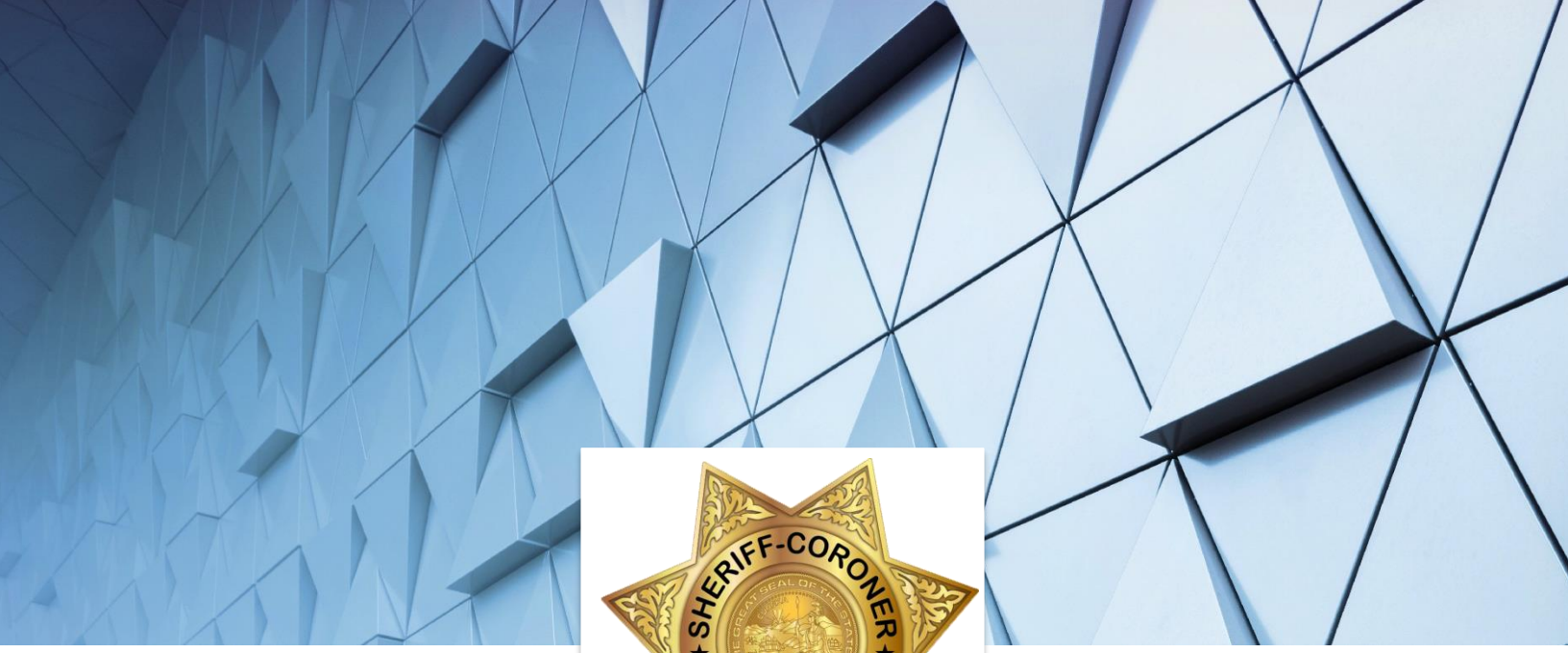


MissionCriticalPartners
Because the Mission Matters

Multiagency Consolidated Communication and Emergency Operations Feasibility Study

Final Report

PREPARED DECEMBER 2019 FOR
HUMBOLDT COUNTY SHERIFF'S OFFICE, CALIFORNIA

MissionCriticalPartners.com
Dallas Office | 502 N. Carroll Ave. Suite 120 | Southlake, TX 76092 | 888.8.MCP.911 or 888.862.7911

Table of Contents

Executive Summary

Mission Critical Partners, LLC (MCP) was hired by Humboldt County (County), California, to assess the feasibility of a consolidated Public Safety Answering Point (PSAP). Such a center would consolidate the four PSAPs managed by the Humboldt County Sheriff's Office (HCSO) and police departments in the cities of Eureka, Fortuna, and Arcata. Collectively, the four PSAPs provide services to the Sheriff's Office, six police departments, two fire departments, and an animal-control department. They are located within 30 minutes of each other, from north (Arcata) to South (Fortuna).

This study provides stakeholders with four options to achieve consolidation, each option providing advantages and disadvantages. The options are:

- Full (physical) consolidation – two or more agencies share facilities, resources and costs under an agreed upon governance structure.
- Partial (operational) consolidation – Similar to full consolidation, but with the following variations:
  - Some view a partial consolidation to mean that multiple law-enforcement agencies are served by one communications provider, but the provider does not serve fire/rescue and/or emergency medical service (EMS).
  - Some view a partial consolidation as the service provider only providing service to a customer on a part-time basis. For example, a law-enforcement agency may be served by their primary agency between 8:00 a.m. to 5:00 p.m. Monday through Friday, and then an associated agency in the identified 24 hours a day, 7 days a week, 365 days a year (24 x 7 x 365) gaps.
- Colocation – Two or more individuals but like agencies share core technology, but each entity is housed in a separate physical location within the same facility.
- Virtual (shared) consolidation – Two or more agencies at separate physical locations share technology; typically, a host agency is determined, which will house the core technology that each entity will share.

A consolidated PSAP in the county would provide several operational efficiencies when compared to operating multiple PSAPs with their own disparate call-handling and dispatching functions. To help the County determine the feasibility of consolidating the four PSAPs or any of the options identified, MCP assessed the current level of activity, facility accommodations and staffing for PSAPs within the county. This data was also used to conduct a staffing analysis to determine the current staffing levels and its influence on the optimal number of telecommunicators needed in a fully consolidated PSAP. Last, MCP kept the goal Humboldt County stakeholders stated for this project in mind. Considering the four options identified, we were cognizant of what option best realizes the desired outcomes:

- Enhance the safety of law enforcement, fire, rescue, emergency medical, and emergency management personnel and the citizens served
- Expand cost-effective benefits to its members and other agencies
- Create a common operating picture and maintain a plan for the expanding needs of the public-safety agencies in the region that fosters partnerships with surrounding entities
- Facilitate the expansion of HCSO public-safety dispatch services to other community and private-sector entities
- Standardize equipment and procedures to bring all first responders into a common public-safety radio and data communications system

The geographical threats and challenges of the Humboldt Bay region coupled with aging facilities, facility limitations in adapting to modern technology of today's PSAPs, and the continued advances in emergency communications technology will only continue to test public-safety agencies' ability to fund and operationally keep up to meet public expectations.

When considering staffing of 911 centers, the challenge is finding qualified applicants, providing training in ways that appeal to the adult learner, and ensuring the employees can thrive in an environment to retain their skills and knowledge. While Arcata and Fortuna reported that their staffing is at full strength for PSAP operations, this report challenges the status quo and compels decision-makers to see PSAP staffing more than filling the seat in the dispatch center. As we add more technology that makes demands on human dexterity and interaction in our PSAPs, the need to review performance in a formal quality-improvement process and on-going training becomes more relevant. These reasons and more that are identified in the body of this report compels MCP to recommend a full consolidation with equitable governance and in a new facility that will accommodate technology needs of today and those which are on the horizon.

A full consolidation would be optimal, meaning all stakeholders consolidate in one PSAP. However, achieving a full consolidated environment can be done in phases or steps, allowing for an incremental installation and acclimation to the changes in operations. Consolidated operations also facilitate common application in procedures and protocols and the understanding of agency policy.

Finally, MCP recognizes that it is easier to recommend a consolidated environment than it is to actually transition and assume new operational practices. Deliberate planning, technology design, workflows, redirected duties and tasks and development of new policies, procedures and protocols, as well as clear governance are critical success factors in forming a new operation. These factors attempt to align the new consolidated PSAP with national best practices. These practices set the agency up for a healthy environment and a thriving workforce.

Full details are contained in the body of this report.

1 Introduction

Mission Critical Partners, LLC (MCP) was hired by Humboldt County (County), California, to assess the feasibility of a consolidated Public Safety Answering Point (PSAP). Such a center would consolidate the four PSAPs managed by the Humboldt County Sheriff's Office (HCSO) and police departments in the cities of Eureka, Fortuna, and Arcata. The four PSAPs provide services to HCSO, six police departments, two fire departments, and three animal-control.

This report contains findings and recommendations regarding technologies, funding, staffing, and governance. The goal of implementing a consolidated PSAP is to enhance emergency communications and response countywide through a more-efficient use of resources.

Specifically, a consolidated PSAP is intended to leverage shared technology systems to more efficiently use resources and ultimately enhance emergency communications across the county. This is turn will result in improved emergency-response outcomes and more lives and property saved. However, sharing of the communications system has not been widely embraced by the public-safety sector nationwide, largely because officials typically are concerned with the corresponding loss of control over communications systems and personnel.

Nevertheless, a consolidated PSAP in the county should provide some level of operational efficiencies compared with operating multiple PSAPs with their own separate call-handling and dispatching functions. MCP assessed the current level of activity, funding and staffing for PSAPs within the county. This data was used to conduct a staffing analysis to determine the optimal number of telecommunicators in a consolidated PSAP needed to provide emergency services to a growing population and incorporated into a space-planning study that will help define the physical requirements of housing and operating a consolidated PSAP, based upon functionalities, technologies, and threats resilience. The study concluded that the County's Office of Emergency Services (OES) could be collocated with the consolidated PSAP in a single, purpose-built, hardened facility.

Law-enforcement officials at the aforementioned agencies collaborated to determine the usefulness and cost effectiveness of consolidating common resources, in this case, emergency communications. These agencies are experiencing what many agencies across the nation are experiencing: staffing shortages, limited revenue streams, fatigue in recruitment and hiring, and selection processes. As a result, the potential for consolidating resources is worth exploring, as many jurisdictions have achieved success when sharing resources when operational and financial conditions are challenging. The key benefits typically associated with PSAP consolidation are cost savings—largely driven by enhanced economies of scale—and more-efficient resource utilization.

When assessing the feasibility of PSAP consolidation, decision-makers must weigh several dimensions before determining whether some form of consolidation would benefit the stakeholders and communities that would be served by the consolidated PSAP. Difficult questions must be contemplated and answered when considering a drastic shift in how work traditionally is performed in the respective PSAPs, including the following:

- Do stakeholders agree on the drivers that are prompting a possible consolidation?

- Would PSAP consolidation resolve the challenges being experienced at the existing centers?
- Is there a will at all levels of the stakeholder agencies to pursue PSAP consolidation?

The answers to these questions will provide tremendous insights into whether consolidation should be pursued.

2 Background

Humboldt County is located in northern California and is bordered by three counties: Del Norte to the north, Siskiyou to the northeast, Trinity to the east, and Mendocino to the south. The entire west side of the county is bordered by the Pacific Ocean. The county is home to Humboldt Bay, the largest deep-water port between San Francisco and Coos Bay, Oregon. It also is home to Humboldt State University (HSU) and the College of the Redwoods.

The county's footprint is vast, encompassing 3,558 square miles,[1] including 110 miles of Pacific Ocean coastline. Much of the terrain is mountainous with limited access. U.S. Highway 101 is the only north-south artery in the county. According to the U.S. Census Bureau, the county's population was 136,373 in July 2018. Eureka is the largest city—with an estimated population of 26,998—and is the county seat. The city experienced a 0.7 percent decrease in population between 2010 and 2018.

Figure 1: Humboldt County Map

[1] California State Association of Counties (CSAC).

The county is well known for the number of old-growth and historic redwood trees. The county is densely populated with forest lands, which historically supported its logging industry. The county's coastal areas support the community's fishing industry while farming dominates the eastern areas of the county.

The inherent challenges the county faces are numerous. From a public safety aspect, some of the challenges include, but are not limited to:

- The county is vulnerable to natural disasters such as earthquakes, tsunamis, wildfires, flooding and mudslides. Getting in or out of the county can and will be difficult if basic transportation infrastructure fails, such as highways and airports. Ingress by boat may be the only mode to render aid in a natural disaster should transportation infrastructure be compromised. Recently implemented public-safety power-shutoff (PSPS) procedures can result in the loss of electric service to the county during periods of heightened fire danger from high winds.

- Humboldt County is isolated geographically, which makes immediate response from external resources challenging. The nearest large city to the north of Eureka is Crescent City in Del Norte County, which is 85 miles away. The closest city to the south is 135 miles away from Eureka. From a public-safety perspective, this translates to a "you're on your own" mentality, leaving few allied agencies that can be a force multiplier should the situation arise. Other state agencies have a presence in the county, such as the California Highway Patrol (CHP), CSUH's police department, and California State Parks and Beaches; however, on-duty emergency response is limited. Federal agencies, such as the Federal Bureau of Investigation (FBI) and U.S. Postal Service (USPS) Police, also have a presence.

3 Project Scope

MCP worked closely with HCSO to define the approach and methodology that was used to conduct the consolidation assessment. As described in the request for proposals (RFP), the County foresees the HCSO's PSAP coordinating and supporting the shared information and communications technologies to:

- Enhance the safety of law enforcement, fire, rescue, emergency medical, and emergency management personnel and the citizens served
- Expand cost-effective benefits to its members and other agencies
- Create a common operating picture and maintain a plan for the expanding needs of the public-safety agencies in the region that fosters partnerships with surrounding entities
- Facilitate the expansion of HCSO public-safety dispatch services to other community and private-sector entities
- Standardize equipment and procedures to bring all first responders into a common public-safety radio and data communications system

3.1 Methodology

MCP conducted the assessment in three phases:

- Data Gathering – MCP facilitated a project kickoff meeting and a series of onsite meetings with HCSO, Eureka, Fortuna, and Arcata representatives. MCP also met with OES representatives and toured the emergency operations center (EOC). MCP developed a survey tool that was provided to stakeholders to document each element of their operations including staffing, budget, technology, and facilities. The meetings, onsite observations, and surveys produced the data that was necessary to conduct the assessment.

- Data Analysis – MCP compiled and analyzed the data provided by the stakeholders. The following figure identifies the areas that were examined and assessed. MCP worked with stakeholders to resolve gaps that were identified in the data and to clarify information.

- Report Preparation – MCP prepared an administrative draft that was submitted to the County and reviewed by stakeholders. MCP conducted a meeting with the stakeholders to receive their comments and resolve any gaps in the report. MCP then prepared a draft report for review and final report for submission to senior officials.

4 Vision

MCP's consultants met with the supervisory staff of each PSAP. They were very candid regarding the idea of consolidation. The discussions touched on the current public safety communications environment in Humboldt County. MCP also asked the stakeholders to describe their vision of a consolidated center. The supervisory staff envision a consolidated emergency communications center that will:

Effect efficiencies, ensure timeliness and responsiveness, and better serve the public. Combining the workforces allows us to learn from each other.

Further describing the type of facility that is envisioned, the managers noted the following:

- A two-story facility that supports the colocation with other essential service providers, such as OES
- A new facility should be hardened and constructed outside of a tsunami-inundation zone
- If located within a hazard zone, include a training/multipurpose room that could be leveraged for vertical evacuation and sheltering
- The facility should accommodate space for wellness, which includes:

- A workout area, quiet room, lactation room, and breakroom
- Space for a locker room, showers, kitchen facilities and site security
- An operations room designed with windows

5 Current PSAP Environment

5.1 Overview

The four primary stakeholders involved in this project include HCSO and the police departments of Eureka, Arcata, and Fortuna. The PSAPs are located within 30 minutes of each other, from north (Arcata) to South (Fortuna). Seventy-five percent of the population lives in a dense-population area known as Humboldt Bay. The remaining 25 percent is spread throughout remote areas of the county. HCSO has jurisdiction over the unincorporated portions of the county that includes the remote areas.

Each stakeholder agency has its own emergency dispatch center. Services provided by these centers include the following:

- HCSO dispatch center (includes contracts with the cities of Blue Lake and Trinidad) – law enforcement only
- Eureka dispatch center – law enforcement, fire/rescue, including emergency medical dispatch (EMD) protocols
- Fortuna dispatch center – law enforcement (includes contracts with police departments in the cities of Ferndale and Rio Dell), Fortuna Fire/Rescue
- Arcata dispatch center – law enforcement, Fire/Rescue

All three police department dispatch centers are housed in their respective facilities, while the HCSO dispatch center is in the County's courthouse in Eureka.

Although fire/rescue/emergency medical service (EMS)-only dispatch centers are not part of this project's scope, it is relevant to provide descriptions of the remainder of the public-safety community in the county. Nine career fire departments exist, including the California Department of Forestry and Fire Protection (CAL FIRE), the CAL FIRE Law Enforcement Unit as well as 34 volunteer departments. The Fortuna Interagency Command Center (FICC) dispatches for CAL FIRE, federal agencies and 36 fire departments, as well as Southern Humboldt Technical Rescue and Eel River Valley Technical Rescue. FICC provides initial dispatches for Fortuna and Arcata ambulance companies and handles calls for Southern Trinity Ambulance and Hoopa-Willow Creek Ambulance when the call is within its dispatch zone.

CAL FIRE's Humboldt-Del Norte emergency command center (ECC) has five fire captains and two communications operators. The center serves as a secondary PSAP for several agencies, including California Highway Patrol (CHP), HCSO, and the police departments for HSU, Arcata, and Fortuna.

HSU's police department operates a PSAP that is dedicated to serving its campus. They work closely with the Arcata police department to coordinate operations on and around the campus. HSU's police

department does not wish to participate in the PSAP-consolidation feasibility assessment, as they render specialized services that do not align with local-government-driven PSAP operations.

5.2 Threat Assessment

Humboldt County is susceptible to a variety of hazards and threats. There are three basic categories of threats that are introduced when assessing a community's vulnerabilities:

- Natural hazards – Natural phenomena that place individuals and the built environment at risk. These include both geophysical (e.g., earthquake, tsunami, flooding, wildfire) and biological, such as naturally occurring disease (e.g., pandemic influenza).

- Technological hazards – Hazards resulting from the manmade environment, but which are unintentional or accidental in nature. These include hazardous-materials release, utility failure, transportation incident, and other events that originate due to unintended human intervention.

- Human-induced threats – Threats based upon the intentional acts of individuals that result in harm to people and/or property damage. This category includes criminal acts of violence (e.g., active-shooter incidents), terrorism, theft, vandalism, and civil unrest.

Geophysical hazards, including earthquakes and tsunami inundation, represent the primary threats to public-safety facilities in the county. The Cascadia subduction zone parallels the coastline of northern California and Humboldt County. A rupture along the fault could result in catastrophic consequences, including tsunamis. The County has experienced significant earthquakes in the past and must be prepared for future incidents.

5.3 City of Arcata Police Communications

The PSAP is in the police department facility and is equipped with two console positions in the Dispatch Center. Additionally, there is a mobile console that is in the supervisor's office adjacent to the Center. Accommodations are close to the on-duty telecommunicator, such as restrooms, copier area, and kitchen. The center is comfortable, well-appointed, modern, and well-maintained, making it conducive to a healthy work environment.

While Arcata has used the limited space efficiently, the manager and staff described the need to expand the PSAP space. The communication supervisor's office, reception area, copy/mail area, and break room would benefit from expansion. They reported that the facility lacks general storage space. Conversely, they reported that the PSAP has ample space in the manager's offices, information technology (IT)/systems office, and restrooms.

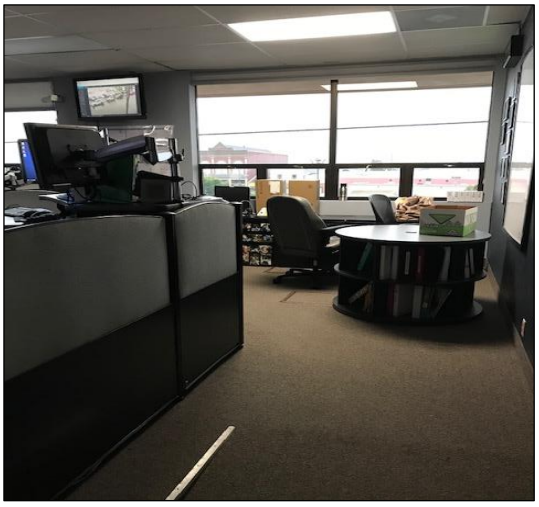
Arcata staff members reported that maintaining sufficient staffing is the most pressing challenge. They often have only one telecommunicator on duty, although two are preferable. They report that busy periods with only one telecommunicator supports the idea of consolidation so that immediate assistance and backup would be available. The biggest hesitation regarding consolidation concerns whether the established level of service would be compromised. Additionally, it is unknown whether the agencies that consolidate could agree on a level of response regarding the different call types, e.g. if Agency A goes on all ambulance calls but Agency B does not. This is just one example of variations amongst stakeholder departments. Arcata remains committed to its established level of service and meeting the public's expectations.

Arcata recently overhauled its technology systems, including dispatch center workstation consoles and master street address guide (MSAG) programming through its geographic information system (GIS) department and RapidSOS, a vendor of data solutions targeted to the public-safety sector. Arcata has established HSU's police department as its alternate 911 PSAP should their systems fail. However, there are no provisions for access to the computer-aided dispatch (CAD) system or other technology at the backup site.

Exterior security and safety threats are few. It was reported that parking is shared with the public and that no secure parking space exists for personnel. There are no provisions for building security in terms of bollards to prevent crash impacts to the building. There are, however, provisions for securing communications personnel to the inner core of the facility, prohibiting the public from unauthorized access and limiting the public's view into the PSAP.

