using MCT. AMR is not interested in installing the CAD MCT software in its ambulances. |
| Patient Reporting System | CAD transfers data to AMR's MEDS system per agreed design. |
| Billing | CAD transfers data to AMR's MEDS system per agreed design. |
| Medical Triage System | No |
| System Status Management | Yes as per AMR design. Its considered more of a "Deployment Plan" rather than a true System Status Management Plan. CAD has a System Status Plan feature that was disabled when AMR changed to a zone deployment over a system status management plan in 1999. |
| RMS | CAD transfers data to AMR's MEDS system per agreed design. |
| TDD | Integrated with the Positron Power 911 telephones |
| Public Works | |
| MDT | No |
| List Others | Law Enforcement customers utilize MDT's |

Note: To date there has been no reports that the CAD has not been able to produce. The perception that CAD can't do it is false. Before a report can be created, the customer must state in detail what is needed. In the past 4 months, 6 reports/features were specifically created for AMR. This is because a technical group now meets monthly and work on the details on what the report/feature should be. This includes a CAD to Excel Exception report interface, unit snapshot report, etc.

| CTI Equipment | PSAP Response |
|---|---|
| | Number/Quantity |
| | |
| CTI Manufacturer | Positron |
| CTI Type | Power 911 |
| CTI Age | 8 years |
| Number of CTI Positions | 13 in dispatch center / 1 in training room |

| Radio System | PSAP Response |
|---|---|
| | **Number/Quantity/Comment** |
| System Manufacturer/Type/Age | Motorola Astro 4.1 Smartzone installed 2005 |
| Type of PS System | Trunked |
| Band | UHF-T |
| Communications Frequencies (VHF,UHF,800MHz) | 480 |
| VHF System meets Narrowband Requirement? | No |
| Single Site, Trunked, Voting, Simulcast | Trunked Voting Simulcast |
| # Radio Channels : Analog / Digital | Approximately 128 talk-groups defined in the Trunking System |
| Command | N/A for EMS |
| Dispatch | 1 Digital Trunked talk-group (REGTG) |
| Tactical | 2 Digital Trunked talk-groups (MCI1 and MCI2) |
| Mutual Aid/Auto Aid | 10 Digital Trunked talk-groups (System Common 1-5 and County Common 1-5) |

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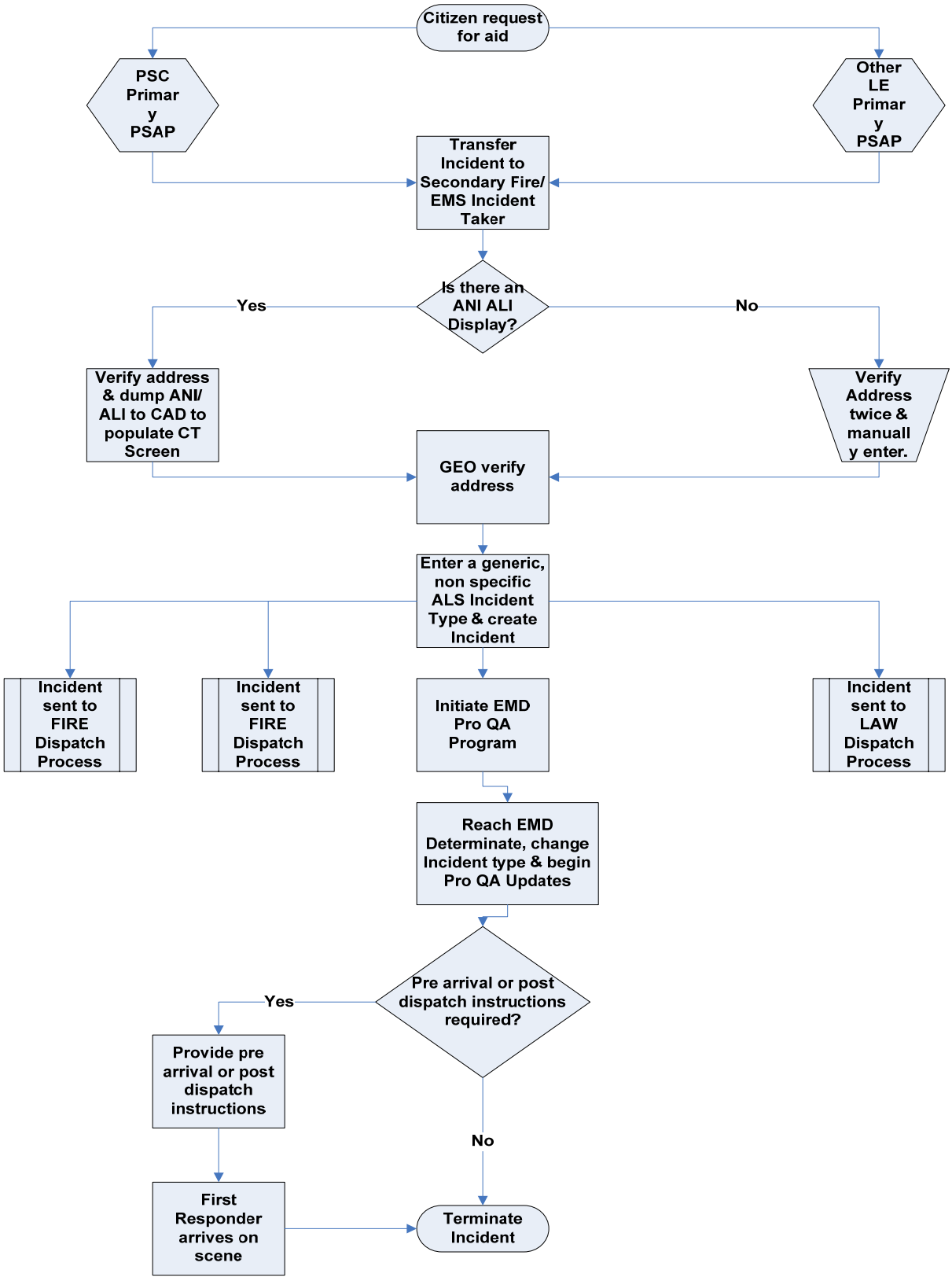
|---|---|
| Other | Each AMR ambulance is equipped with a VHF radio capable of operating on the Fire service dispatch and tactical channels (VHF analog conventional repeated (for dispatch channels) and simplex (for tactical channels) |
| # Radio Base Stations | 56 control stations (all agencies) |
| # Transmitter Sites | 4 sites North Zone, 3 Sites South Zone, 6 Site IR |
| # Repeater/Receiver Sites | 7 additional voting receiver sites |
| # Mobile Radios | 521 |
| # Portable Radios | 989 |
| # MDT/Laptops | 1 |
| # Alpha Numeric Pagers | 182 utilized by AMR / 6 utilized by EMS Agency / 1,695 total pages / 213 groups |
| # Dispatch Consoles | 13 in dispatch / 1 training room |
| Console Manufacturer Type/Age | Motorola Centracom Gold Elite |
| How is Dispatch / Mobile Interfaced to CAD | Not sure of the question here |
| How are Transmitter/Repeater Sites connected to Dispatch and CAD/RMS | Digital Microwave Sonet loop / Fibre cable |
| Data Format (RS____, DSX_, IP,……) | RS232 |
| Mobile Data Network provider | AT&T |
| Paging System Provider | American Messaging |
| # Microwave Sites | 43 |
| # Fiber Sites | 2 |
| Existing Copper Plant | |
| Leased inter-agency circuits and type | 8 T1, 5( 4 wire e/m) |
| # of voice conversations from mobile units | Unknown |
| Average length of mobile conversation | Unknown |
| # of data requests from mobile units | Unknown |