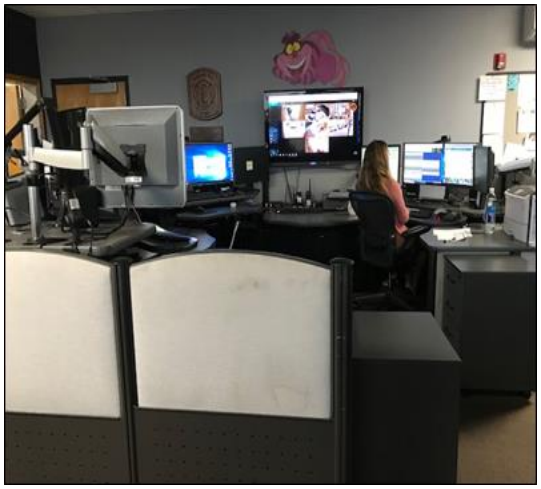
5.4 City of Eureka Police/Fire Communications

The PSAP is located on the second floor of the Eureka police department facility. The public reception area is on the first floor and removed from the PSAP. The reception area is equipped with glass windows to separate staff from the public. Visitors entering the inner core of the building are permitted by staff who controls the locking function on the interior door or visitors are received or escorted by staff.



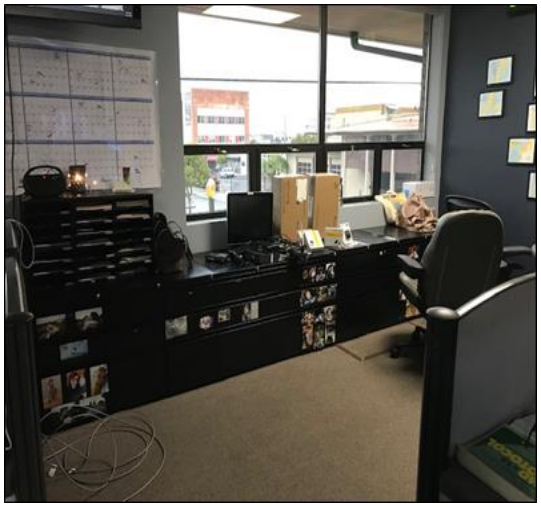
The PSAP is equipped with four console workstations and two additional workstations that are staffed as needed. Staff members report that the center has adequate space for current operations and that the manager's office has

sufficient space. However, separate space for training using communications and dispatch equipment is not available.



The PSAP is well-appointed, modernized and well-maintained. Restrooms are located on the second floor and are accessible to dispatchers. The center provides a comfortable work environment that features large windows that provide a partial view of the bay. Being located on the second floor limits the public's ability to view operations in the center.

New-hire training is conducted in a conference room that is not equipped with CAD or telephone equipment. Training in this regard is conducted on the job.



The PSAP has very few communications related policies. It is reported that new or modified general orders are distributed via email and there are no formal change management procedures in place.

Additionally, there is no office space for shift supervisors or leads, nor room for growth. Adequate space also is lacking for administrative personnel, for spare offices to accommodate future assignments, and for a break room. However, space is available for expansion adjacent to the manager's office. This space formerly was a locker room and includes a restroom. Additionally, staff reported that space is lacking to store and service computers and other communications equipment, and for general storage. Staff members further reported that a plan has not been developed for equipment replacement. Requests for replacement are continually submitted until the equipment is funded.

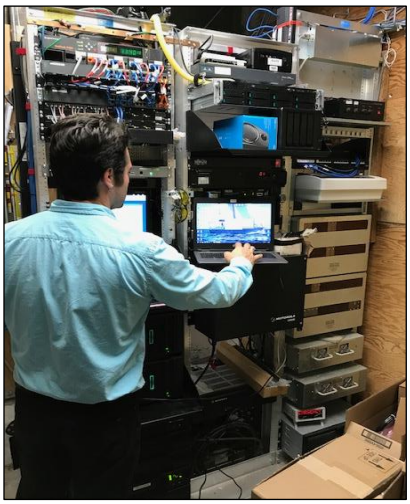
Eureka recently hired a new IT manager who is responsible for maintaining the PSAP's CAD servers. The center's computer and data equipment room is well-organized and -maintained. New uninterruptible power supply (UPS) equipment recently was installed that exceeds the needed capacity of the PSAP and the building. Staff members exercise the PSAP's backup plan monthly.

Parking is allowed in the perimeter of the building and there are no safeguards, such as bollards that reduce crash impacts to the building. Eureka's police department has no provisions for secure parking for personnel, who share the parking area with the public. However, the parking area is lit.

5.5 City of Fortuna Police Communications

The PSAP is located in the main office area of the police department facility. Staff members reported that the building is at capacity and additional space is needed for all department operations.

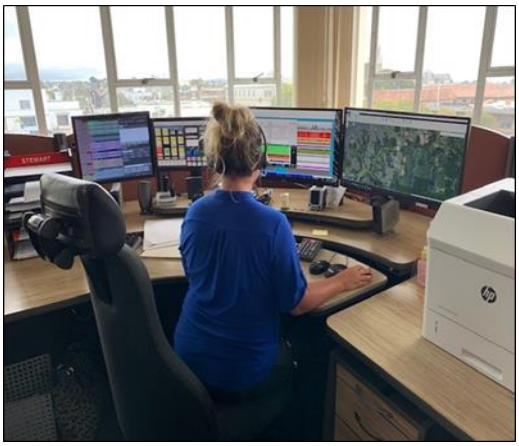
Access to the building is restricted and visitors must be escorted or let in via a remote door control operated by PSAP or office staff. The PSAP serves the Fortuna police, fire department, animal-control and public works departments (after hours). It also serves the Rio Dell and Ferndale police departments. Communication operations are housed in a small room that is equipped with three console workstations. Two positions normally are staffed. The additional position is staffed as needed.



Training for new staff members is conducted at a console position due to the lack of training space. Space is not assigned for a full-time communications manager or administrative staff. The department had made efficient use of the small space assigned to the communications function. Though somewhat cramped, the space is clean and well-appointed. Monitors for Fortuna's security-camera system are mounted above the workstations.

The PSAP's computer room is located in the building's basement. The room contains three equipment racks and serves as a storage space for miscellaneous materials.

5.6 Humboldt County Sheriff's Office Emergency Communications Center



HCSO's PSAP is located on the third floor of the Humboldt County Courthouse at 826 4th Street in Eureka. The courthouse complex houses HCSO, the county jail and courts, and several other county offices. Visitors to the courthouse must complete security screening in the lobby that includes a magnetometer and inspection or X-ray of personal property.

Accessing the PSAP involves traveling by elevator to the fourth floor and then descending a set of stairs to the third floor. The elevator cannot stop on the third floor due to jail operations. The county is under a consent decree to resolve accessibility issues in the building related to compliance with the Americans with Disabilities Act (ADA).

Staff members have done an outstanding job of creating a productive and comfortable work environment. A portion of the PSAP occupies space that once was part of the county jail. Features of the jail still are present in the center. The center includes an operations room with three console workstations, and an enclosed supervisor's office with an additional console position. Each console position has 911 call-handling and radio-dispatch capabilities.

The PSAP space also includes a small data closet, a unisex restroom, a kitchen, and a break area. The exterior walls of the operations room and manager's office primarily are comprised of windows. The windows provide a scenic view that enhances the workspace. However, the windows also represent a hazard during seismic events. Also, though improbable, individuals could target telecommunicators from several nearby multi-level buildings. Industry standards for mission-critical facilities include placing windows high in exterior walls to limit exposure to outside attack.

A restroom is located adjacent to the operations space. Plumbing fixtures still are present in an old jail cell that is located next to the restroom. The plumbing system suffers from frequent blockages that cause wastewater to overflow and spill across the floor. Sewage spills have disrupted PSAP operations; further, spills could damage critical electrical equipment and cabling the sits on the floor beneath the nearby workstations and present bio-hazardous contamination when it occurs.

Space to expand the center is available adjacent to the current space. However, the space still contains jail cells that are of hardened construction. The county is concerned that, given the age of the building, the space may contain hazardous materials, including asbestos. Demolition of the jail cells, remediation of the asbestos, and construction would be difficult to accomplish while maintaining an active communications operation.

The PSAP manager reported that the workstation consoles need to be upgraded. She has contacted vendors to identify design options and costs. A building support column is located within the operations space. The presence of the column limits the ability to reconfigure the placement of workstations.

The center does not have a dedicated training or conference space that is convenient. The manager's office is the only enclosed space in which to conduct employee meetings or other confidential

conversations. Personnel files are maintained in the manager's office, where she reports all personal and personnel-related materials are secure at all times.

A small kitchen is located adjacent to the operations area. An open area around a corner from the operations room has been adapted for a break/lounge area. The center and adjacencies lack a quiet room and a lactation room.

The PSAP is protected by a water-based fire-sprinkler system. Sprinkler heads are positioned in the ceiling above the workstations. A sprinkler head is also located in the small data closet above critical electronics equipment. Condensate drain lines for the air-conditioning system are present above critical electronics equipment as well. Activation of the sprinkler system or leak in a drain line would destroy the center's computer systems. The closet also houses 911 telephone equipment, which also would be at risk if water infiltrates the area.

5.7 Staffing

The primary goal of a staffing analysis is to determine whether a PSAP is staffed appropriately with the number of personnel to ensure efficient processing of emergency calls now and to determine the number of personnel that may be needed in the future; however, the farther into the future one looks, the more difficult it is to predict. Operational efficiency is gauged by comparing statistical data and personnel utilization with appropriate national standards.

Many PSAPs across the country are struggling with staffing shortages. Tenured employees are retiring; others just leave for any number of reasons—shift work, the hours, childcare issues, stress, and better pay in the private sector. While generally there is no lack of applicants for open positions, the often-stringent job qualifications (e.g., background checks, prior drug usage) disqualify many, as does the lengthy application process; it is not unusual for many communications centers to have processes that take as much as six months from application to start date. Thus, PSAPs often find themselves with a revolving door for staff members; unfortunately, many are not able to fill the vacancies before more staff members leave, creating an even larger gap.

MCP's staffing analysis involves a multimodal approach that considers workload, volume- and/or coverage-based staffing, and performance metrics. Volume-based staffing calculates the number of personnel required to handle the volume of the respective data, while coverage-based staffing calculates the number of personnel required to staff a position 24 hours a day, 7 days a week (24 x 7), regardless of need.[2] Coverage-based staffing is used most often because a PSAP generally has a defined operational configuration. However, MCP uses these calculations in tandem. Statistical calculations are balanced with operational logistics to identify how many personnel are needed for a PSAP to achieve its performance goals while providing efficient and effective service. MCP analyzes the resulting data, considering a respective PSAP's operational configuration, to determine staffing requirements.

Additional information on the staffing analysis methodology and the statistical calculation used (including any assumptions made) can be found in Appendix B, Staffing Methodology.

[2] For example, if fire call volume is low, perhaps one person could handle all the traffic based on the provided statistical data. However, this is not realistic as one person cannot work 24 x 7. In this case, coverage-based staffing would be used to calculate the number of staff required to staff the fire position 24 x 7.

5.7.1 Current Staffing

To determine the overall potential staffing for a consolidated center, the staffing of each PSAP was evaluated individually. Staffing shortages from one (or more) of the centers within the proposed consolidation can affect the overall staffing needs of the consolidated PSAP. Staffing shortages should be addressed as soon as fiscally possible, to minimize the negative impact said staffing could have on a newly consolidated PSAP. When reviewing the data, MCP calculates the true number of available hours for a full-time equivalent (FTE). FTE's work 2,080 hours in a year, based on traditional workforce hours. Then, based upon local personnel rules and negotiated leave hours, all hours that take the employee away from their post are deducted. The results identify the true time that an employee performing duties at their post and that number is used as opposed to the commonly asserted 2080 hours.

It should be noted that the following staffing recommendations based on current configurations include shift supervision. To meet span-of-control standards as well as provide proper leadership around the clock, management should consider the addition of a supervisor position per shift (i.e., four supervisors for an agency with four shifts on a 12-hour rotation). Supervisors can provide supervision while also serving as call-taking or dispatch backup or providing shift relief. Shift supervisors also can assist management with administrative tasks, such as conducting training (new hire and continuing education), performing quality-assurance reviews, and counseling employees.

5.7.1.1 Arcata Police Communications

This PSAP is authorized for, and currently employs, six full-time employees and one part-time employee. The agency staffs a single telecommunicator around the clock, handling both call-taking and law-enforcement dispatching duties.

Based on the provided data, staffing one position 24 x 7 within this PSAP requires 5.6 telecommunicators, without attrition, as indicated in the table below. With attrition, 6.2 telecommunicators are needed. One position is staffed around the clock, which is appropriate for the agency's low call and incident volumes. During peak hours of the day, a single call-taker should be able to answer emergency and non-emergency calls and meet industry standards, while also handling dispatch duties.

Table 1: Arcata Police Communications Coverage Staffing

FTEs[3] for Coverage		
A	1	Total number of console positions to be covered
B	24	Number of hours per day that need to be covered
C	7	Number of days per week that need to be covered
D	52	Number of weeks per year that need to be covered
E	8,736	Total hours needing coverage (A x B x C x D)
Telecommunicator Availability:		
F	1,562.00	True availability per telecommunicator
FTEs Needed:		
G	5.6	FTE base estimate (FTE) = E / F
H	10.3%	Attrition rate
I	6.2	FTEs required to accommodate turnover

5.7.1.2 Eureka Police Communications

This PSAP is authorized for ten full-time employees, with two current vacancies. The agency staffs three telecommunicators per shift—one call-taker, one law-enforcement dispatcher and one fire dispatcher.4

Based on the provided data, staffing one position 24 x 7 within the center requires 4.2 telecommunicators, without attrition, as indicated in the table below. With attrition, 4.3 telecommunicators are needed. One position is staffed around the clock for call-taking duties; during peak hours of the day (9:00 a.m. – 6:00 p.m.), two call-takers are needed to answer emergency and non-emergency calls and meet industry standards. This requires one call-taker position more than the current staffing. A power shift would be appropriate through the busiest times of the day to accommodate this surge in incoming call volume. A single position is dedicated to law-enforcement communications, with another dedicated to fire/rescue/EMS communications.

To staff three positions around the clock with a power shift position during peak hours, 13 full-time telecommunicators are needed (including attrition). Not including the two current vacancies, this PSAP is short staffed by five full-time positions based on optimal shift staffing.[5] [6]

[3] Full-time equivalents.
[4] Eureka Police Communications is the only agency involved in this assessment that dispatches fire department resources.
[5] Using a 12-hour shift rotation, 13 personnel divides as three personnel per shift with an additional employee who can be scheduled over the busiest hours of the week.
[6] MCP acknowledges that most entities are not able to recognize a significant increase to authorized strength during a single budget cycle. MCP recommends incremental increases over several years to reach appropriate FTE strength.

Table 2: Eureka Police Communications Coverage Staffing

FTEs for Coverage		
A	1	Total number of console positions to be covered
B	24	Number of hours per day that need to be covered
C	7	Number of days per week that need to be covered
D	52	Number of weeks per year that need to be covered
E	8,736	Total hours needing coverage (A x B x C x D)
Telecommunicator Availability:		
F	2,066.11	True availability per telecommunicator
FTEs Needed:		
G	4.2	FTE base estimate (FTE) = E / F
H	3.3%	Attrition rate
I	4.3	FTEs required to accommodate turnover

5.7.1.3 Fortuna Police Communications

This PSAP is authorized for, and currently employs, five full-time employees. The agency staffs a single telecommunicator around the clock, handling call-taking, law-enforcement and fire dispatching duties.

Based on the provided data, staffing one position 24 x 7 within the center requires 5.6 telecommunicators, without attrition, as indicated in the table below. With attrition, 6.2 telecommunicators are needed. One position is staffed around the clock, which is appropriate for the agency's low call and incident volumes. During peak hours of the day, a single call-taker should be able to answer emergency and non-emergency calls and meet industry standards, while also handling dispatch duties.

Table 3: Fortuna Police Communications Coverage Staffing

FTEs for Coverage		
A	1	Total number of console positions to be covered
B	24	Number of hours per day that need to be covered
C	7	Number of days per week that need to be covered
D	52	Number of weeks per year that need to be covered
E	8,736	Total hours needing coverage (A x B x C x D)
Telecommunicator Availability:		
F	1,562.00	True availability per telecommunicator
FTEs Needed:		
G	5.6	FTE base estimate (FTE) = E / F
H	10.3%	Attrition rate
I	6.2	FTEs required to accommodate turnover

5.7.1.4 Humboldt County Sheriff's Office Communications

This PSAP is authorized for nine full-time employees. The agency staffs a single telecommunicator around the clock, handling both call-taking and law-enforcement dispatching duties.

Based on the provided data, staffing one position 24 x 7 within the center requires 5.2 telecommunicators, without attrition, as indicated in the table below. With attrition, 7.2 telecommunicators are needed. For optimum staffing during peak hours of the day, two call-takers are needed to answer emergency and non-emergency calls and meet industry standards. This requires one call-taker position more than the current staffing.

To meet industry call-answering standards, as well as provide for adequate service for emergency responders, separating the call-taker and dispatcher positions could prove advantageous. During times of peak volume, the radio dispatcher could answer overflow calls while still maintaining situational awareness over the law-enforcement radio. In doing so, the radio dispatcher potentially would realize a decrease in the amount of time spent on the phone while trying to comprehend radio traffic.

To staff two positions around the clock, 10 full-time personnel are needed.

Table 4: HCSO Communications Coverage Staffing

FTEs for Coverage		
A	1	Total number of console positions to be covered
B	24	Number of hours per day that need to be covered
C	7	Number of days per week that need to be covered
D	52	Number of weeks per year that need to be covered
E	8,736	Total hours needing coverage (A x B x C x D)
Telecommunicator Availability:		
F	1677.93	True availability per telecommunicator
FTEs Needed:		
G	5.2	FTE base estimate (FTE) = E / F
H	39.6%	Attrition rate
I	7.3	FTEs required to accommodate turnover

5.8 Technology

The participating PSAPs operate various disparate systems and some shared systems. During the data-collection process, participants were asked a variety of questions pertaining to systems used, and upgrades or replacements recently installed or on the horizon. In addition to data collected while onsite, a comprehensive survey was distributed that requested information on said systems, which enabled MCP to gauge whether core systems are at end of life or otherwise in need of replacement.

5.8.1 Core Technologies

The requested data encompassed core technologies including CAD systems, records management systems (RMS), automatic vehicle location (AVL) systems and mobile data systems (MDS).

5.8.2 Computer-Aided Dispatch

All four participating agencies use Sun Ridge Systems' RIMS CAD system. Each agency implemented its respective system within the last five years. All four agencies use the RIMS Collaborative feature that allows each agency to view all others' CAD and RMS data. For a region with a dense population within a relatively small geographical footprint, it was a smart choice to implement this feature.

Three of the four agencies reported that they do not operate a redundant CAD server at this time. Agencies that do not run redundant CAD servers are indicated with an asterisk in the table below, which contains data provided by the agencies.

Table 5: Core Technologies

Sun Ridge RIMS CAD						
	Installed	Version	Licenses	CLETS/ NCIC[7]	Last Upgrade	Common Features
Arcata PD*	Nov. 2014	25.09	Unlimited	Yes		Unit recommendation AVL Premise hazards
Eureka PD	2017	25.08.4	Unlimited	Yes + eAgent (warrants)	Feb. 2019	Unit recommendation Premise hazards
Fortuna PD*	July 2015	26	Unlimited	Yes		Unit recommendation AVL Premise hazards
HCSO*	Sept. 2018	26.05.8	Unlimited	Yes		Unit recommendation Premise hazards

*Agencies do not run a redundant CAD server.

5.8.3 Analysis

For the most part, stakeholder agencies are in good position concerning the status of the current CAD systems. Sun Ridge Systems' RIMS suite is known to be a user-friendly product, with timely updates and reliable support. Not all stakeholder agencies have optimized the features available with this product, which would need to be addressed for alignment in a consolidated environment. All agencies stated satisfaction with the product and were not seeking replacement any time soon. It should be noted that

[7] California Law Enforcement Telecommunications System/National Crime Information Center

although HSU's police department does not participate in the collaborative network and thus is not included in this study, it also operates a RIMS CAD system.

5.8.4 Other Core Technologies

Other core technologies include this identified in the table below:

Table 6: Other Core Technologies

Agency	MDS	AVL	RMS	Call-Handling	Logger/ Recorder	Radio
Arcata PD	RIMS v16 Toughbook hardware	RIMS	RIMS v25.09 plus mobiles	Motorola Vesta (July 2019)	Nexlog (2013)	Avtec Scout consoles (2016)
Eureka PD	RIMS v16 Toughbook hardware	RIMS, but not deployed	RIMS v25.08 plus mobiles	Motorola Vesta (2017 upgrade) IP Windows 8	AT&T 2014	Motorola trunked (2019)
Fortuna PD	RIMS GeTec hardware	RIMS	RIMS	Motorola Vesta (July 2019)	Goserco Inc, Verint Media Recorder	Moducom
HCSO	RIMS GeTec hardware	None	RIMS v25.08	Motorola Vesta (2014) Windows 7	Stancil (2015 upgrade)	Avtec consoles

5.8.5 Mobile Data Systems

All stakeholder agencies are equipped with mobile data systems. They use the RIMS mobile CAD client. All user agencies report satisfaction with the product and appear to use industry-standard mobile-computing hardware.

5.8.6 Automatic Vehicle Location Systems

Two of the four agencies use the RIMS AVL features. The AVL solution is native to Sun Ridge's mobile client and can facilitate a common operating picture and efficient allocation of resources for those who use it.

5.8.7 Records Management Systems

All four agencies use the Sun Ridge RMS and all report they are satisfied with the product.

5.8.8 Call-Handling Equipment

The three police departments have call-handling equipment (CHE)—also known as customer premises equipment, or CPE—that will be at end of life within five to seven years. Funding from the State Emergency Telephone Number Account (SETNA), obtained through the California Governor's Office of Emergency Services' (Cal OES's) 911 Office can be used for replacement. HCSO also has CHE that is nearing end of life, but is eligible for years five, six and seven years of vendor maintenance that can be funded or reimbursed by SETNA.

All stakeholder CHE is reported to be:

- Phase I ready
- Phase II ready
- Interfaced with the CAD system for ALI/automatic number identification (ANI) functionality
- Capable of the rebidding function used to more accurately locate a wireless 911 caller

Additionally, Arcata and Fortuna Police Departments, who installed their systems in the last few years have CHE systems that feature an integrated text-to-911 solution. To date, the PSAPs in the county have not submitted their intention to Cal OES regarding implementation of this function. It is worth noting that the California legislature recently passed Assembly Bill 1168, which requires text-to-911 implementation to include short message service (SMS) and real-time text (RTT) functionality at all PSAPs in the state by January 1, 2021.

All four agencies report that the number of 911 trunks allotted to them are sufficient.

5.8.9 Logging/Recording Systems

All four agencies are using disparate systems for logging/recording. HCSO reported that the system it is using is not user friendly. Fortuna PD recently replaced their system when replacing their call-handling equipment. Arcata and Eureka are within one to two years of being able to replace their systems using SETNA funds from Cal OES.

5.8.10 Radio Communications

Each of the stakeholder agencies operate and maintain their own radio systems.

Arcata's PSAP uses the two police channels identified in the table below and does not transmit on the other frequencies assigned to the city.

Table 7: Arcata Radio Frequencies

Arcata

Frequency	License	Type	Tone	Alpha Tag	Description	Mode	Tag
155.43000	KMA433	RM	146.2 PL	Arcata PD1	Police Dispatch	FM	Law Dispatch
154.65000	KMA433	BM	146.2 PL	Arcata PD3	Police Channel 3	FM	Law Tac
154.13000	KAR819	RM	192.8 PL	Arcata FD1	Fire Dispatch/Tactical	FM	Fire Dispatch
151.12250	KAR819	BM	192.8 PL	Arcata FD2	Fire Tactical 1	FM	Fire-Tac
155.76750	KAR819	BM	192.8 PL	Arcata FD3	Fire Tactical 2	FM	Fire-Tac
152.40500	WQGL912	RM	151.4 PL	Arcata Amb 1	Arcata Mad River Amb - Dispatch	FM	EMS Dispatch
155.17500	KUE648	BM	151.4 PL	Arcata Amb 2	Arcata Mad River Amb - Secondary	FM	EMS-Tac

Eureka's PSAP uses the two police frequencies identified in the table below. The car-to-car channel is a simplex channel. The PSAP dispatches on the fire dispatch channel, and fireground channels are assigned for tactical use when needed. The PSAP does not transmit on the EMS or zoo channels but does transmit on the public-works channel during on-call, after-hours incidents.

Table 8: Eureka Radio Frequencies

Eureka

Frequency	License	Type	Tone	Alpha Tag	Description	Mode	Tag
154.95000	KMA523	RM	100.0 PL	Eureka PD1	Police Dispatch	FM	Law Dispatch
156.03000	KMA523	RM	100.0 PL	Eureka PD3	Police Tac	FM	Law Tac
155.61000		M		Eureka PD	Police Car-to-Car	FM	Law Talk
154.37000	WQBK597	RM	141.3 PL	Eureka FD1	Fire Dispatch	FM	Fire Dispatch
154.43000	KMH646	BM	103.5 PL	Eureka FD2	Fire Tac 2	FM	Fire-Tac
154.32500	KCV425	BM	107.2 PL	Eureka FD3	Fire Tac 3	FM	Fire-Tac
153.95000	KCV425	RM	100.0 PL	Eureka FD4	Fire Command	FM	Fire-Tac
462.97500	WXB963	BM	85.4 PL	Eureka EMS	EMS Dispatch	FM	EMS Dispatch
152.36000	WPUS392	B	192.8 PL	EMS Paging	EMS Paging	FM	EMS Dispatch
154.04000	WNSG290	BM		Eureka PW	Public Works	FM	Public Works
156.00000	WPLP621	M		Eureka Zoo	Zoo/Sequoia Park	FM	Public Works

Fortuna's PSAP uses the one police channel identified in the table below and two tactical channels. They do not transmit on the other frequencies assigned to the city. They also transmit on the assigned Public Works channel after-hours.

Table 9: Fortuna Radio Frequencies

Fortuna

Frequency	License	Type	Tone	Alpha Tag	Description	Mode	Tag
155.25000	KNEJ762	RM	CSQ	Fortuna PD	Police Dispatch	FMN	Law Dispatch
154.23500	WNKH975	BM		Fortuna FD Disp	Fire Dispatch	FMN	Fire Dispatch
153.83000		M	CSQ	Fortuna FD Tac 1	Fire Tac 1	FMN	Fire-Talk
154.31000		M	CSQ	Fortuna FD Tac 2	Fire Tac 2	FMN	Fire-Talk

The only countywide mutual-aid channel available is the statewide channel named CLEMARS (California Law Enforcement Mutual Aid Radio System), which also operates in the VHF band (150 MHz). Each law-enforcement agency has this frequency installed in mobile and portable radios used by patrol officers for interoperability, but it is reported to be unreliable due to inadequate coverage in outer areas. The cities of Fortuna and Eureka police departments also have NLEMARS (National Law Enforcement Mutual Aid Radio System).

HCSO's PSAP operates on the frequencies identified in the table below:

Table 10: HCSO Radio Frequencies

Sheriff

Frequency	License	Type	Tone	Alpha Tag	Description	Mode	Tag
154.74000	KMF377	RM	192.8 PL	Humboldt Co SO1	Dispatch	FM	Law Dispatch
155.07000	KUJ569	BM	CSQ	Humboldt Co SO3	Tac 3	FM	Law Tac
155.85000	WPJP621	M	CSQ	Humboldt Co SO4	Tac 4	FM	Law Tac
45.96000	KZO475	BM		Humboldt Co SAR	Search and Rescue	FM	Law Tac
460.12500	WNVC241	RM		Humboldt Co Crt	Court Security	FM	Law Tac
460.40000	WNNC341	RM		Humboldt Co Jail	Jail	FM	Corrections

The dispatch channel, and the Tac 3 and Tac 4 channels, are the only channels that are used for day-to-day operations and to interact with the PSAP. The PSAP does not monitor the court-security or jail frequencies but does monitor the search-and-rescue frequency when there is an activation. During the onsite interviews, MCP personnel met with an HCSO captain, who was tasked with a $4 million radio-system replacement project. Motorola is projected to implement a Project 25 (P25) Phase II-compliant, 800 megahertz (MHz) trunked radio system in November 2019. To date, only county agencies will utilize this system. The new portable radios will be Global Positioning System (GPS)-enabled, which is a useful feature. The new system will operate four talkgroups, one for patrol and three tactical channels.

The very-high frequency (VHF) frequencies used for the existing land mobile radio (LMR) system provides generally reliable coverage given the county's topology. However, dead spots exist in the county. While few radio systems are able to deliver 100 percent reliability regarding coverage and capacity, it nevertheless is vexing when dead spots are discovered or encountered when critical incidents are in progress. When this occurs, the default strategy is to use cell phones, which effectively become a "car-to-car" frequency, leaving the PSAP out of the mix. This was reported to have taken place during the Twin Trees Incident; while the default strategy is innovative and somewhat reliable, the "all points" connectivity provided by an LMR system is essential for all involved. It is anticipated that the dead spots will be addressed in the new system design and that more channels will become available for primary responders and allied agencies.

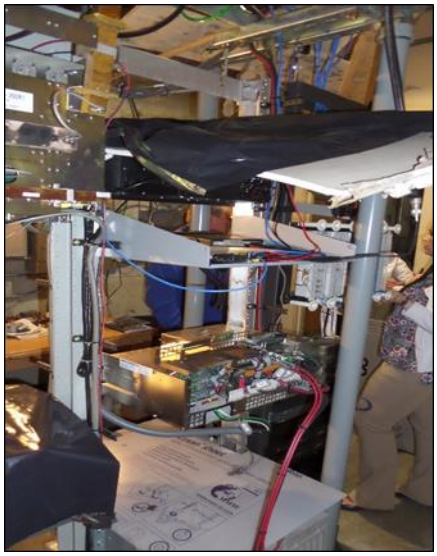
5.8.11 Radio System

The County's radio equipment room is located on the fifth floor of the courthouse. The room is accessible off a main corridor. The radio room is accessed through an anterior room that houses the building's mechanical equipment, including an air-handling unit.

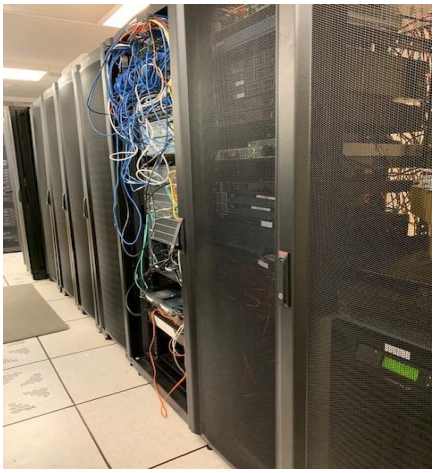
The space, given its configuration, is not suitable for housing critical and sensitive electronic equipment.

The radio room has experienced water leaks from the roof. A series of tarps and makeshift water chutes have been positioned above critical electronics equipment that is mounted in racks. County staff members reported that the radio equipment will be moved to an alternate space or the problems will be repaired before the new radio system is installed.

The room is protected by a smoke-detection system and water-based fire-sprinkler system. Activation of the sprinkler system would damage critical electronics equipment. A cursory inspection of the grounding system revealed deficiencies that need to be corrected. The grounding system protects electronics equipment from overcurrent conditions resulting from lightning and other electrical surges. The lighting in the room is provided by several temporary work lights. The pendant lighting in the room was inoperable.



5.8.12 County Information Technology Division



The County's IT division maintains the technology that supports HCSO's call-handling and dispatch operations. The IT division's offices and the County's data center are located across the street from the PSAP to the east of the courthouse. The single-story brick building was constructed in 1977 and has served several functions. The building rests at ground level and is susceptible to flooding during a tsunami. The building appears to be of commercial-grade construction but is not hardened to withstand seismic events. Staff members reported a desire to relocate the data center to a more risk-adverse environment, but such a move appears to be cost-prohibitive.

Emergency power for the data center is provided by the same generator that serves the courthouse and jail. The generator is tested monthly. However, load testing rarely occurs due to possible disruptions that would negatively affect jail operations. The data center is compliant with Criminal Justice Information Services (CJIS) and the California Law Enforcement Telecommunications System (CLETS) security requirements.

The IT division maintains the public-safety servers that include the CAD production, training, and failover servers. They are backed up every other night.

The County utilizes leased fiber-optic lines for connectivity to the four PSAPs. The city PSAPs access the County's system through a virtual private network (VPN). There are few vendors in this marketplace that can provide redundancy if a catastrophic failure occurs.

IT division staff members reported that technology upgrades completed in HCSO's PSAP reduced the number of trouble tickets being submitted. Staff members are trained to support the center's various applications, but they are not subject-matter experts (SME) in public-safety applications. The staff members indicated that current staffing levels will not support the anticipated increased workload that would accompany a PSAP consolidation. Additional IT staff members would be required to provide the 24 x 7 support required by a consolidated PSAP.

5.9 Mapping and GIS

All four agencies use Google Maps, which is interfaced to Sun Ridge's CAD system, for response-location purposes. Using this mapping application enables all agencies to view locations countywide, as opposed to only those locations within each agency's jurisdiction. This facilitates mutual-aid response.

All stakeholder agencies have their own CHE interfaced with the aforementioned mapping display application.

The County's GIS is managed by the planning and building department. There is no direct relationship between this department and the public-safety applications.

Arcata's police department is the only agency that reports using GIS to manage its MSAG maintenance. The department has interfaced its CHE mapping system with an Esri ArcGIS/Google interface to determine incident location on a map. The other agencies do not use GIS-integrated solutions in their PSAPs or MDS. Arcata indicates that it uses a Phase II-compliant GIS solution, which is updated annually, and that its city-specific GIS layers—which are underused— are trail maps; they further indicate that they do not intend to use any public-safety-specific layers in the future.

5.9.1 Associated Technologies

What makes communications centers complex, in part, is the plethora of technologies and applications beyond CHE and the CAD system that are implemented in them. Some of these technologies stand alone, while others interface with CHE and the CAD system. The table below identifies the associated technologies that stakeholder agencies have deployed:

Table 11: Associated Technology

Agency	Scheduling Software	Field Reporting	Text-to-911	Public Surveillance Cameras	Alarm Board	Gunshot Location
Arcata PD	Telestaff Visual Scheduler	No	No	No	No	No
Eureka PD	No	Yes	No	Facility only	No	No
Fortuna PD	Adaltec Scheduling	Yes	Yes	City Properties (public views only) and Parks	No	No
HCSO	No	No	No	No	No	No

5.10 Operational Functions

The core functions in a PSAP vary from agency to agency across the country. The size of the center, where they are located, and governance often determine what is considered a core function. While a particular PSAP's core functions might seem obvious, it is important to identify the actual current core functions in the event that those functions change in the future.

Table 12: Operational Functions

Core Functions							
Agency	911 Call Handling	Radio Dispatch	7-Digit Emergency Number Call Handling	Abandoned Call/ Call Back	City/County Services	Animal Control Dispatch	Administrative Telephone Lines
Arcata PD	Yes	Yes	Yes	Yes	Yes	Yes	No
Eureka PD	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fortuna PD	Yes	Yes	Yes	Yes	Yes	Yes	Yes
HCSO	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Often an agency has to transfer emergency calls to another agency that is more appropriate. Typically, this happens when a police department receives a call requesting fire/rescue/EMS response. But it also occurs when calls are misrouted due to an inability accurately locate the caller.

All stakeholders, with the exception of Eureka and Fortuna, transfer calls requesting fire/rescue/EMS response to Cal FIRE or the appropriate agency. Eureka and Fortuna relay call information to the appropriate EMS provider. All agencies use the proper call-transfer procedure, whereby law-enforcement call-takers stay on the line until the receiving call-taker answers and an announcement is made that the call is being transferred; at that point, the law-enforcement call-taker disconnects and the receiving call-taker assumes responsibility.

In terms of 911 call-processing performance, all agencies report that they comply with the National Emergency Number Association (NENA) and Cal OES standards.

5.11 Non-Core Functions:

PSAPs typically perform the core functions of 911 call-taking and emergency response dispatch, along with some additional support functions. The non-core functions will have an impact on decisions made by some of the PSAPs in the county regarding consolidation. The non-core functions performed by some or all of the PSAPs are as follows:

- Private-property tows (and related CLETS status checks)
- Repossessed vehicle tows (and related CLETS status checks)
- Abandoned vehicle tows (and related CLETS status checks)
- City wastewater (lift station auto dialers)
- Lost/found property
- Child custody orders
- Child Welfare Service

- Vacation house checks
- Ride-along application processing
- Detention and prisoner monitoring (one agency monitors temporary holding cells)
- Front counter (two of four agencies greet the public)
- Warrant confirmation (all four agencies perform warrant confirmation)
- Tow (impound) vehicle releases and related CLETS status checks (two of four agencies perform walk-up vehicle releases and all four agencies perform CLETS entries)
- Building access control (two of four agencies perform these duties)
- Phone/dispatch support of non-public-safety agencies (two of four agencies perform these duties)
- Emergency warning sirens and public notifications (all four agencies provide this function)

Independent of typical public-safety technology is the use of social media. It is reported that social media is used by each agency's public information officer (PIO) or other designated personnel. The gap in communication occurs when PIOs or others post information that has potential to impact the PSAP. This is not exclusive to Humboldt County law-enforcement agencies but impacts all agencies that interact with social media and use it as a communications tool to reach other public agencies and the public at large.

5.12 Workforce

A minimum of eight telecommunicators on duty at any given time between the four agencies. According to the data provided, a total of 33 full-time and 0.5 part-time telecommunicators are authorized to staff the four PSAPs. All PSAP staff members are members of an existing collective-bargaining Organization or Police Officers Association bargaining unit. Personnel work 8-hour or 12-hour shifts, with 12-hour shifts being the more prevalent.

Table 13: PSAP Personnel Breakdown

PSAP	Total # Authorized Dispatch Staff	Total (as of 7/19)	Base Salary Range	Incentives, Stipends and Differentials	Shift Configuration
Arcata PD	**6.5**	**6.5**			
Dispatcher	6.5		$40,898 – $49,712	• Bilingual • Longevity • Certificates	Combination (8 and 12 hours)
Senior Dispatcher	0		$42,993 – $52,258		
Supervisor	1		$51,506 – $62,607		
Eureka Fire/PD	**12**	**6**			
Dispatcher Trainee	5		$24,960 – $30,341		
Dispatcher	4		$ 38,663-46,996	• Longevity • Certificates • Training	12-hour shifts
Senior	1		$42,507-$51,669		
Supervisor	1		$46,964 – $57,086		
Manager	1		$63,346 – $76,999		

PSAP	Total # Authorized Dispatch Staff	Total (as of 7/19)	Base Salary Range	Incentives, Stipends and Differentials	Shift Configuration
Fortuna PD	**5**	**5 FTE .5 PTE**		Longevity, Certificate Pay, Bilingual Pay Shift Differential	12-hour shifts
Dispatcher Trainee			$34,159 – $41,560		
Dispatcher	6		$40,761 – $49,591		
HCSO	**9**	**5**		• Longevity	12-hour shifts
Dispatcher	7		$41,974 – $53,872		
Senior Dispatchers	2		$52,270 – $62,608		
Supervisor	1		$67,080		
	33.5				

Three of the four stakeholder agencies stated that they have experienced roadblocks regarding recruitment, hiring, and selection of new staff. The stated roadblocks include the following:

- Long and tedious process in a market where finding candidates who can and want to do the job— and who can pass the background-check process—is challenging
- Little strategic or pre-planning for recruitment efforts pertaining to telecommunicators; most efforts are towards sworn personnel
- POST pre-employment battery tests are not provided enough times throughout the year
- Human resources assistance causes impediments
- Pay inequity
- Job demands and constant excessive overtime

Overall, the current state is staffing shortages of line staff, in where the solutions are supervisors/managers having to work shift work and deferring their duties, excessive amounts of overtime allocated to existing staff and filling vacant shifts with sworn personnel.

5.13 Workload

The four stakeholder agencies reported workload indicators that are identified in the table below. For the purposes of this report, it is appropriate to discuss what these indicators represent. When examining and describing workload, some terminology often is used interchangeably, particularly when referring to an event that requires the dispatch of emergency responders. Yet there is a difference.

“Calls” reflect incoming messages or signals from the public via a wireline, wireless, or Voice over Internet Protocol (VoIP) device, a text message delivered by a wireless or TTY/TDD[8] device, or other means of

[8] Teletypewriter/telecommunications device for the deaf.

communicating through the telephony network or internet, as well as outgoing calls by a telecommunicator (e.g., text-*from*-911).

In contrast, an "incident" is an event that is created in a CAD system or other means of logging the activity, that may or may not require the dispatch of emergency responders. Not all calls result in an incident, and not all incidents are the result of a call. For example, a person initially may call to request police to consult with them about a parking problem, but during the ensuing discussion, the telecommunicator was able to resolve the call. As another example, a police officer may initiate a vehicle stop, which results in the creation of an incident, but was not the result of a call from a person or device.

Table 14: PSAP Core Workload Statistics

	911 Calls	Other Calls	CAD Incidents	Population
Arcata PD	7,825	54,507	35,834	17,231
Eureka PD	29,150*	80,348*	73,994	50,000 (PD and FD service area)
Fortuna PD	5,272	27,690	22,677	12,191
HCSO	27,117	132,231	60,308**	136,754

*Average four-year statistics from 2014-2017; 2018 data was not available.

**First six months of CAD data was extrapolated to determine an average current statistic, due to legacy CAD data being non-existent.

5.14 Facilities

Four facilities house the four PSAPs. The city PSAPs are housed within each police department facility, while HCSO's PSAP is in the county courthouse, on an upper floor in a space that formerly housed jail inmates.

In a pre-site visit questionnaire, stakeholder representatives were asked about facility conditions and the space allotted to their respective PSAP—specifically they were asked to assess current space issues and whether the space was adequate for growth. The table below summarizes their answers.