| | |
|---|---|
| Average length of data message. | Unknown |
| Encryption (type) | None |
| System Synchronization | GPS |

| **Peripheral Equipment - CAD Only** | **PSAP Response** |
|---|---|
| **Itemize additional equipment not previously listed** | **Description** |
| Instant Recall Recorder Manufacturer | Positron |
| Instant Recall Recorder Type | Built in to the phone software. Only records telephone calls |
| Instant Recall Recorder Age | 8 years |
| Number of Instant Recall Recorders | One at each phone position |
| Software Release | Unknown |
| Last Upgraded | January-99 |
| Future Upgrade Timeline | January 2008, New IRR will do phone and radio |
| Problems associated with the Instant Recall Recorder | None |
| Logging Recorder Manufacturer | Dictaphone (aka NICE) |
| Logging Recorder Type | ProLog (Digital DAT tape) |
| Logging Recorder Age | 12 years |
| Number of Recording Channels | 96 |
| Software Release | Unknown |
| Last Upgraded | 1999 was the last software upgrade |
| Future Upgrade Timeline | 2008 the recorder will be replaced |
| Problems associated with the Recorder | No problems, equipment has been very reliable. Now with the number of tape reproductions, we need a disk based system for faster recording access and software with additional features. |

| | |
|---|---|
| TDD Equipment Type | Built into the Positron Power 911 system. BAUDOT and ASCII capable. BAUDOT auto detection. |
| Electronic Hospital Assessment Systems | Yes, by EMSystems. CAD interface polls EMSystems to keep the CAD system updated with hospital status. This is now the 3rd electronic hospital assessment system this been integrated with CAD (Choral, HART, and now EMSystem). |
| Network / Software Monitoring System | Utilize WhatUp Gold to monitor the network and software (CAD interfaces, links, etc). Reports via email and pager if device or software stops responding. Currently monitoring about 400 devices/software items. |
| Priority Dispatch ProQA Medical Interface | Full CAD to ProQA interface. PSC is an accredited EMD center. |
| Alpha Pager Interface | Full CAD to alpha pager interface. Pages are sent upon dispatch for secondary notifications. Administrative and automatic pages (greater alarm fire, multi-causality incident, etc) are sent. |
| Email Interface | CAD interface to send automated email messages. Greater alarm fire, multi-causality incident, etc. |
| Web based CAD status monitor | Web based CAD incident/unit status monitor that is identical to the CAD. The Web based is used by users that don't need a full CAD and then don't need to purchase a CAD software license. |
| Fax Machines | Yes. 1 stand-a-lone unit in dispatch center. Full send/receive fax interface to the CAD system (i.e. can route a message to a fax and can receive a fax and print it at a CAD workstation). 1 fax/copier/scanner (office grade, no consumer grade) for admin staff. |
| Planned Systems/Equipment Upgrades | |
| Planned Upgrades Reflected in Budget (Yes or No) | Yes |
| Major Issues/Problems | Staff time to work on projects. In July 2007 a new IT position was authorized and a person hired to help with this issue. |

# Appendix D: Calltaker Workflow Process



# Appendix D: EMS Dispatch Workflow Process