Table 15: Facility Space Breakdown

	Arcata PD	Eureka Fire/PD	Fortuna PD	HCSO
Dispatch floor	Yes	Ok	No	No
Manager office	Ok	Yes	N/A	Yes
Assistant manager office	Ok	N/A	N/A	N/A
Administratively assigned offices	Ok	NG	N/A	N/A
Shift supervisor/lead office	No	NG	N/A	No
IT/systems offices	Yes	Yes	N/A	N/A
Spare offices (for growth)	No	NG	N/A	NG
Training room (academic)	N/A	NG	N/A	NG
Training room (CAD laboratory)	N/A	NG		NG
Reception/waiting area	No	N/A		NG
Storage	No	No		Yes
Copy center/mail room	No	N/A		N/A
Break room	Yes	NG		No
Conference rooms (secure area)	Yes	Yes		No
Conference rooms (public)	N/A	N/A		No
Quiet room	N/A	Ok		N/A
Computer/backroom	No	No		NG
Electronic equipment room	No	No		Yes
Locker room	No	Yes		No
Restrooms (non-public)	Yes	Yes		Yes
Kitchen facility	Ok	N/A		Yes

	Arcata PD	Eureka Fire/PD	Fortuna PD	HCSO
Generator area	Ok	No		N/A
Exercise area	N/A	Yes		N/A
Outside patio space	N/A	N/A		N/A
Emergency operations center	Ok	NG		NG
Emergency operations satellite rooms	Ok	NG		NG

Key: No – Not nearly enough space for this area
Yes – Plenty of space for this area
NG – No space for growth in this area
Ok – Satisfied with the space for this area
N/A – Not applicable
Highlight – Easily identifiable trend

In addition to space needs, questions were asked regarding security measures in place for employees, the table below summarizes their answers.

Table 16: PSAP Security Measures

	Arcata PD	Eureka Fire/PD	Fortuna PD	HCSO
Secure parking area	No	No	No	No
Lighted parking area	Yes	Yes	Yes	No
Perimeter facility security barrier from public access	No	No	No	Yes
Interior/core building security barring public entry	Yes	Yes	Yes	Yes
Zone security (e.g., entry doors) barring public entry	Yes	Yes	Yes	Yes
Visibility via windows is obscure, limiting public view	Yes	Yes	Yes	Yes
Exterior intercom or phone connection to dispatch for public access	Yes	Yes	Yes	Yes
Public parking in the perimeter is barred	No	No	No	No

	Arcata PD	Eureka Fire/PD	Fortuna PD	HCSO
Lobby has transaction window and ballistic barriers	No	Yes	No	No
Exterior bollards	No	No	Yes	No

Key: No – Not nearly enough space for this area
Yes – Plenty of space for this area
NG – No space for growth in this area
Ok – Satisfied with the space for this area
N/A – Not applicable
Highlight – Easily identifiable trend

5.14.1 Facility Space Needs, Conditions and Security Summary

With professionalizing public-safety communications and dispatch services in the 1970s and 1980s, public agencies met the demand to provide space for 24 x 7 operations to support these services. More than 30 years later, these facilities no longer are suitable for communications/dispatch services for various reasons. Most notably, public-safety agencies find that older facilities are inadequate due to:

- Growth and space needs—Public-safety workstations that accommodate eight to 10 flat screens and various pieces of technology require a minimum of 80 square feet per workstation. Generally, space for two (or more) workstations for each telecommunicator can be difficult to accommodate in older buildings where office space does not lend itself to today's public-safety operational space needs.

- Infrastructure and wiring—Aging facility infrastructure cannot accommodate the tunneling and/or electrical capacity needed for modern equipment.

- Facility accommodations—Typically when public-safety communications and dispatch services started up in the 1970s and 1980s, staff members worked eight-hour shifts, like most other government workers. That shift configuration did not, at the time, warrant kitchen facilities, and restroom facilities were shared with other offices. There are still entities that have telecommunicators take a portable radio with them when using the restroom because the facilities are not close by and/or because staffing is inadequate to accommodate a spontaneous relief break.

- Retrofitting—Transitioning an existing facility to meet the needs and codes of today's environment is costly; for some entities, it is cost prohibitive.

Amongst the four stakeholder agencies, one common facility is used for training. It was reported that the 3030 L Street facility is inadequate for this purpose; even if it were adequate, it is not on ground high enough to forestall a tsunami. It also was reported that the facility is situated next to a Department of Public Works water tower, which represents another possible hazard.

The three city police departments are in aging facilities but have made great strides to modernize the space utilized by their PSAPs. All facilities are well-maintained, and the space is utilized to the greatest extent possible. The following section describes the current operating environment for each of the four stakeholders.

6 PSAP Operating Environments

The current environment is known and felt by all who work for the respective agencies we visited. There are no surprises to uncover in the current environment; there are, however, trends that should be assessed and documented as each stakeholder agency moves toward the future state. The most relevant areas are as follows:

- PSAP and associated technology
- Network connectivity
- GIS and mapping
- Non-core functions
- Workforce
- Workload
- Facilities

Overall, the four stakeholder agencies receive an A+ grade for overcoming and improvising in their current environment.

PSAP and associated technology—Overall, the technology used by each stakeholder agency today is satisfactory in terms of the user experience. However, there are areas of improvement that should be addressed—even if consolidation doesn't immediately take place—to ensure system reliability, such as:

- All agencies should reevaluate their equipment and the rooms that house the equipment to ensure sound environments that secure the technology from external elements and provide structural stability.
- All agencies should reevaluate storage needs and relocate items that are stored in technology equipment rooms. In doing so, risk is reduced by limiting unauthorized personnel from entering this space for needs other than servicing the equipment that is housed there.
- Two out of the four agencies are using the RIMS AVL. This indicates that the remaining two agencies have yet to optimize the use of their state-of-the-art equipment. When optimized, and agreements are in place, a common operating picture can benefit all stakeholders.

Network and connectivity—Network connectivity is leased and therefore the County and municipalities are forced to rely on the vendors regarding connectivity and reliability. While a network failure was not reported during our interviews, the stakeholder agencies are in position to ensure that their technology connected to these vendor-provided networks is well-protected from cyber threats and that redundancies are in place to ensure continuity of operations.

GIS and mapping—None of the agencies using GIS-based public safety mapping solutions with customer-defined public-safety GIS layers. Rather, they rely on access to commercial mapping systems when needing something other than the mapping solution native to the RIMS product.

For the PSAPs to be ready to implement Next Generation 911 (NG911) services, GIS databases will be required to align with the legacy ALI and MSAG, with a match rate of 98 percent, as prescribed by NENA. This is explained in Section 11.

Non-core functions—In terms of trends, there is no consistency in this area. It is worth mentioning, however, that providing non-dispatch-related duties is a necessary conversation to have when considering the way work will be done in a proposed new PSAP. Reinventing established workflows and who is best to do work that was otherwise well established in an agency is often a determining factor as to whether consolidation is a viable option.

Workforce—The difficulty in staffing PSAPs is near epidemic proportions nationwide. The Humboldt Bay law-enforcement agencies are no exception and, in fact, have an added layer of complexity due to their somewhat remote location and lack of a qualified employee pool. At the time of this writing, HCSO and Eureka communications centers are experiencing staffing shortages, and staff members are overworked and tired. Managers are working in the PSAPs to offset the amount of overtime assigned, which results in their inability to efficiently manage their own workloads.

Workload—The workload at each PSAP was reported to be manageable. What wasn't manageable is the number of people to do the work. While this report provides the staffing analysis, if staffing levels were full strength at each center, it is recommended that re-evaluating the workload tasks that dispatchers are conducting be analyzed to ensure the communications division is the right place for those tasks. As 911 gets more complex, the administrative tasks that are often assigned to the communications personnel should be re-examined regardless of consolidation.

Facilities—Collectively, the PSAPs are stunted in their ability to optimize operations and supporting functions, such as entry-level and in-service training, office space for shift supervisors and communications training officers, and break- or quiet-room space. It was reported that when large group training occurs, outside facilities are rented to accommodate the volume. While this certainly works for the given situation, agencies should explore the utility and cost/benefit of a shared facility dedicated to training sworn and non-sworn personnel.

Modernizing aging buildings not only presents costs that often are prohibitive, but such buildings generally also lack an adequate footprint for expansion, technical infrastructure that is easily accessed and/or can accommodate the load of modern-day business, and an ability to comply with today's construction standards for seismic reinforcements. They do, however, have one advantage, which is the parcel of upon which each facility is located. It is not unusual to have limited city- or county-owned land that has structures on it, land that is deemed cost-prohibitive to demolish based on environmental restrictions and impacts, such as contamination. Conversely, buying land to accommodate new construction also can be cost-prohibitive. Thus, many agencies choose to stay put and enhance existing environments.

While all of the stakeholder agencies have done an exemplary job in implementing the technology needed to keep pace with modern applications and the public's expectations, MCP believes modern facilities are needed not only for today but also to meet the expectations of increasingly multimodal service delivery in the future.

7 Humboldt County Sheriff's Office/Office of Emergency Services

7.1 Current Environment

The County's OES provides emergency management services to the entire county including the municipalities within its footprint. The OES administrative offices and EOC are housed in the courthouse basement adjacent to the parking garage. Entry to OES offices is controlled by two badge-controlled doors from the exterior or three badge-controlled doors from the building's elevators.

The elevation is three to four cement steps up from the foundation level, providing some protection from vehicle penetration. During heavy rains, the basement experiences minor flooding and accumulation of mud at the entrance. While this area is secure, it is not ideal for ingress and egress by responding personnel—with and without badge access—during an EOC activation.

The EOC is intended to serve as a centralized physical site from which information and resources are coordinated during a local emergency. In the event of a large-scale incident or disaster, operations would be moved to a larger community facility as early as possible. The EOC is considered a mission-critical function, as is the PSAP. The facility in which it is housed must be able to survive a variety of hazards and threats to maintain mission capability during an emergency. PSAP and EOC operations should be housed in a secure and resilient (hardened) facility that is ADA compliant; today this facility is not ADA compliant.

EOC's space includes an open operations area and adjacent offices that augment the open EOC space in an activation, as well as a radio room. The space adjacent to the radio room is shared with HCSO's special services division (i.e., marijuana enforcement team, search and rescue, livestock unit, marine unit and vehicle abatement) which in an activation would house the Operations Section. It is reported that the Joint Information Center (JIC) and Policy groups would not be located in the EOC due to space limitations. This is inconsistent with best practices.

MCP was unable to ascertain whether the courthouse is constructed as a hardened facility. However, based on its appearance, design, and age, we conclude that the standards under which it was built, circa 1950s, did not include seismic standards as compared with today.

This identification of this facility's condition was well-documented in the Humboldt County 2015-2016 Civil Grand Jury Report, which stated, "The OES facilities that presently exist are outdated and not sufficient to

meet the needs of training for a future disaster."[9] The preferred OES alternate site is the Sequoia Conference Center, which would provide space to accommodate a full Incident Command System (ICS) staffing complement. However, the site does not have a generator for backup power.

Three OES staff positions exist: The County's emergency manager, a program coordinator, and a senior office assistant. It was reported that none of the cities served have assigned emergency managers. It further was reported that no internal resource is known to the OES staff pertaining to grant writing and administration. OES staff members manage five state and federal grants and advise the county, cities, and special districts regarding pre- and post-disaster grants related to emergency management and hazard mitigation.

When activated, EOC operates using ICS, as required. The open EOC space only can accommodate 12 to 15 individuals. OES staff partners with local response agencies to supplement and staff ICS roles as needed.

OES offices and EOC are on a generator to keep power and IT working if the main power sources fail. However, the heating/ventilation/air-conditioning (HVAC) systems are not on the generator circuit. Working conditions for those who staff EOC would be extremely uncomfortable, considering that there would be no natural airflow should HVAC systems fail. This would be problematic as activations generate a considerable amount of physical and emotional stress for those assigned to EOC operations.

EOC activation itself attracts scores of people who are associated with, but not essential to, an operation. Essential services facilities should be protected by a generator and a UPS system for continuity of operations and basic comfort for those working in the center. Facilities typically install redundant systems that incorporate two generators. Each generator operates using a different fuel source. For example, one would operate using diesel fuel while the second uses natural gas. Multiple fuel vendors are also under contract to provide redundancy in fuel delivery during an emergency.

In addition to state and federal alerting authorities, HCSO is a licensed IPAWS/WEA[10] alerting authority, covering the county's operational area.

Wireless reception in the basement was nonexistent, and network drops are experienced at this location. An antenna has been installed to provide access to outside communications towers that connect to the Operational Area Satellite Information System (OASIS)[11] and to amateur radio operators. The CAD system cannot be accessed from EOC.

OES staff also reported that the Humboldt Bay area only has two fiber-optic cables providing broadband coverage to the county. Should a catastrophic earthquake, tsunami or wildfire disable either or both cables, the area would be isolated from a communications perspective. Local communications and commerce have been disrupted for days when one fiber-optic cable was damaged by fire, severed by construction equipment, or intentionally destroyed.

[9] https://humboldtgov.org/DocumentCenter/View/55541/8-Earthquake-Flood-Tsunami-Is-Humboldt-County-Ready?bidId=
[10] Integrated Public Alert and Warning System/Wireless Emergency Alerts.
[11] According to the Cal OES website, OASIS "is a network of over 80 earth stations (terminals) located statewide … [that] provide broadband internet and telephone access immune to regional failures in the terrestrial network"

Overall, this group is another employee group that deserves credit for overcoming and improvising based on what it has been given. It was clear that OES leadership and staff understand the importance of this work unit and the complexity of their duties, which increasingly appear to be performed in conditions that are suboptimal. When activations do occur, it is felt that operations in a dated environment are subpar compared with modern-day EOC operations.

Subpar funding also is an issue. It was reported that HCSO's leadership continues to support OES in its efforts to attain better conditions for this work unit.

MCP recommends that no matter the outcome of consolidation, that the County addresses the EOC's working conditions and, at the very minimum, replaces the furniture systems and resolves the wireless technology accessibility and generator connectivity issues.

8 Future State – Consolidation Feasibility

The previous section summarized the current state of the four individual stakeholder agencies. Each agency has its own set of challenges and opportunities—what is working well and what isn't. The four agencies share similar situations that warrant further discussion regardless of whether consolidation efforts continue.

Regarding consolidation feasibility, the following areas were analyzed, and recommendations were developed for each of them.

- Consolidation models
- Governance options
- Fee formulas
- Finance and budgeting
- Organizational structure
- Human resources
- Political feasibility
- Facility options
- Technological feasibility
- Operations and non-core tasks
- Projected call volume/workload
- Projected staffing levels
- Projected cost estimates
- Funding mechanisms

8.1 The Case for Consolidation

The public-safety communications sector, like its counterparts in law enforcement, fire/rescue and EMS, has changed drastically over the past 50 years. Prior to the inception of 911 services, dispatch operations were a combination of clerical and telephone-operator duties in law-enforcement agencies. Fire dispatch was in "fire alarm" rooms in each firehouse, and EMS was usually provided by several small companies in

contract to the large corporate providers of today. Public safety alerting, call receipt, dispatch and tracking is a completely different world, where old-fashioned ways of doing business can no longer be tolerated in the advancing world of technology and the public's expectation regarding public-safety response.

There are many drivers for consolidation, but most of them are human-resource oriented or monetary. In the 1980s, 1990s and in some instances, even now, the people-oriented drivers were based on the inability to attract people, and train them for the job of answering 911 calls and radio dispatching at the same time. Frustrated leaders trying to solve the staffing problem in PSAPs saw consolidation as a way to relieve the cycle and place the responsibilities upon those who appear to have achieved success in their PSAPs. Monetary drivers include the cost benefit of maintaining a PSAP to paying a fee for services provided by another dispatch center. Another benefit realized is discontinuing the assignment of sworn supervisors or command staff to the continuously changing landscape of 911 operations. Both drivers are valid, but typically, a third driver can be the one that captures the attention of public-safety leaders, i.e., the cost of technology—based on this, the logic shifts from trying to justify the reasons *to* consolidate, to asking the question, "*why not*?"

Never in public safety's history has it been easier to consolidate technology-based organizations. This is seen every day in myriad businesses as calls to their 1-800 telephone support numbers are answered in a different part of the world. The internet and IP technology have impacted public safety in many ways, and PSAP consolidation is one of them. Generally, the roadblocks to consolidation do not come from technology; rather, they come from the inability to agree on governance, fee equity, and perceived loss of command and control.

In MCP's experience, the arguments regarding command and control center on "loss" in general. No agency and its leadership enjoy the thought of losing a part of the organization. The loss of people that have served the workplace and the community does not feel honorable. A loss of control in command environments is also felt, as those in command positions see their ability to impact their staff threatened.

Whatever the driver, administrators and executives must keep an open mind to the variables involved in consolidation. There are many standalone organizations in California that are successful and continue to grow, including the following:

- Monterey Communications – fire and law enforcement
- San Francisco Department of Emergency Management – fire/rescue, EMS and law enforcement
- San Mateo County Office of Public Safety Communications – fire/rescue, EMS and law enforcement (an EMD-accredited center of excellence)
- Santa Cruz Consolidated PSAP – fire/rescue, EMS and law enforcement (CALEA-certified)
- Yolo (County) 911 Communications – fire/rescue, EMS and law enforcement (joint powers authority, or JPA)
- Stanislaus Regional 911 – fire/rescue, EMS and law enforcement (JPA)

8.2 Consolidation Types

The type of consolidation is one of the many important decisions that stakeholders consider when sharing services appears to make sense. Four consolidation models typically are considered, as follows:

- Full consolidation
- Partial (operational) consolidation
- Colocation
- Virtual or shared consolidation

8.2.1 Full Consolidation

MCP defines full consolidation as that where one agency provides services to more than two agencies, each of which shares resources and costs with the service provider. The service provider is the central hub for services, equipment and resources. The service provider has a business agreement with those to which it is providing service and may be employed by one of the agencies to which it is providing service or may be an independent entity, such as a JPA. A consolidated center's infrastructure generally allows for the ability to provide multidiscipline services (e.g., law enforcement, fire/rescue and EMS) using a common CAD system, CHE, and associated core technology. Some agencies have operated two separate CAD systems and dispatched under the same roof, to keep continuity of business for a respective agency.

As with any business configuration, there are advantages and disadvantages for both the provider and the customer. Some of them are applicable to the County's situation while others are perceptions that can be overcome. Common advantages and disadvantages to a full physical consolidation are identified in the table below.

Table 17: Consolidation Advantages and Disadvantages

Advantages	Disadvantages
Cost sharing of capital expenses	Pro-rata share of capital expenses still may seem high relative to the size of the customer agency(ies)
Expertise in emergency communications	Loss of knowledge of community locations and people
Management and supervision responsibilities	Costs include managers and supervisors when sworn personnel did the same work at no additional cost
Personnel, systems and administrative management responsibilities	Having to pay for administrative overhead when it already existed in the customer agency(ies)
Cost sharing of human resources, systems maintenance and overhead responsibilities	Costs of managing people and systems were not itemized in a communications budget; therefore, costs were shared amongst other operational divisions
Depending on governance, fee allocation is generally i**s** apportioned based on agency call volumes or equal percentages per agency	Hard costs of paying the service provider may not prove to be a cost savings to the customer agency(ies)

8.2.2 Partial (Operational) Consolidation

A partial consolidation can take on a couple of definitions. A partial consolidation is largely the same as a full physical consolidation, with a couple of exceptions or variations, as follows:

- Some may view a partial consolidation to mean that multiple law-enforcement agencies are served by one communications provider, but the provider does not serve fire/rescue and/or EMS.
- Some may view a partial consolidation as the service provider only providing service to a customer on a part-time basis. For example, a law-enforcement agency may be served only from 2100-0600 Monday through Friday.

Partial consolidation occurs when a service provider has capacity to take on additional business without incurring a degradation of service to its own agency. Capacity must be in place for effective and efficient services to take place, i.e., technology and human resources are available to take on the additional workload.

Common advantages and disadvantages of a partial consolidation are identified in the table below.

Table 18: Partial Consolidation Advantages and Disadvantages

Advantages	Disadvantages
It is a service option for an agency not ready to commit to full consolidation	Operational risks may be high due to technological incompatibilities
A service provider that has capacity can fill the gap operationally and monetarily	Service delivery may be different at the host agency than at the customer agency(ies)
May resolve staffing deficits in hard-to-fill telecommunicator positions	Technology usually is deactivated manually, increasing operational risk
Services are provided during low-call-volume periods, resulting in minimal service impacts to the agency and community	Switching from one service provider to another during an active incident poses risk
Allows for customer agency(ies) continuity of service	Hard costs of paying the service provider may not prove to be a cost savings to the customer agency(ies)
Governance, command and control remain at the customer agency(ies)	

8.2.3 Consolidation

A consolidated arrangement involves two (or more) individual but like agencies, situated in the same facility, usually within proximity of each other. This configuration enables sharing of core technology such as radio, CAD, and CHE, but each entity is housed in a separate physical location within the same facility. This model is not widely used but can serve entities looking to share costs but maintain their governance, operational service delivery and control over personnel. There are a couple of examples of this model in California:

- The City of Long Beach communications has fire/rescue/EMS and law-enforcement communications in the same facility, but they were separated by a physical load-bearing wall, which keeps each discipline in separate locations. Each discipline is managed by its own command staff, and center personnel share common facility accommodations, e.g., the kitchen, restrooms, and parking. The CAD system and CHE is shared; therefore, the city realizes some economies of scale.

- RED-COM in Santa Rosa is a JPA that provides fire/rescue/EMS dispatch services. The agency is located in the Sonoma County Sheriff's Office facility, down the hall from the County's PSAP. They are completely different entities with no common operational platforms; RED-COM rents the space from the County. This model allows for accessing each entity during large-scale incidents, without going to different locations, while each entity maintains its governance structures and operational foundation.

Common advantages and disadvantages of colocation are identified in the table below.

Table 19: Colocation Advantages and Disadvantages

Advantages	Disadvantages
Agency governance and operational autonomy	Due to close proximity of another agency, loss of personnel to the other agency is a threat
Shared facility infrastructure including some public-safety technology	No control over facility quality, condition or needed improvements

8.2.4 Virtual or Shared Consolidation

Virtual consolidation enables the sharing of technology at separate physical locations. In this configuration, a governance structure generally is established that identifies cost-sharing allocations to each entity for the provisioning of capital purchases and maintenance of shared equipment. A host agency is determined, which will house core technology that each entity will share. This core technology can be the CAD system, CHE, logging/recording systems, and LMR systems, at a minimum. Most IP-based technologies are able to program different jurisdictions into the software to accommodate this shared approach. Generally, this configuration works well for those jurisdictions that are aligned geographically and can share the benefits that software can provide.

Common advantages and disadvantages of virtual consolidation are identified in the table below:

Table 20: Virtual Consolidation Advantages and Disadvantages

Advantages	Disadvantages
It is a service option for any agency that is not ready to commit to full consolidation	System failure disables all participating agencies
Retains agency autonomy	Governance may not agree on data to be shared
Shared situational awareness, mapping and other systems, if governance allows data to be shared	Oversight may not agree on equipment to be procured
Potential cost savings for participating agencies	
Interoperability is improved	
Participating entities can serve as a backup	

There is at least one virtual consolidation that includes all core PSAP technology in the San Francisco Bay Area. The Palo Alto-Mountain View-Los Altos virtual consolidation has been in place for more than five years, where all entities share CAD and MDFS software and are now in the procurement phase for CHE. This option can serve as a first phase of a multiphase process to full consolidation if desired.

All stated consolidation models can apply to Humboldt County entities should they desire to move to a consolidated model.

8.3 Governance

It can be argued that sharing anything of value can be a challenge. Today, however, information is a commodity and the desire to share it for the greater good is overwhelming. In the public-safety sector, information can be a matter of life or death. The public sector has a proven record of sharing costs and many public-safety entities have joined together for common benefits, to share risks, and to attain cost effectiveness. But some argue that information sharing has too many risks, too many limitations and restrictions, and complex rights of ownership. Effective governance can overcome these challenges.

One applicable definition of governance is: the establishment of policies, and continuous monitoring of their proper implementation, by the members of the governing body of an organization. It includes the mechanisms required to balance the powers of the members (with the associated accountability), and their primary duty of enhancing the prosperity and viability of the organization.[12]

[12] http://www.businessdictionary.com/definition/governance.html

"Such structures allow for greater understanding and evaluation of existing communications capabilities such as plans, procedures, and equipment; identification of communications gaps; and development and implementation of a coordinated vision and plan to address and prioritized resources, investments, and staffing."

Effective governance structures are designed to operate in a collaborative manner with input from stakeholders across multiple disciplines, emergency communications functions, levels of government, and nongovernmental entities.[13] Such structures allow for greater understanding and evaluation of existing communications capabilities such as plans, procedures, and equipment; identification of communications gaps; and development and implementation of a coordinated vision and plan to address and prioritize resources, investments, and staffing.

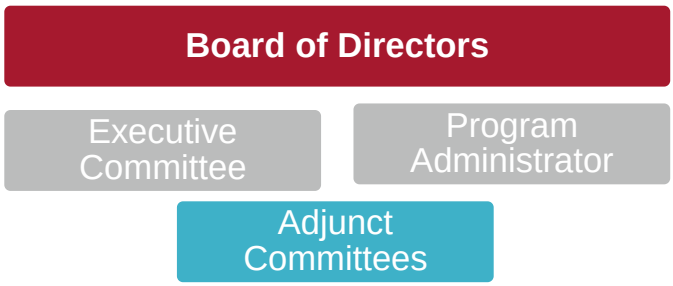
The following characteristics, attributes, and activities are typical of effective governance structures:

- Documented authority – Establish formally with either an executive order or legislation.
- Balanced representation – Align needs and priorities across various stakeholders that have a role in, or are impacted by, communications-related initiatives
- Properly-sized membership – Determine appropriately sized membership that maintains inclusiveness while permitting a quorum to be met regularly
- Accountability – Determine whether stated roles, responsibilities, and membership requirements are met routinely
- Active membership – Provide multiple means to participate in meetings (e.g., in person, video conference, and teleconference) while advancing information sharing and transparency by disseminating meeting minutes to members
- Meeting frequency – Maintain a consistent meeting cadence. Members collectively should determine where meetings will be held and include consistent or alternating meeting location to increase attendance and participation depending on the size of the state or jurisdiction and residency of members
- Scalable and agile – The group should be able to respond to changes in the emergency-communications landscape
- Rules of engagement – The group should be able to manage internal and jurisdictional differences (e.g., "checking egos at the door" and working toward common, universally beneficial goals)
- Transparent and responsive – The group should maintain an open and transparent forum to promote greater stakeholder buy-in
- Funding and sustainment – Sustainable funding should be identified to support existing and future emergency-communications priorities
- Oversight of strategic plan(s): To monitor progress and align activities

The characteristics and attributes of an effective governance structure will vary, but successful examples include most—if not all—of the characteristics, attributes, and activities listed above.

Governance structures generally are divided into the following levels:

[13] SAFECOM - Governance Guide for State, Local, Tribal, and Territorial Officials - September 2015.



Governance structures may be basic, but the structure itself, as well as the authority and responsibilities held by the governing body, are the keys to successful programs and projects if they are taken seriously.

The basic structure includes:

- A board of directors that consists of a representative from each of the participating agencies identified in the intergovernmental agreement (IGA) or joint powers agreement
  - Officers
    - The board elects from its membership a president, vice president, treasurer, and secretary, and defines term limits for each position
  - Executive Committee
    - The board selects an executive committee consisting of five members and an alternate, plus the president and vice president. The executive committee oversees the day-to-day business and conducts business between board meetings
    - The board retains a program administrator to administer its business and activities, subject to the general supervision and policy direction of the board and executive committee

Adjunct committees or councils may assist the governing bodies when needed:

- Advisory councils – may take many different forms, such as expert advisors, leaders, or independent assessors
- Committees and ad hoc groups, subcommittees, liaisons, and workgroups may come in and out at different phases

It is recommended that official members of the governing body not be part of these adjunct groups.

8.3.1 Governance Types

The most contemporary and effective governance models for public agencies are IGAs and joint powers agreements, with the latter creating and defining a JPA.

In August 2012, The Integrated Justice Information Systems (IJIS) Institute's Public Safety Technical Standards Committee (IPSTSC) published a guideline that is relevant today, *Governance Agreements in Public Safety Information Sharing Projects*. IPSTSC identifies two major agreements for national public safety agencies:

8.3.1.1 Intergovernmental Agreement

An IGA is an agreement (i.e., contract) between government agencies that contains specific terms and conditions regarding how the agencies will interact and govern their dealings with each other. IGAs also are known as memoranda of understanding (MOU), mutual-aid agreements, and automatic-aid agreements.

8.3.1.2 Joint Powers Agreements

The Law.com dictionary defines a joint powers agreement as “a contract between a city, a county and/or a special district in which the city or county agrees to perform services, cooperate with, or lend its powers to the special district or other government entity.” The result of a joint powers agreement is the formation of an independent JPA (i.e., agency) whose powers are granted to it by the agreement. The JPA is totally autonomous from the agencies that create it and typically has its own staff, facilities, and equipment, including computer resources. Whereas the systems, data and other resources used as the result of an IGA continue to be owned by the agencies that participate in the agreement and contributed to it, in a joint powers agreement, the systems, data and other resources used in the daily business of the JPA are owned by the entity created by the joint powers agreement.

The following table provides advantages and disadvantages of each governance type.

Table 21: IGA/JPA Comparison

	AGREEMENT TYPE	
	Intergovernmental Agreement (IGA)	**Joint Powers Agreement (JPA)**
TYPICAL USES	CAD/Dispatch consortiums in which one agency provides 9-1-1 call receipt and dispatching for several member agencies	Dispatch consortiums in which a separate agency is created to provide 9-1-1 call receipt and dispatching services for the participating agencies
	RMS in which one or more agencies collaborate to share a single RMS	Regional RMS in which a separate agency is created to manage a single RMS for all participating agencies
	Automatic Aid Agreement in which two or more public safety agencies agree to dispatch each other's emergency resources	Fusion centers in which a separate agency is created to manage a regional data warehouse with an interface to each participating agency for uploading its information.
	CAD-to-CAD data sharing in which two or more public safety dispatch centers agree to exchange CAD incident information	
ADVANTAGES	A new administrative entity does not have to be created – existing resources are donated or shared among the participating agencies	Autonomy of operations – the new entity is free to operate in a manner that is most efficient to its charter
	Legally less complex	Requires a formal, legal agreement to transfer authority from the member agencies to the new entity
	Lower costs	
	May be governed by an informal agreement	
DISADVANTAGES	Autonomy of operations is difficult to obtain	Legally complex to establish.
	Decisions may be unduly influenced by the requirements of one agency	Not universally available – some states do not allow JPAs or limit the types that can be established
		Higher costs due to administrative and other overhead

8.3.1.3 Contracting with a JPA

There are a few examples in California where public-safety JPAs contract with entities for communications services, including the following:

- REDCOM Dispatch – Sonoma County Fire/EMS (JPA)
- San Mateo County Office of Public Safety Communications – fire/rescue, EMS and law enforcement agencies (executive management is the county manager)
- Santa Clara County Communications – fire/rescue, EMS and law enforcement agencies (executive management is the county's fire department)
- Lifecom (a unit of American Medical Response) – San Joaquin County EMS and Fire Dispatch
- CONFIRE[14] Dispatch – San Bernardino County Fire

[14] Consolidated Fire Agencies.

This arrangement allows public-safety entities to come together for specific purposes and form a JPA. Once this process has been ratified, the public-safety entity can negotiate an agreement that itemizes the term and conditions of services to be rendered. This model enables the JPA members to be fairly represented by the officers who negotiate the contract with the service provider.

8.4 Funding, Finance and Fees

Generally, MCP staff is unfamiliar with funding opportunities that exist in California for 911 operations or for the creation of new 911 entities or physical structures. Typically, grant funding, depending on the type, can complicate proceedings. For example, federal grants for construction of a facility may require more study than those that are undertaken by local and state agencies, and then, more restrictions and/or compliance is imposed upon the owner (county) in future years. Matching-fund grants also impose compliance on grantee agencies.

The only funding known in California is the off-set funding available through Cal OES, but this is for equipment only. However, 911 funding mechanisms are expected to change significantly in the future as NG911 becomes more of a reality than a concept. What we know:

- The National 911 Program awarded the State of California $11,399,076 for the implementation of NG911.

- The State approved the 2019-2020 budget, which includes $172 million to start the NG911 migration, which is expected to cost $1 billion when implementation is complete and legacy equipment is no longer maintained. (The preliminary network diagram for NG911 operations is depicted in the figure below).

- In addition, the monthly surcharge for each mobile device that subscribes to a wireless carrier and is able to access the 911 system will increase from $0.34 per device up to $0.80 cents per device. However, allocation of this money to PSAPs has not been established as of this writing.

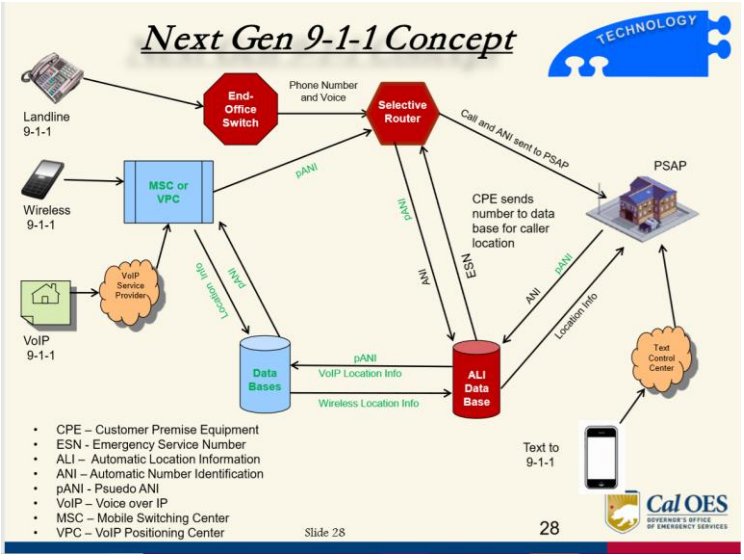


Figure 2: Preliminary NG911 Network Diagram

Cal OES's 911 Office has been clear throughout the preceding years that the ability of small agencies to afford monthly NG911 system maintenance fees, which will include cybersecurity monitoring of the IP-based infrastructure, will be a challenge. To this point, consolidated centers sharing the costs of (two) diverse paths for connectivity and redundancy is more cost effective than, in Humboldt County's case, eight diverse paths for four independent PSAPs.

8.4.1 Special District

The final option, which normally would take longer than the aforementioned governance options, is the creation of a special district. The California Special District Association[15] provides the following information:

Special Districts

Special Districts are a form of local government created by a local community to meet a specific need. Inadequate tax bases and competing demands for existing taxes make it hard for cities and counties to provide all the services their citizens desire. When residents or landowners want new services or higher levels of existing services, they can form a district to pay for and administer them.

Nearly 85 percent of California's special districts perform a single function such as sewage, water, fire protection, pest abatement or cemetery management. Multi-function districts, like community services districts, provide two or more services and are usually found in the unincorporated areas of the counties. Other types of services provided by independent special districts include police protection, parks and recreation, libraries, irrigation, reclamation, harbor, transit, and healthcare, among others.

There are approximately 2,300 independent special districts in California, meaning they are governed by an independent board of directors elected by the districts' voters or appointed to a fixed term of office by either the city council or board of supervisors. Dependent districts are governed by other existing legislative bodies like a city council or board of supervisors. Larger independent districts have a professional manager, similar to a city manager or county administrator, to assist the governing officials. The governing boards adopt policies that the general managers carry out.

Just over a quarter of California's independent special districts are enterprise districts. Enterprise districts operate more like a business enterprise, charging customers for their services. For example, a hospital district charges room fees just to their patients, not the district's other residents. Water districts charge water rates to their customers. Virtually all water, waste and hospital districts are enterprise districts. Non-enterprise districts provide services that don't lend themselves to fees because they benefit the entire community, not just certain residents. These districts provide services like parks, police and fire protection, pest abatement, libraries, and cemeteries and rely overwhelmingly on property taxes to fund their operating budgets. Although some non-enterprise districts like parks and libraries may charge fees for some services, these fees generate very little revenue. Additionally, both enterprise and non-enterprise districts can issue either general obligation or revenue bonds to help pay for capital improvements.

[15] https://www.csda.net/special-districts/learn-about

8.5 Fee Formulas

To provide stakeholders with an idea of the formulas and level of equity that can be applied, MCP offers applicable fee structures to consider. Often, fee structures can be one of the most arduous discussions for a newly formed governance body. Knowing this component is part of other JPAs or contractual agreements that are successful elsewhere may assist in relieving the stress of financial discussions.

There are several parts to budgeting. Charges and fees and how they are allocated to stakeholders can be complicated. Several categories of fees should be considered for a new entity:

- Initial capital investment
- Technology maintenance of effort (MOE)
- Annual revolving expenditures
- Technology replacement funding
- Debt service

If consolidation is realized, and a new entity is created, defining the estimated fee structure and revenue allocations before the entity is legitimized is a recommended approach. This is to address budget and funding issues prior to finalizing any further proposals with decision makers.

8.5.1 Budget Elements

Budget elements for a new entity are straightforward. Approximately 80 percent of budgetary expenditures will revolve around labor costs, while the remaining will be in services, supplies, fixed assets and debt service. A breakdown for each element follows.

8.5.1.1 Labor

Salary and benefits packages for a new entity would have to be created. To that end, the new entity would have a controller and finance position that manages the budget. Another approach, which is recommended over creating a new structure, is designating a host agency that would be the administrative and financial controller. If there are costs involved in providing this service, it could be a “trade-for-service” arrangement, which allows a member agency to deduct those costs from its annual contribution. Labor costs include:

- Hourly pay
- Differentials (e.g., nightshift, training, bilingual)
- On-call pay
- Sick leave
- Vacation pay
- Holiday pay
- Compensatory-time pay
- Jury-duty pay
- Military paid leave
- Overtime pay

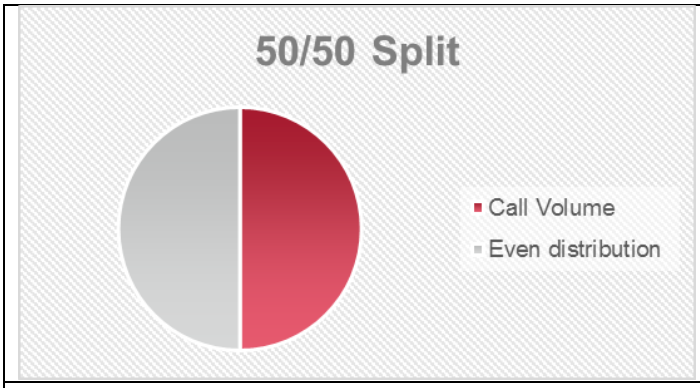
This is not an exhaustive list. See Appendix A for a complete line-item list for budget creation. The listed labor expenditures, coupled with benefits costs, typically represent 80 percent of the overall budget.

8.6 Cost Allocation

There are many formulas to consider when allocating costs to stakeholders. This often is the most controversial decision made by stakeholders as some formulas do not appear to be as equitable as some may expect. The perception often is that the fee is too expensive compared with what they pay today. The transition from the status quo to a new formula can be tricky, but also can be developed as an interim bridge that allows for slow escalation or de-escalation depending upon what is agreed upon.

The governance entity should explore the various options regarding these formulas and establish an agreed-upon formula to include in the business model. Research on other agencies' practices also should be considered in reviewing successes and challenges of these agreements. Below are two formula examples, but many others exist.

8.6.1 50/50 Split



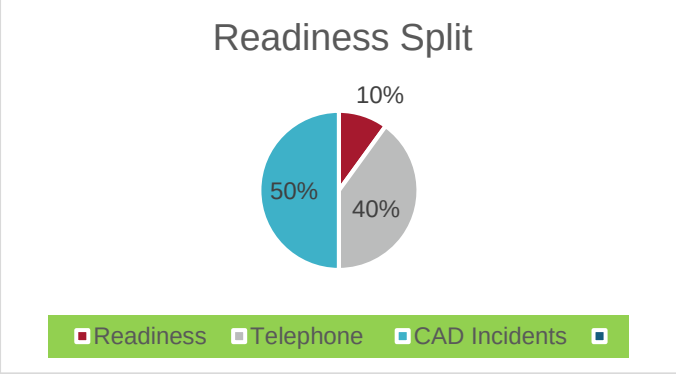
50/50 Split

50% of the total cost is divided by the percentage of the workload of each Stakeholder. The other 50% is evenly distributed to each Stakeholder.

Example:
Bay City Communications has seven Stakeholders: 2 Law Enforcement, 3 Fire and 2 EMS entities. Cost for communications services total: $2,000,000. The following distribution under this model results in:

	2015 Call Volume	Call Volume (CV) %	$1,000,000 / by CV %	$1,000,000 / 7 Entities	Service Fee Total
Bay City PD	38,990	17%	$170,000	$142,857	$312,857
Bay County Sheriff	85,011	37%	$370,000	$142,857	$512,857
Bay City Fire	26,456	12%	$120,000	$142,857	$262,857
Bay County Fire	19,844	9%	$90,000	$142,857	$232,857
Creek Fire Authority	20,002	9%	$90,000	$142,857	$232,857
River-Creek EMS	25,096	11%	$110,000	$142,857	$252,857
Shores EMS	11,830	5%	$50,000	$142,857	$192,857
	227,229	100%	$1,000,000	$1,000,000	2,000,000

8.6.2 Readiness Split



Readiness Split

10% of costs are divided into all stakeholders representing their equal payment towards operational readiness, i.e., operations 24 x 7 x 365. 40% of costs are divided by the percentage of the 911 telephone volume received in the Center from each Stakeholder and 50% of costs are divided by CAD incidents enter. Data used is the year prior to the fiscal year being billed.

Example:

River City Communications has seven Stakeholders: 2 Law Enforcement, 3 Fire and 2 EMS entities. Cost for communications services total: $2,000,000. The following distribution under this model results in:

	2015 CAD Calls		2015 911 Volume %		10% Readiness	40% 911 Calls	50% CAD Incidents	Service Fee Total
River City PD	38,990	17%	11,998	9%	$28,571	$136,000	$170,000	$334,571
River City Sheriff	85,011	37%	67,867	71%	$28,571	$296,000	$370,000	$694,571
River City Fire	26,456	12%	5,303	6%	$28,571	$96,000	$120,000	$244,571
River County Fire	19,844	9%	3,677	5%	$28,571	$72,000	$90,000	$190,571
Creek Fire Authority	20,002	9%	2,988	4%	$28,571	$72,000	$90,000	$190,571
River-Creek EMS	25,096	11%	3,032	4%	$28,571	$88,000	$110,000	$226,571
Shores EMS	11,830	5%	1,053	1%	$28,571	$40,000	$50,000	$118,571
	227,229	100%	94,918	100%	$200,000	$800,000	1,000,000	$2,000,000

9 Political Acumen

MCP's experience concerning stakeholder attitudes toward consolidation is generally, "it sounds like a good idea, but we won't likely do it," or conversely, "consolidation is the worst thing that 'they' can do, but they probably will to save money." Consolidation is a 50/50 proposition, where one component can build it or destroy it (deconsolidation). Deconsolidation, i.e., leaving a consolidated agreement, can take place due to any combination of the following factors: customer service, increasing costs, incompatibility, or disagreement regarding capital purchases and/or contractual agreements.

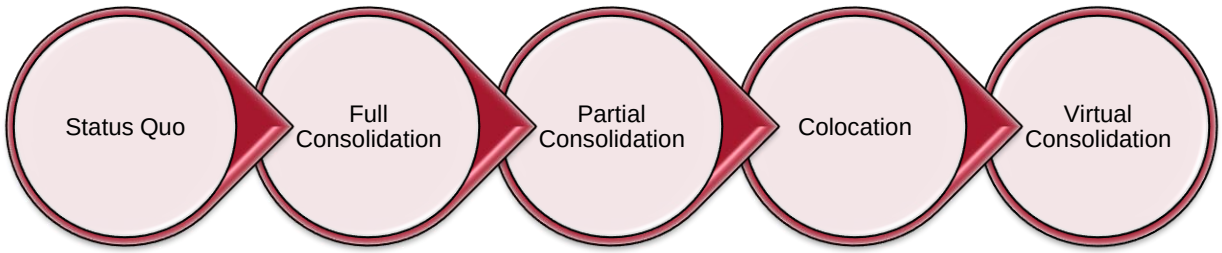
For the purposes of this study, the police department chiefs and the County's sheriff are reported to agree on the feasibility of consolidation. During the interviews, we asked what they thought regarding consolidation taking place in Humboldt County. The general response was that it may happen in some form, but it would be surprising if total consolidation were to occur. The feedback received was that

leadership in the participating agencies disagrees on how to get it done, with the key question being, “who (chief/sheriff) would be in charge?” if the idea moves forward.

MCP’s project team did not interview the leadership of the stakeholder organizations, nor did we interview members of decision-making bodies as to political tolerance. MCP’s experience is that this dialog generally occurs when or if concept-of-operations plans or a formal implementation plan is developed. To that end, MCP did not interview those who would receive service from a consolidated PSAP.

MCP’s team was impressed with the willingness of those we did interview to discuss consolidation. Generally, personnel who would be impacted directly by consolidation are the first to voice their fears and dismay; they have a legitimate concern about job security and whether consolidation is a good fit for their agency. In this instance, MCP applauds each participating PSAP’s staff members for embracing the idea and providing their candid feedback and relevant data regarding this effort.

10 Public Safety Communications Consolidation Scenarios



As previously identified, there are several options for consolidation. The goals of this feasibility assessment also were stated earlier in this report, but to ensure that each scenario is assessed against these goals, they are reiterated here:

- **Enhance** the **safety** of law enforcement, fire, rescue, emergency medical, and emergency management personnel and the citizens served
- Expand **cost-effective benefits** to a consolidated center’s members and other agencies
- Create a **common operating picture** and maintain a **plan** to address the expanding needs of the public-safety agencies in the region that **fosters partnerships** with surrounding entities
- **Facilitate the expansion of HCSO’s** public-safety **dispatch services** to other community and private-sector entities
- **Standardize** equipment and procedures to bring all emergency responders into a common public-safety radio and data communication system

Scenarios for achievable consolidation are as follows.

10.1 Full Consolidation – “Bay Comm Consolidated” (BCC)

10.1.1 Governance

Four stakeholder agencies enter into a full joint powers agreement to form a JPA to provision public-safety communications in the county. The JPA would define ownership as well as facility, technology and personnel responsibilities and costs essential for delivering the desired service levels. The agreement also should define the terms and conditions to which entities desiring to join the JPA after its creation would need to agree. All four founding stakeholder agencies would have equal voting rights, with an established tie-breaker strategy, i.e., move the issue to the city/county managers association.

In this model, there are two ways to represent Eureka’s fire/rescue/EMS dispatch services. If the fire department pays for dispatch services, then it can be a fifth stakeholder in the JPA. If dispatch services are paid for through general funds dispersed to the police department, and the funds are not differentiated as to which department pays for personnel costs, then the four-stakeholder model applies.

10.1.2 Cost Allocation

50/50 readiness—This cost-allocation model works well for a full consolidation. Dispatch operations are not unlike other components of public safety where, even during low-workload periods, personnel need to be present to answer 911 and radio calls. Equal payment of 10 percent of the total cost of ownership (TCO) and then a percentage that represents telephone and CAD incidents processed per agency is the most equitable combination of costs where each stakeholder literally pays its fair share.

10.1.3 Workload and Division of Labor

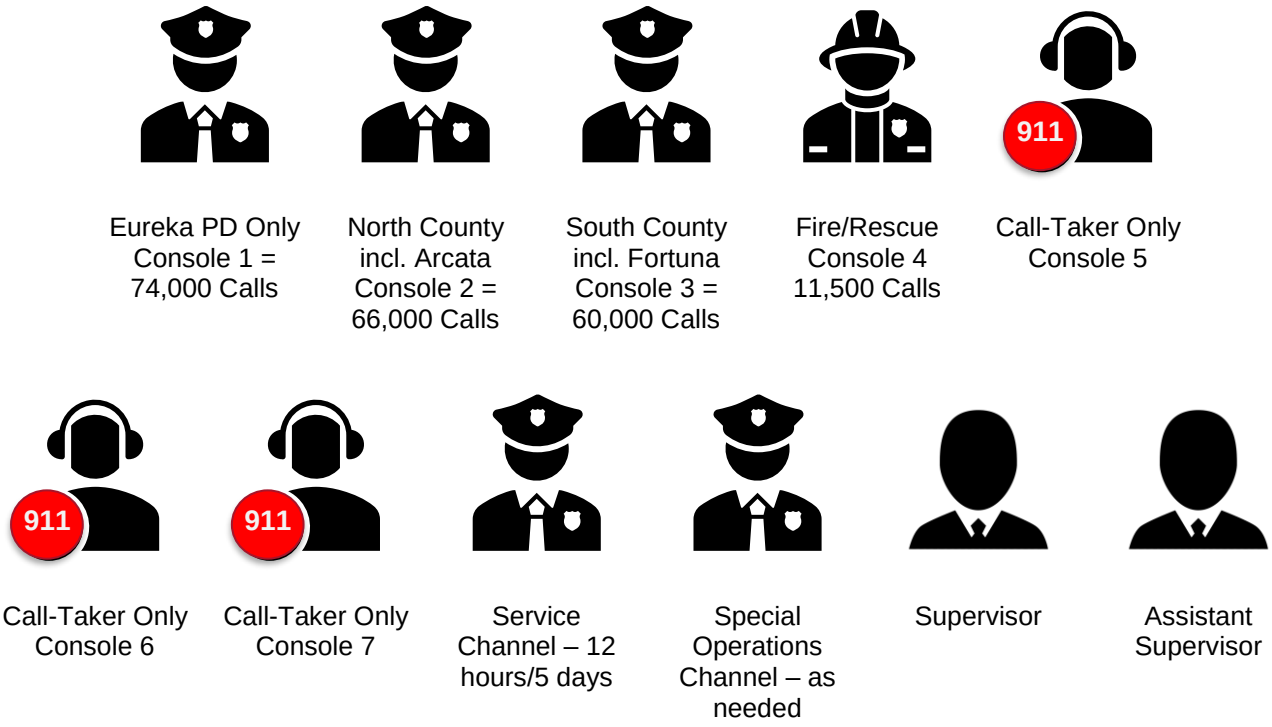
The combined workload for the BCC is projected in the table below using 2018 stakeholder statistics.

Table 22: BCC Projected Workload

	All Telephone Calls	All CAD Incidents	CAD Incidents minus Fire/ Rescue Incidents
Arcata PD	62,332	35,834	
Eureka PD	114,752	73,994	62,556 (11,438)
Fortuna PD	6,000	28,000	
HCSO	159,348	60,308	
Estimated Totals	342,432	198,136	
Total Law Enforcement Incidents		186,698	(11,438)

The proposed division of labor in the BCC is illustrated in the figure below.

Staff Based on Workload Demand – 24 x 7 operation



This division of workload aligns with objectives stated for this project:

- **Enhance** the **safety** of law enforcement, fire, rescue, emergency medical, and emergency management personnel and the citizens served
- Expand **cost-effective benefits** to a consolidated center's members and other agencies
- Create a **common operating picture** and maintain a **plan** to address the expanding needs of the public-safety agencies in the region that **fosters partnerships** with surrounding entities
- **Facilitate the expansion of HCSO's** public-safety **dispatch services** to other community and private-sector entities
- **Standardize** equipment and procedures to bring all emergency responders into a common public-safety radio and data communication system

10.1.4 Operational Design

This design is a vertical configuration that separates the call-taking function from the radio-dispatch function. Larger centers can make these functions distinct as call volume allows. Eureka is the only police department where call volume dictates that the dispatch console be staffed 24 x 7. The other two law-enforcement consoles are designed to patch either Arcata or Fortuna into a radio talkgroup, creating a shared radio frequency and thus, 24 x 7 operation for consoles 2 and 3. HCSO's workload is split into geographical sectors—grouping Arcata in the north and Fortuna in the south—allowing for natural mutual-aid responses into jurisdictions as necessary. In hypothetical terms, the rebalanced workload picture is indicated in the table below.

Table 23: Rebalanced Law-Enforcement Workload

3% Rebalanced Workload	All Telephone Calls	All CAD Incidents
North County – HCSO/Arcata PD Talkgroup	62,332	65,834
Eureka PD	114,752	62,556
South County – HCSO/Fortuna PD Talkgroup	6,000	58,000
Estimated Totals*	200,000	200,000

*Rounded numbers

Historical call volumes indicate that the expected peak loads will occur during traditional business hours from 0900-1800. Staffing recommendations pertaining to call loads indicate that the aforementioned staffing configuration for the combined workload is appropriate. While workloads at the respective consoles may “feel” heavy when reviewing the numbers, it is likely because when staff members review them, they are performing both radio and phone duties, which is a much more complex multitask compared with a singular focus of answering phone lines or performing radio operations. Another contributing factor would be what exactly is considered a statistic. To ensure that workload is accurately measured prior to consolidation, participating agencies must align CAD type codes so when staffing configurations are projected and decided upon, it is supported by accurate data.

However, workloads during the hours the evening hours, or more specifically, 1800-0000 can be demanding. Thus, the inception of a “service channel” is recommended; this channel can be staffed during these hours for three functions: 1) making outbound calls for requests made of police radio dispatchers; 2) performing computer inquiries for field units, performing computer entries and updates, and any associated and related tasks, and; 3) break relief. The special-operations console could be staffed during pre-scheduled work hours, i.e., 0700-1800 for traffic enforcement or 1300-2000 for street enforcement or generally when specific field units or groups are on-duty. This channel can be a common channel for detectives, gang and/or narcotics task forces, motor units or traffic-enforcement details, and any other activity that is assigned a tactical channel rather than the primary radio channel(s). If this channel is staffed and there is little to no workload during a period (e.g., during searches after warrants are served) then the channel can be assumed by the service-channel console and staff members can perform break relief or other duties as assigned.

The recommended staffing levels in this model may look like more than is needed. The theory of the workload study that supports this configuration is to optimize workload and increase staffing numbers to minimize backfill and overtime. The operational configuration meets this staffing theory.

A best practice of a PSAP handling this call volume is to assign a shift supervisor to each shift. Assuming that the preferred shift configuration involves 12-hour shifts, then four shift supervisors would be needed to meet the 24 x 7 demand. It also is a best practice to place an operational lead on each shift, who can

assume day-to-day operational oversight in the center when they are on-duty, while supervisors are conducting human-capital-related duties such as individual and shift quality assurance, performance monitoring and evaluations, employee recognition and rewards, and incident after-action investigations.

… the theory of the workload study to optimize workload and increase staffing numbers to minimize backfill and overtime…

10.1.4.1 Proposed Organizational Chart

The organizational chart, at a minimum, is proposed as:

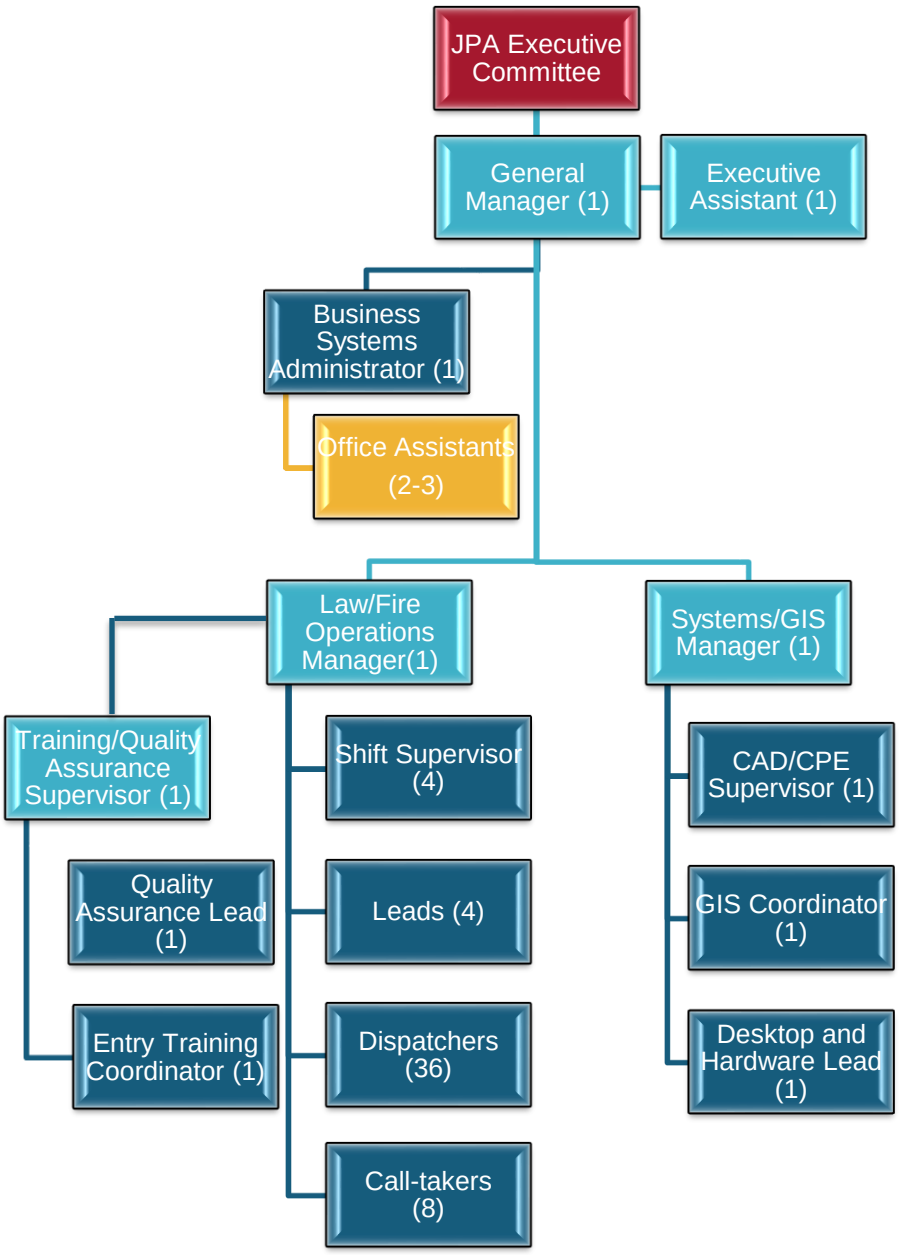


Figure 3: Proposed Organizational Chart

It should be noted that the aforementioned projected numbers for staffing of telecommunicators and supervisors solely based on operational need. The above positions for systems and training are additional requirements to the operational projections.

The above design is akin to Santa Cruz Consolidated Emergency Communications, which employs: 42 dispatchers, 2 shift supervisors, 1 training supervisor, 2 division managers, 1 systems supervisor, systems and GIS technicians, administrative assistants, and a general manager. [16]

[16] www.scr911.org

10.1.4.2 Non-Operational Joint Power Authority (JPA) Employees

Typical JPA staffing can include a combination of the following positions:

Overhead

- Executive positions
- Middle-management positions
- Supervisory positions
- Business systems and analytical support
- Administrative assistance
- Management analysts
- Payroll support
- Accounting/receiving support

Technical Support

- Legacy 911 CHE and NG911 support
- GIS maintenance and support
- CAD system and interfaces support
- MDS support
- Third-party application support
- LMR support
- Desktop/LAN/WAN[17] support

Operations

- Communications call-takers
- Communications dispatchers
- Lead dispatchers
- Training officers (CTOs)
- Training instructors (CTIs[18])
- Quality-assurance support
- Operations-management support
- Personnel-services support
- Public-relations and social-media support
- Special operations and real-time analytical support

ALTERNATIVES

Blue font indicates positions or duties that can be contracted.

Green font indicates position differential, incentive or stipend positions.

Typical differentials, depending on MOU or assignment, can be anywhere from 5% to 15%.

Contracts for duties or positions that otherwise are filled by employees can be entered into with member agencies (e.g., payroll, HR)

NG911 technology will impact systems and operations to the degree that support is not provided by agencies today.

In this model, other positions exist that can assume several related duties of the above positions, such as the following:

Business systems and analytical support—While this one position has a direct nexus to each of the described duties, the two can be split if necessary. Examples of related duties include:

- Business-systems and personnel management

[17] Local-area network/wide-area network.
[18] Certified training instructors.

- GIS maintenance and analytical support
- Management analyst and executive assistant (depending on duties)

This model also includes a fifth supervisor, which is a position designated for a standalone JPA, which can create its own classification and compensation rates. As a gauge for understanding how human-resource costs are estimated, a side-by-side comparison is provided below.

Table 24: Positions Comparison

Santa Cruz Consolidated		Bay Comm	
General Manager	1	General Manager	1
Division Managers	2	Division Managers	2
Administrative Supervisor	1	Business Systems Manager	1
Operations Supervisors	2	Shift Supervisors	5
System Supervisor	1	Systems Supervisors	1
Senior System Technicians	3	System Technicians	2
		Executive Assistant	1
Office Supervisor	1		
GIS Technician	1		
Senior Administrative Assistant	2	Office Assistants	2
Senior Public-Safety Dispatcher	7	Shift Leads	6
Public-Safety Dispatcher I/II	32	Communications Dispatcher	26.5
Public-Safety Dispatcher Assistant I/II	4	Call-takers	6.5
Total	57	Total	54

Santa Cruz recorded an estimated overtime expenditure of approximately $430,000

Santa Cruz Call-Volume Stats (2018)	585,137	Population:	262,382
Bay Comm Call-Volume Stats (2018):	342,432	Population:	132,646
	(242,705)		(129,736)

Santa Cruz Consolidated Total Expenditures: **$7,907,478**

If the Bay Comm JPA were to use the Readiness 50/50 Split cost-allocation formula and use the Santa Cruz PSAP budget, estimated costs are:

Example:

Total Costs including salary, benefits, services and supplies = $7,907,478
*Percentages are rounded off

$7,907,478	2018 CAD Calls %		2018 9-1-1 Volume %			10% Readiness (790,748)	40% 9-1-1 Calls Cost	50% CAD Inc Cost	Service Fee Total
Arcata PD	35,834	18%	62,332	18.2%		$158,150	$575,664	$711,672	$1,445,486
Humboldt SO	60,308	30.5%	159,348	46.5%		$158,150	$1,470,790	$1,205,890	$2,834,830
Eureka Fire	11,438	6%	11,438	3.3%		$158,150	$95,848	$237,224	$491,222
Eureka PD	62,556	31.5%	103,314	30%		$158,150	$948,897	$1,245,427	$2,352,474
Fortuna PD	28,000	14%	6,000	1.7%		$158,150	$53,770	$553,523	$765,443
	198,136	100%	342,432	100%*		$790,750	$3,144,969	$3,953,736	$7,889,455

10.1.5 Facilities

Amongst the four (or perhaps five) stakeholder agencies, no facilities exist that can provide the amount of space that would be needed for a minimum of 10- or 12-console PSAP and/or to consolidate with an existing OES/EOC space. Based on our review of all PSAPs visited, additional space is one component that is not available; regarding retrofitting existing space, structural impediments exist, or competition exists within each respective agency regarding its allocation.

10.1.5.1 General PSAP/EOC Design Guidelines

Mission-critical public-safety facilities such as a PSAP or EOC must continue operations even under the most adverse conditions (i.e., it must be the last operational building). To accomplish this, the design team will need to incorporate site features, architectural features, and structural design techniques that will allow the facility to maintain its physical integrity under extreme conditions. The building also must be designed to include sufficient redundancy to ensure continuity of operations in case of equipment failure, or during maintenance periods. Backup power must be scaled to provide sufficient power for mission-critical spaces and equipment for extended periods of time.

The State of California has adopted stringent building codes that are intended to mitigate the impacts of seismic events. Codes regulate the construction of buildings in earthquake and tsunami inundation zones.

California specifically addressed the importance of critical facilities that support public-safety missions. The *Essential Services Buildings Seismic Safety Act of 1986* addressed the critical functions that emergency-service facilities serve during disaster response. The legislature recognized the need to protect essential-service buildings and the systems that support public-safety operations. The Act amended Division 12.5 of the California Health and Safety Code to add Chapter 2, Essential Services Buildings. According to the Act, such buildings are those designed to house law-enforcement agencies, fire departments, PSAPs/EOCs, the California Highway Patrol and the like.

Appendix M*, Tsunami-Generated Flood Hazard* of the California Building Code addresses tsunami hazard-mitigation requirements. The section prohibits construction within a tsunami hazard zone. However, two exceptions are available. The first requires that facilities incorporate a vertical evacuation and sheltering design in compliance with Federal Emergency Management Agency (FEMA) P646, *Guidelines for Design of Structures for Vertical Evacuation from Tsunamis*. The second exception allows the construction of critical facilities *"when such a location is necessary to fulfill their function, providing suitable structural and emergency evacuation measures have been incorporated."* However, a local jurisdiction would be hard-pressed to justify the investment of funds to construct essential-services buildings within a high-hazard zone.

10.1.5.2 Recommended Design Criteria for Mission-Critical Facilities

In addition to state and local building-code requirements, public-safety facilities should be constructed in accordance with standards related to the design of critical infrastructure, including the following:

- National Fire Protection Association (NFPA) 1221, *Standard for Installation, Maintenance, and Use of Emergency Services Communications Systems*, 2010 revision
- NFPA 1600, *Standard on Continuity, Emergency, and Crisis Management*, 2019 revision
- FEMA 361, *Design and Construction Guidance for Community Shelters*
- FEMA P-646, G*uidelines for Design of Structures for Vertical Evacuation from Tsunamis*, April 2012 revision
- FEMA 452, *A How-To Guide to Mitigate Potential Terrorist Attacks Against Buildings*, January 2005 revision
- Unified Facilities Criteria (UFC) 4-010-01, *Department of Defense (DoD) Minimum Antiterrorism Standards for Buildings*
- UFC 4-141-04, Department of Defense (DoD) Emergency Operations Center Planning and Design
- National Institute for Occupational Safety and Health (NIOSH), *Guidance for Protecting Building Environments from Airborne Chemical, Biological, or Radiological Attacks*
- Telecommunications Industry Association (TIA) 942, *Telecommunications Infrastructure Standards for Data Centers*
- NENA 04-502, *E9-1-1 PSAP CPE Site Characteristics Technical Information Document*
- NENA, Generic E9-1-1 Requirements Technical Information Document

10.1.5.3 Best Practices Recommendations for Mitigating Risk

While the DoD's UFC standards have specific elements of the design prescribed for the proposed consolidated PSAP facility, we often find it advisable to delineate general design concepts. Design elements important to a facility of this type are identified below.

A. Site Perimeter and Access Points

- Perimeter fencing will be provided and will be considered the controlled perimeter, to implement UFC-designated standoff requirements. Note that the design team likely will need to utilize the outside perimeter of the facility as the standoff boundary to minimize site impacts
- Provide the ability to reject unauthorized vehicles in secure parking areas
- Provide clearly defined employee vehicle access with a second means of egress

B. Site Layout

- Recommended standoff of 82 feet (25 meters) to parking areas and drive lanes
- If standoff is less than 82 feet, provide an enhanced structure, enhanced perimeter, exterior windows, etc., per UFC 4-010-01
- Locate primary loading/receiving area outside the secure parking area
- Provide a vehicle barrier between the parking area and building to inhibit vehicle access
- Locate critical utilities 50 feet away from high-risk areas, such as the loading/receiving area
- Do not locate areas of concealment, such as trash containers and ashcans, within 30 feet of buildings
- Provide electronic access control to secured areas
- Provide sufficient light levels around buildings and in parking areas, e.g., 4 foot-candles (fc) in parking areas

C. Building Layout

- Create multiple security levels within the facility
- Provide vestibules/airlocks at public and staff entrances
- Control the public entry/lobby
- Provide a dedicated employee entry point if possible
- Provide a secure service-access point
- Limit glass at and around emergency egress routes to prevent visual access into secure spaces and opportunities for intrusion
- Avoid building shapes with reentrant corners to limit concealment areas
- Provide electronic access control to secure areas of the building

D. Building Envelope

- Use conventional construction if the building is located 82 feet away from public parking areas and is less than three stories in height
- Design the building envelope to withstand 4 pounds per square inch (psi)—28 psi per millisecond dynamic load—if the standoff is within 50 to 82 feet of public parking areas
- Design the building envelope to a specific threat if the standoff is less than 50 feet
- Exterior doors should open outward
- Provide windows as recommended by UFC 4-010-01 if an 82-foot standoff is not guaranteed
- Windows shall be designed to comply with FEMA 361 guidelines
- Windows around the backup PSAP/EOC should comply with NFPA 1221 for ballistic protection
- Radio towers must be located an appropriate distance from structures to prevent damage resulting from a collapse

E. Building Structure

- Utilize appropriate seismic standards as required by the California Building Code
- If located within a tsunami inundation zone, provide vertical evacuation and sheltering per code
- Use non-combustible materials per the Uniform Construction Code (UCC)
- Minimize column spacing where acceptable to reduce the chance of progressive collapse
- Provide vertical continuity of columns (avoid using transfer girders)

- Design connections to the capacity of the element if the standoff is less than 82 feet
- Design elements for blast if the standoff is less than 50 feet

F. HVAC/Fire Protection

- Place outdoor air intakes high on sidewalls, on the roof, or in high soffits per NIOSH guidelines
- Provide emergency shut-off for the outdoor air intake and monitoring system
- Provide a separate exhaust system for the public lobby, mailroom, and loading area
- Provide a redundant/independent HVAC system for emergency communications per NFPA 1221

G. Electrical/Telecommunications

- Provide underground utilities encased in duct banks
- Provide emergency generators for all functions and a UPS system for critical infrastructure
- Provide closed-circuit television (CCTV) surveillance around the building perimeter and in parking areas

H. Other

- Provide a security desk with visitor screening. Provide ballistic glazing and wall construction around the security desk for a controlled entry point
- Provide a mail/package room for receiving and screening
- Provide for the potential future installation of security screening areas

10.1.5.4 Architectural Considerations

In addition to the above-stated requirements for the various components related to enhancing security and reducing vulnerability, a variety of requirements serve as good guidelines for the architectural design of a PSAP/EOC facility.

A. Zoned or Layered Levels of Protection

Facilities of this type should be designed using intensifying areas of security and hardening, starting at the site perimeter and moving to the interior of the building. This will become particularly important given the interest in providing continued public access for training in the facility.

B. Passive versus Active Security Design

While it is critical to include appropriate electronic monitoring and security measures, good architectural techniques should be used to provide a facility that creates appropriate levels of hardening and anti-vulnerability through its design. Careful consideration should be given to this approach architecturally. A multidisciplinary design approach should be used to create a facility that leverages all of its systems to deter intruders.

C. Capability of Increasing or Decreasing Security

A facility such as this should have the ability to vary its security levels in response to various threat levels. General site recommendations include the following:

- *Buffer zones* – Such zones provide an adequate exterior buffer around the hardened portion of the site to prevent vehicular intrusion in proximity to the facility. A sufficient setback must be available on the site to accommodate this specific need. In addition, the site should allow appropriate buffering from adjacent sites and, where possible, sites of high risk adjacent to a potential chosen site should be avoided.

- *Landscaping* – Appropriate setbacks from the facility can be accommodated through landscaping of the site. Specific solutions include berms, street furniture, podium design of public spaces, large-diameter deciduous trees, ponds, trenches, fences, water basins, sculptures, and bollards, among others.

- The site perimeter is the first step in the provisioning of the anti-vulnerability zones of protection. Appropriate vehicle speeds should be considered, dependent upon the level of anti-vulnerability desired for a project of this type. In addition, site circulation should be designed to prevent high-speed approaches by vehicles.

- *Site signage* – Appropriate site circulation signage should be provided to assist visitors in finding their way, to eliminate accidental entry into prohibited areas. In addition, elimination of signage in sensitive areas should be considered to discourage entry.

D. Architectural Space Considerations

- *Office locations* – Offices of vulnerable officials may be positioned, and/or windows glazed so that the occupant cannot be seen from an uncontrolled area. Either a location with visual access into a secure area or a courtyard should be considered, or suitable obscuration—through use of glazing, window treatments, ballistic-resistant glazing, or other protective devices—should be provided.

- *Mixed occupancies* – Public areas should be separated from high-risk areas (e.g., PSAP/EOC floor area), using appropriate anti-vulnerability measures. In addition, no public toilets or service-oriented spaces should be located in non-secure areas.

- *Loading docks* – Shipping and/or receiving areas should be given special attention. These areas should be separated from utility rooms, utility mains, service entries—including electrical, telephone, data, fire protection, alarm systems, fire suppression, cooling and heating mains—by a minimum of 50 feet. Loading docks and service-access areas should be located so that no vehicles will be driven into, or parked under, the facility.

- *Concealment areas* – Avoid installing features such as trash receptacles and planters that can be used to conceal an explosive device.

- *Exterior walls* – The description provided here is specific to a building for which it is determined blast design must be applied. Again, the owner and designer must contemplate the potential situation mitigation described throughout this section to determine whether blast design is needed.

E. Other Items

The following items must be located remotely from the main entrance, as well as the vehicle circulation, parking and maintenance areas. If this cannot be accommodated, the following spaces should be hardened as necessary.

- Emergency generators, fuel systems, day tank, fire sprinkler and water supply
  - Normal fuel storage
  - Main switchgear
  - Telephone distribution and main switchgear

- Fire pumps
  - Building control centers
  - UPS systems controlling critical functions
  - Main refrigeration systems critical to building operation
  - Shafts for utilities
  - Critical distribution feeders for emergency power

10.1.5.5 Definition of Space Standards

Standards exist in the industry that provide guidelines for general space planning; some are identified in the table below. These standards do not preempt any space standards that local agencies may have adopted.

Table 25: Space Allocation Standards

Space-Allocation Standards	
Position/Purpose	Recommended Space
Director's Office (closed office)	160 square feet per office
Private Office (closed office)	120 square feet per office
Supervisor Position (console workstation)	96 square feet per position
Training Telecommunicator Position	96 square feet per position
Telecommunicator Position	64 square feet per position
EOC Emergency Support Function (ESF) Position	24 square feet per position
Training Room	20 square feet per person
Conference Room	15 square feet per person

The programming assessment utilizes a conversion formula to define the total square footage for each functional space. Typically, the worksheet will indicate a 40 percent to 60 percent net square foot (NSF)-to-gross-square foot (GSF) conversion for workstation spaces, and a 30 percent NSF-to-GSF conversion for office spaces. The conversion factor for other spaces differs based upon the function of the space. Gross square footage accounts for space allocated for walkways, interior wall dimensions, and other spaces that are not specifically allocated to a purpose.

10.1.5.6 Space Allocation Breakdown

For the purposes of this feasibility assessment, MCP has estimated space requirements for the proposed consolidated PSAP, which includes the projected overhead staffing structure. The breakdown is organized as follows:

- Administrative offices space
- PSAP operations floor
- Equipment/mechanical space

Table 26: Administrative Offices Space Allocation Breakdown

PSAP Administrative and Common Spaces									
		Space Code*	Area/ Unit (SF)	Proposed # Units	NSF	Grossing Factor	GSF	Total	Comments
1.0	**Humboldt County Consolidated Communications Center**								
1.0	**Administrative Spaces**								
1.1	General Manager	CO	160	1	160	30%	48	208	
1.2	Manager(s)	CO	120	3	360	30%	108	468	
1.3	Business Admin	CO	120	1	120	30%	36	156	
1.4	PSAP IT Technician/ Office Assistants	CO	120	5	600	30%	108	780	
1.5	Vestibule/Waiting		15	4	60	30%	18	78	
1.6	Reception/Clerical	WS	80	1	80	50%	40	120	
1.7	Copier/Printer/File Area		120	1	120	25%	30	150	
1.8	Storage/File Room		100	1	100	25%	25	125	
1.9	Training		20	20	400	30%	120	520	
1.10	Supervisor Office	CO	120	1	120	30%	36	156	
1.11	Shift Leads Office	CO	120	1	120	30%	36	156	
1.12	Academic Training Room	CO	20	24	480	30%	144	624	
				Subtotal	**2,720**			**3,541**	

*CO = Closed Office WS= Workstation

The following considerations correlate with the functional space allocations denoted in the preceding table:

1.4 The office assistants' space is open. One of two can serve as the reception area.

1.10 Supervisors office – Two supervisors would be assigned to the PSAP but would not be on duty at the same time; however, two workstations would be in the office to accommodate both. There would be one systems supervisor office and one office supervisor space.

1.11 There are two closed-door offices for shift leads—four leads sharing two offices with two workstations.

1.12 Academy training room – Ideally equipped with six workstations that emulate PSAP consoles, plus table space for six trainees and a desk and workstation in an enclosed office within the same room (maximizing scenario facilitation).

Table 27: PSAP Operations Floor Space Allocation Breakdown

PSAP Operations Floor and General Area									
		Space Code*	Area/ Unit (SF)	Proposed # Units	NSF	Grossing Factor	GSF	Total	Comments
2.0	**Communications Center**								
2.0	**Operations Floor**								
2.1	Shift Supervisor	CW	96	1	96	75%	72	168	
2.2	Training Position	CW	64	1	64	60%	38	102	
2.3	Telecommunicator Workstations	CW	64	12	768	60%	460	1,229	Ergonomic features
2.4	Unisex Toilet		70	2	140	35%	25	189	
2.5	Locker Area/Room		100	1	100	35%	35	135	
2.6	Kitchen/Break Room		250	1	250	35%	88	338	
2.7	Quiet Room		75	1	75	30%	23	98	
2.8	Printer/Copier/Work Area		50	1	50	25%	13	63	
2.9	Storage/Supplies		100	1	100	25%	25	125	
2.10	Shift Briefing Conference Space		20	20	400	30%	120	520	
				Subtotal	**2,043**			**2,967**	

*CO = Closed Office WS= Workstation

2.10 Space allows for shift briefing, in-service training and general conference space.

Table 28: Equipment/Technology Space Allocation Breakdown

Equipment/Technology Space									
		Space Code	Area/ Unit (SF)	Proposed # Units	NSF	Grossing Factor	GSF	Total	Comments
3.0	**Communications Center IT Equipment**								
3.0	**Computer Room – MDF**								
3.1.1	PSAP Computer Room/IT Racks		16	10	160	100%	160	320	
3.1.2	911 Computer Room/IT Racks		16	6	96	100%	96	192	
3.1.3	Uninterruptible Power Supply (UPS)		16	2	32	100%	32	64	
3.2	**Equipment Rooms**								
3.2.1	Power and Mechanical		250	1	250	10%	25	275	
3.2.2	IDF Space		16	2	32	100%	32	64	
				Subtotal	**666**			**915**	

This summary provides the space that is estimated for a standalone, fully consolidated PSAP.

Cost Estimate

Table 29: Consolidated PSAP Space Summary Cost Estimate

Consolidated PSAP Space Summary		
Function	Area	Space (rounded)
1.0	Administrative Spaces	3,541
2.0	Communications Operations Floor	2,976
3.0	Equipment/Mechanical Spaces	915
	TOTAL	7,432 Net Square Feet

Cost estimates are difficult to calculate with certainty due to several factors:19

- Cost of insurance on construction materials
- Labor shortages
- Steel tariffs
- Modular options for construction

[19] ProEst – commercial construction costs per square foot (2018).

Case Example:

Using the costs per square foot from a recent OES/EOC/PSAP/data center project, which started in 2016 in the San Francisco Bay Area on a design-bid-build contract—whereby an architect subcontracts with a construction firm and bids on requirements identified in a request for proposals (RFP)—the following table illustrates what goes into this type of hardened construction.

Recognizing that labor costs in the Bay Area possibly are higher than in Humboldt County, the calculations are used to gauge costs in California for an "all-in" project. Such projects have the following components:

- Deconstruction of existing structures/monuments
- Soil engineering
- Lot preparation
- Slab engineering and preparation
- Steel and building construction
- Telecommunications infrastructure installation
- Mechanical, electrical, plumbing system installation
- Finishings
- Landscaping
- Anything else associated with the facility and grounds

At project completion, this 32,000-square-foot project is estimated to cost within a range of $1,000 - $1,500 per square foot.

Table 30: Estimated Construction Cost Breakdown

Estimated Construction Costs		
Bay Comm Estimated SF	Low Range	High Range
6,500	$6,500,000	$9,750,000

Additionally, for the building construction only, the table below estimates[20] costs for a 6,500-square-foot building:

[20] BuildingJournal.com – online calculator/estimates.

Commercial Cost Estimate		
Type of Building		Fire Station 1 Story
Project Location		California-Sacramento
Type of Work		Lump Sum
Cost Index		Median
Square Feet		6,500.00
Subtotal		**830,834.02**
Overhead	10.00%	83,083.40
Profit	5.00%	41,541.70
Bonding	1.00%	8,308.34
Total Budget		**963,767.46**
Per Square Foot		148.27

10.1.6 Technology

10.1.6.1 Core Technologies

Computer-Aided Dispatch

All four stakeholder agencies use Sun Ridge Systems' RIMS CAD system. Because all stakeholder agencies implemented their respective systems within five years of each other, replacement of these systems is not needed. However, a CAD system version alignment by the vendor would be required so that a single platform could be used in the PSAP and for mobile data. This vendor evaluation would determine whether the initial investment made by each agency could be salvaged, by using each respective CAD system as a "message switch" to process the CAD data at mobile data terminals. Sun Ridge also would need to modify software to program jurisdictional groups to the new single platform. This would give each agency its own identifier to enable data to be pushed to the RMS and other agency-owned technology.

For CAD functionality, jurisdictional groups allow operation at separate workstations or at one depending on the desired configuration. For example, today Eureka has two jurisdictions—police and fire. The same would hold true for all law-enforcement agencies in one operating system.

As part of the business plan under a full consolidation, it is recommended that the operations groups come together to identify common CAD functionality. A critical success factor in achieving optimization in consolidated environments is the standardization of dispatch practices. For instance, one agency may use terminology that is different from another. Agency A may use the word "cover" when requesting backup, while Agency B may use the term "fill." Common practices are essential to successful outcomes. This is true with CAD functionality.

Next, Sun Ridge and the County's IT personnel would need to evaluate the size and scalability of the servers and networks in place, to ensure optimal response and reflex time for system use. If a new facility

were to be built, this exercise would be part of the normal planning process. In a consolidated environment with a single point of operations, a redundant or backup server is mandatory to ensure a solid continuity of operation should there be a primary system failure. The exercise of sizing and scalability also should be undertaken when planning for a new facility.

Some of the benefits of this CAD system modification include, but are not limited to:

- Enhanced situational awareness
- Simplification of system operation, versions, maintenance and troubleshooting
- Common training amongst all telecommunicators
- The ability to create universal backup and continuity of operations plans

Mobile Data Systems

Mobile-data hardware and connectivity can remain the same; however, to achieve standardization, a single vendor may be more cost effective (volume pricing) and easier for maintenance (on-call). Three of the four stakeholder agencies deploy MDS. It is recommended that, if a consolidation takes place, an audit of stakeholder agency hardware be conducted, so it can be determined whether a wholesale purchase can be considered to replace existing systems and install new systems as needed. A wholesale replacement can be seen as valuable to those who will be maintaining this equipment and who will need to project its replacement for the future.

The RIMS mobile client used by all of the stakeholder agencies will assist everyone—but specifically supervisors and command levels of the respective organizations—in seeing a dynamic and common operating picture. For a region as isolated as Humboldt, interagency coverage and automatic-aid/mutual-aid responses are better coordinated by seeing who is available, and if they are not, what kind of call they are on to determine whether they can break free for a response. While each agency may be able to do this independently, the ability to see all regional responders in a common platform can be very helpful when making assignment decisions.

Automatic Vehicle Location

It is recommended that all stakeholders agree on CAD features and functionality such as AVL, which is native to Sun Ridge's solution. To achieve a common operating picture, all agencies must use this feature to evaluate deployment options and need for mutual-aid equipment. This feature enables a more accurate unit recommendation on priority calls and provides a visual for command personnel when tracking units in routine and large-scale emergency events. It also is an effective officer safety tool should personnel separate from a vehicle and the unit is not responding when being called. Because the AVL feature is integrated into the CAD solution, no additional interface is needed.

Records Management Systems

Stakeholder agencies will retain their respective RMS and collaborative features. Because the RMS is integrated into the CAD product, no additional interface is needed.

Call-Handling Equipment

HCSO's PSAP will be due for CHE replacement by 2021. When notifying Cal OES's 911 Branch of a consolidation, a host agency is identified, and reprogramming of the traffic load and allocations is performed. Timing for this replacement will be critical to aligning it with a consolidation option. All equipment to be purchased needs to be IP-based and NENA i3-compliant. Vendors can be found on the State's vendor list. This equipment and its features need to be compatible with the State's implementation of NG911, which starts in 2021. When considering a new product, features and functionality such as integrated text-to-911, real-time data mining, and interfacing with RMS, CAD and third-party applications are strongly recommended. As previously mentioned in this report, the California legislature is due to pass AB1168, whereby the assembly bill would require text-to-911 implementation—to include SMS and RTT functionality—at all PSAPs in California by January 1, 2021.

Logging Systems

A countywide shared logging/recording solution is recommended for the current and future models. A countywide IP/i3-compliant system allows communications and records personnel to access the system, as well as other users—such as fire departments and the district attorney's office—while being able to support NG911 system functionality. When considering a consolidation of this sort, the stakeholder agencies will need to explore the efficacy of building out any of the existing logging/recording platforms versus procuring a new system. Currently, SETNA funds from Cal OES can be used toward this purchase.

Radio Systems

HCSO's move toward a trunked radio system is necessary, for numerous reasons, as follows:

- Interoperability is optimized amongst stakeholders
- Maintenance costs of disparate systems are minimized
- The existing radio backbone can be repurposed to another county/city agencies, allowing the system to be maintained and sourced as a backup system as needed
- Interfacing IP-based radio backbone technology to the CAD system enables seamless logging on and off when on or off duty
- Handheld or portable radios that are GPS-enabled also can be visually tracked, akin to AVL, which can be an asset for officer safety
- Device maintenance and replacement is streamlined
- A talkgroup designated as a countywide mutual-aid channel can be created and used by all stakeholder agencies. This would add reliability to the system because the only countywide mutual-aid channel currently available is CLEMARS

Interoperability is paramount for this region. Considering the interface with allied agencies in any region is important, but as isolated as Humboldt County is, doing so is an officer-safety priority, as well as an efficient and effective tool when common responses are necessary.

Costs for this transition can be perceived as prohibitive compared with existing systems. Portable devices operating on trunked systems cost more than conventional equipment. However, under a proper governance model as described in this report, cost sharing that leverages a volume-pricing model can

benefit all users. There are many governance agreements in place in the state—such as EBRCSA[21] (San Francisco Bay Area) and LA-RICS[22] (Los Angeles area)—to model if a separate MOU is needed for this system.

10.1.7 Networks

When considering construction of a new facility, it is imperative to consult with last-mile service providers (e.g., ATT, Cox) and broadband providers that service the area, to ensure that they will deliver service, and then provide them with a construction quote. It should not be assumed that network infrastructure is in place. Our experience is that documentation with companies that have provided legacy service often is deficient and may take time to unravel before a site is finalized. MCP also highly recommends that network and power providers facilitate dual entrances into the facility for redundancy, e.g., East/West ingress. NG911 interfaces will need protected power and cooling, and an adequate HVAC system is needed to protect mission-critical equipment.

MCP's analysis of the data collected to date regarding network connectivity is enough to develop the initial concept of operations. Once a more detailed plan regarding the transition and implementation is developed, opportunities likely will emerge for further data gathering and analysis. These needs should be updated in future editions of this plan. The remedial data collection can be started during the development of the transition plan.

It can be anticipated that a more detailed network inventory—including an analysis of fiber and microwave capabilities and bandwidth—will be necessary as facilities are selected to participate in the end state and shared systems start to move from the visionary stage toward reality. This inventory should be developed alongside other shared system development plans, e.g., CAD, CHE, and radio. The vision also should include a common emergency services IP network (ESInet)—which will transport emergency calls and associated data in an NG911 environment—that can be utilized for multiple shared applications in the consolidated PSAP.

First Net Public Safety Broadband[23] – FirstNet The First Responder Network Authority's (FirstNet) mission is to deploy, operate, and maintain the Nationwide Public Safety Broadband Network (NPSBN)[24] to provide Long-Term Evolution (LTE)-based broadband services and applications to public safety entities. The network is a single, nationwide network architecture consisting of a core network, transport backhaul, and radio access network (RAN). While mission critical voice communications will continue to occur on LMR, in time, FirstNet is expected to provide the public safety community with mission critical broadband data capabilities and services including, but not limited to:

- Messaging
- Data Storage
- Image Sharing
- Applications
- Video Streaming

[21] East Bay Regional Communications System Authority.
[22] Los Angeles Regional Interoperable Radio System.
[23] DHS- Office of Emergency Communications: Fiscal Year 2018 SAFECOM Guidance on Emergency Communications Grants.

- Location-based Services
- Group Text
- Quality of Service, Priority and Voice Preemption

FirstNet is responsible for developing the network architecture, technical and user requirements, spectrum access policies, standards, and deployment plans for the network. As the NPSBN is deployed, FirstNet will continue to actively engage public safety entities, federal, state, local, tribal, and territory jurisdictions, and other stakeholders.

FirstNet submitted a detailed State Plan to each state and territory describing how FirstNet intends to deploy the network in that state or territory. Governors were to then decide whether to adopt the FirstNet State Plan (and thus have the network deployed in their state at no cost) or whether they wish to take on the full risk and responsibility of developing an alternative State Plan. All 50 States, 5 Territories, and the District of Columbia adopted the FirstNet State Plan and network deployment is ongoing.

While entities may want to pursue funding for broadband equipment and systems on commercially designated spectrum, there are no assurances that such equipment and systems will be compatible with FirstNet. Therefore, FirstNet strongly advises grantees to coordinate with FirstNet in advance of any strategic acquisition of LTE equipment to ensure purchases support future service choices. Grantees are encouraged to further focus on planning and outreach activities (e.g., community outreach and education, documenting user needs) and to work with any applicable governing bodies in planning for the arrival of broadband and other advanced technologies. This includes:

- Planning for integration of Information Technology infrastructure, software, and site upgrades necessary to connect to FirstNet Broadband devices including smartphones, feature phones, tablets, wearables, laptops, ruggedized smartphones, ruggedized tablets, ruggedized laptops, USB modems/dongles, in-vehicle routers, and Internet of Things devices.

- Customer owned and managed broadband deployable equipment, enabling public safety to own and dispatch coverage expansion or capacity enhancement equipment within their jurisdiction.

- Broadband device accessories that enable efficient and safe public safety operations such as headsets, belt clips, earpieces, remote Bluetooth sensors, and ruggedized cases.

- FirstNet SIM/UICC card to allow public safety users to update existing devices, “Bring Your Own Device”, and new devices to operate on public safety prioritized services.

- One-time purchase and subscription-based applications for public safety use which could include, among several other options, enterprise mobility management, mobile Virtual Private Network, identity services, or cloud service tools.

Grantees interested in investing federal funds in broadband-related infrastructure projects should consult the federal granting agency to understand all requirements and restrictions impacting broadband investments. Grantees should also consult with any applicable governing bodies and state agencies.

The term “advanced technologies” includes, but is not limited to, the use of emerging technologies to provide advanced interoperability solutions; solutions that allow the use of commercial services, where appropriate, to support interoperable communications; IP-based technologies; use of common advanced encryption options that allow for secure and vital transmissions, while maintaining interoperability; use of standards-based technologies to provide voice and data services that meet wireless public safety service quality; solutions that have an open interface to enable the efficient transfer of voice, data, and video signals; and investments in these technologies, such as NG911 and Bridging System Interface.

On March 30, 2017, FirstNet awarded a 25-year agreement to AT&T to build the nationwide network. FirstNet and AT&T have developed “State Plans” for each state, including California. These plans include service details, such as cost, coverage and timelines for deployment. The Nationwide Public Safety Broadband Network (NPSBN), or FirstNet network, will be the first ever nationwide high speed broadband data communications network dedicated to public safety. Realizing the FirstNet vision in California will require a concerted effort and close coordination on the part of FirstNet and the state, local, regional, and tribal public safety stakeholders.

FirstNet works directly with the states to plan and build the nationwide network in each state. In California, Cal OES leads the planning and effort for FirstNet. Cal OES has established a Broadband Services Division (CalBSD) within the 9-1-1 Emergency Communications Branch as well as the California First Responder Network Authority (CalFRN) Board. The CalBSD team is actively engaged in public outreach to provide updated information regarding broadband deployment in California.[25]

10.1.8 Non-Core Functions

Full consolidation will necessitate a review of those functions that respective agencies assume are not directly a communications-related task. A business workflow review would be required to address what can be absorbed by others in an 8:00 a.m. to 5:00 p.m. work environment, and those tasks that can be assumed by an officer after hours. Examples of tasks that can move to the administrative hours are lost/found property and ride-along application processes. This discussion also should include administrative telephone answering. Typically, agencies choose to have a voice/menu system that directs callers with a variety of options that assist them after hours.

Any task that involves a CLETS entry will require further examination because those entries must be timely, particularly for vehicles, weapons and missing persons. This includes tows. Vehicle releases typically are performed by officers who respond to the station when it is known that the vehicle owner is present.

City services’ after-hours notification and tracking can remain for each agency as long as the contact and workflow in the consolidated center are well-explained and -understood.

Vacation house and business checks can be an application to be completed online.

The following table represents tasks to consider.

[25] Cal OES 911 Branch Website/Technology/First Net.

Table 31: PSAP Non-Core Functions

Non-Core Function	Implication and Recommendations
Detention and Prisoner Monitoring	
Support of law-enforcement prisoner-detention operations is not a primary PSAP function; however, stakeholder PSAPs may perform some functions related to detention.	It is recommended that a workgroup be formed to discuss the "detention dilemma" and how to best outsource this function.
Building Access Control	
Arcata and Eureka are responsible for remote operation of facility doors and other access control points	Agencies will be required to find an alternative method prior to consolidation. While some of these functions may be performed in the consolidated environment, doing so may depend on the technology in use at each of the current facilities. This would not be a significant issue for a newer, IP-based system.
Phone/Dispatch Support of Non-Public Safety Agencies	
All agencies answer calls, at a minimum, after hours, for city departments.	While not a direct PSAP function, the stakeholders could consider a coordinated 311 system or the use of telephone auto-attendant features to address this issue—enabling the County and municipalities to focus on PSAP consolidation. This approach also helps to reduce the amount of non-emergency calls and provide a place for them to be processed instead of a local PSAP.
Emergency Warning Sirens and Public Notifications	
All PSAPs perform some function related to siren activations and emergency alerts and warnings. This function is commonly performed by PSAPs nationwide as the hub of emergency communications unless it has been a function of emergency management.	It is anticipated that this function would be planned for any consolidated operations. MCP recommends that any 24-hour warning point in the county be capable of activating the emergency sirens. This should be coordinated with County OES.
Premise and External Video Monitoring	
Eureka and Fortuna reported performing some form of on-premises video camera monitoring.	It is anticipated that this function would be planned for any consolidated operations. MCP recommends that the new PSAP be capable of viewing the IP-based camera systems for each jurisdictional footprint.

10.2 Partial Consolidation

10.2.1 PSAP Operations

A partial consolidation has a couple of specific applications. For the Humboldt County feasibility assessment, the most relevant application is that *the service provider provides service to a customer on a part-time basis*. The example used is a law-enforcement agency that is served from 9:00 p.m. to 6:00 a.m., Monday through Friday, by a host agency.

As mentioned previously in this report, partial consolidation occurs when a service provider has capacity to take on additional business without a service deficit to its own agency. Capacity must be in place for effective and efficient services to take place, and that means that technology and human resources are available to take on the additional workload.

Partial consolidation brings additional operations to the agency providing service; therefore, there must be enough space for primary operations, surge and redundancy.

A partial consolidation also means that a host agency (i.e., the service provider) is known to have service capacity in its operation. Generally, this approach is considered when an inquiring agency has the need for part-time services due to staffing or financial considerations. With this in mind, costs are driven by two scenarios:

- Dedicated dispatcher – The inquiring agency desires service from 12:00 a.m. to 6:00 a.m. and wants a dedicated dispatcher on its own radio frequency
- Shared dispatcher – The inquiring agency desires service from 12:00 a.m. to 6:00 a.m. and is willing to share a radio frequency during these hours on the host agency's primary radio frequency

The following partial consolidations are feasible given what MCP observed:

Table 32: Feasible Partial Consolidations

Service Provider	Dedicated Dispatcher	Shared Dispatcher
Arcata	No	Yes
Eureka	Yes	Yes*
Fortuna	No	Yes
HC Sheriff's Dispatch	Yes	Yes*

* Based on low-call-volume periods, presumably midnight shifts

While a part-time consolidation likely can be affected, the following factors should be considered before moving in this direction.

1) Technology integration –While core technology likely is easier to integrate amongst stakeholder agencies (for the most part, all are IP based), accommodating the non-core functions and technologies usually provides the roadblock. It is recommended that these business flows be examined, and a cost/benefit analysis performed to ensure that connectivity can be affected, and non-core duties are assumed by others.

   There is a large amount of work that has to be done for part-time service to take place, particularly as it relates to CAD files. Several programming entries need to be entered including, but not limited to the following:

   - Security files
   - Premises and hazard files
   - Unit types
   - Call Types
   - Geo-file for location validation
   - Common name files
   - Special landmarks, mile markers, etc.

2) Staffing – Taking on another task as important as PSAP operations is compelling when staffing levels can assume the additional workload. In the stakeholder-agency staffing environment—where there are known shortages or hard-to-hire or retain personnel—part-time service could be a complicated issue. At best, increasing staffing levels to accommodate workloads is necessary.

3) Policies and procedures – Defining the scope of work and what is expected will be paramount for this arrangement, particularly as it relates to turning technology over to the host agency. Check-and-balances procedures for this are critical to ensuring connectivity, as are policies and procedures concerning issue case numbers, tow rotations, CLETS entries, etc.

10.3 Space Projections

The colocation or consolidation of PSAP operations potentially offers savings in construction and systems procurement and operations costs. The Eureka, Arcata, and Fortuna police department facilities do not have space available to accommodate the expansion of their PSAPs or a larger consolidated facility. The space in the courthouse currently housing HCSO's PSAP cannot be expanded to support a consolidated center. Expanding the HCSO's current PSAP would be costly and require the temporary relocation of communications personnel during construction. Consequently, the consolidation or colocation of the four PSAPs would require construction of a new, purpose-built facility.

Colocation would house the existing municipal and county operations in a single location. Each agency would maintain its current staffing configuration. Each agency would require a certain number of workstation positions and managers' office spaces. The agencies would share spaces such as a break room, kitchen, restrooms, and other common features.

A consolidation would merge operations into a single organization. Consolidation potentially would reduce the number of telecommunicators and space necessary to provide the desired level of services to the agencies.

This section presents the projected space requirements for the following scenarios:

- Full consolidation of four centers and colocation of OES/EOC into a single facility
- Colocation of HCSO's PSAP and OES/EOC into a single facility

10.3.1 Full PSAP Consolidation and OES/EOC Colocation

The colocation of HCSO's PSAP and OES/EOC offers a variety of benefits. Both serve as the coordination point for information and resources needed by public-safety responders. Colocation of the two operations potentially allows the County to reduce the space requirements of separate facilities, which translates to reduced costs. The departments can share common spaces (e.g., kitchen, training rooms, and conference rooms), technology/data/equipment rooms, IT infrastructure, layered security measures, and resiliency through the construction of a single hardened facility.

The assessment utilized industry space standards that define the allocation of space based on purpose. The following table provides a summary of space programming standards for this configuration. Itemized space projects can be found in Appendices D, E and F.

Table 33: Four PSAP and OES Consolidation Space Summary

Function	Area	Gross SF
1.0	PSAP Administrative Spaces	3,407
2.0	PSAP Communications Center	3,438
3.0	Technology/Equipment	787
4.0	Total OES / EOC Space	7,713
	Total Net Square Feet	15,345

Programming for the PSAP and EOC would be reexamined if colocation is preferable. There are shared spaces that are beyond those listed that could be combined if a new facility were to be considered. Cost reductions can be realized by combining computer rooms, training and conference spaces, and mechanical spaces.

10.3.1.1 Construction Cost and 'All-in' Estimates

Building journal.com provides an on-line calculator that can be viewed as a gauge to understand regional construction only costs that include a myriad of variables such as labor, materials, administrative costs and fees.

Commercial Cost Estimate		
Type of Building		Police Station
Project Location		California-Sacramento
Type of Work		Lump Sum
Cost Index		Median
Square Feet		15,345.00
Subtotal		2,197,743.46
Overhead	10.00%	219,774.35
Profit	8.00%	175,819.48
Bonding	1.00%	21,977.43
Total Budget		2,615,314.72
Per Square Foot		170.43

Using the Bay Area project as a gauge, the estimated cost for the construction of a mission-critical hardened facility, (IT) outfitting, furnishings, finishes, land and hardscaping, or 'ALL-IN' costs, is projected as follows:

Table 34: Projected ALL-IN Costs

Estimated "ALL – IN" Costs		
Humboldt total SF projected:	Low Range	High Range
	$15,345,000 at $1,000/SF	$23,027,500 at $1,500/SF

10.3.2 HCSO PSAP – OES/EOC Consolidation

The consolidation scenario illustrates the space needed if only HCSO's PSAP and OES/EOC facility were to share a common facility. The square footage of the colocated center expands to include scalability for growth and surge capacity. This assumes that each division would continue to operate as a separate entity within the HCSO. Both would occupy shared spaces within a new facility.

The summary table is below:

Table 35: HCSO PSAP – OES/EOC Consolidation Summary

Function	Area	Space (rounded)
1.0	PSAP and OES Administrative Spaces	2,857
2.0	PSAP Communications Center	2,114

Function	Area	Space (rounded)
3.0	Emergency Operations Center	2,256
4.0	SHARED Technology/Computer Room	1,235
5.0	SHARED Common Spaces	1,847
6.0	Vehicle/Large Equipment Storage	2,224
	Total Gross Square Feet	12,553

The building journal.com provides an on-line calculator that can be viewed as a gauge to understand regional construction only costs that include a myriad of variables such as labor, materials, administrative costs and fees.

Commercial Cost Estimate

Type of Building		Police Station
Project Location		California-Sacramento
Type of Work		Lump Sum
Cost Index		Median
Square Feet		12,553.00
Subtotal		1,800,396.53
Overhead	10.00%	180,039.65
Profit	8.00%	144,031.72
Bonding	1.00%	18,003.97
Total Budget		2,142,471.87
Per Square Foot		170.67

Cost Estimate

Table 36: Consolidation Construction Cost Estimate

Estimated Construction Costs		
Bay Comm Estimated SF 12,553 SF	Low Range	High Range
	$12,553,000	$18,829,500

10.4 Virtual Consolidation

As previously mentioned, a virtual consolidation allows for the sharing of technology at separate physical locations. In this configuration, generally a governance structure is established that identifies cost-sharing allocations to each entity for the provision of capital purchases and maintenance of shared equipment. A host agency is determined, which will house core technology that each entity will share. This core technology can be CAD, CHE, logging/recording systems, and radio systems, at a minimum.

Core technology is usually a capital investment for a PSAP. Cost sharing makes sense if the technology is designed to host several clients. Applying this consolidation option to Humboldt County's current situation—by using core technology as the driver to assess feasibility and effectiveness—will enable decision-makers to determine whether to proceed with this option.

10.4.1 Core Technology

10.4.1.1 CAD System

All stakeholder agencies run the Sun Ridge Systems RIMS product, and purchases were made within the last five years. The hardware lifecycle of these systems is between eight and ten years. A hardware refresh usually can be accomplished during this period, causing little downtime. CAD system replacement or upgrade is a common driver for virtualization. In Humboldt County's case, however, the CAD system and its software features—particularly the "collaborative" feature, which provides a common operating picture by sharing RMS information amongst user agencies—makes a weak business and financial case for virtualization.

10.4.1.2 CHE

It was reported that only HCSO's PSAP needs a new system. Unless the other CHE systems are near end of life or in disrepair, replacing this equipment with NG911-compliant should be scheduled over the next five years; all of the stakeholder agencies should consult the state 911 advisor to determine options. If replacement is needed sooner because system reliability is low, then making the decision to replace the system is not complex. However, if the system can be well-maintained over the span of three to five years, this option may enable the stakeholder agencies to wait until a new CHE system can connect to the NG911 infrastructure.

At this juncture, investment in a regional CHE system is not likely to prove cost effective.

10.4.1.3 Radio Systems

Like in the full-consolidation model, the radio system is an opportunity to start a virtualization governance. As previously mentioned, under proper governance, cost sharing in a volume-pricing model can benefit all users. If an initial investment in this system was made by the County, there is still opportunity to create a governance model and develop fair and equitable "buy-in" and maintenance formulas. This one core technology can be the start of virtualization and designed with scalability in mind, can expand into different technical areas when the opportunity arrives.

MCP recommends that this area of virtualization is worth developing if all users agree on the system's functionality, features, coverage and design.

10.4.1.4 Logging Systems

Also mentioned in this report is a countywide shared logging/recording solution. This technology investment also is a good driver for virtualization, which could expand beyond the four stakeholder agencies. A countywide, IP/i3-compliant system allows both communications and records personnel to access the system, as well as other users—such as fire departments and the district attorney's office—while being able to support the NG911 system's functionality. Starting a project of this magnitude, particularly when preparing for NG911 services, is an excellent way to start a virtualization. As with any major purchase or project, stakeholders are identified who collaborate on system requirements and desired features, as well as functionality of the new system, while governance, a host, and cost-sharing formulas for forward years of maintenance would be required. Today, SETNA funds from Cal OES can be used toward the purchase of this equipment. However, saving each agency's allotment of those funds, and deferring the cost of new logging/recording equipment to a cost-sharing model, may be a good option.

Overall, there is viability in exploring virtualization. Some of the options under core technology may be good options to explore, but there may be others to consider. Regardless, if PSAP consolidation moves forward, none of the four stakeholder PSAPs have a reliable and functional backup center to which personnel can evacuate if the need arises.

10.4.1.5 Other Options

Backup Center

The development of a fully automated backup center that shares space, infrastructure, equipment, and maintenance is critical when considering the risks of earthquake and/or tsunami or flooding that exists in Humboldt County. If this option were to be considered, the project lends itself to a governance and cost-sharing formula that could be used for a full consolidation in the future.

Training Facility

The development of a fully equipped training center that shares space, infrastructure, equipment, and maintenance for the provision of the entry-level and in-service training is recommended. Based on feedback, there is no location in the County that is used or can be used, as a location for scenario-based training for both practical application or computer training. As the State moves toward more collaborative training in topical areas that affect both field and dispatch services, the need for space to facilitate joint training becomes more critical. De-escalation training, critical-intervention training, and principled policing/implicit bias are a few course topics that are offered to both sworn and non-sworn ranks in California. This is an excellent business case for developing a location that would serve stakeholders and even external partners.

11 Mapping and GIS

All four agencies use Google Maps, which is interfaced with Sun Ridge's CAD system. It is recommended that under a consolidation, conversion to a GIS-based mapping system, that is maintained by the JPA or other entity, becomes a priority. Arcata's police department is the only agency that reports its uses GIS to manage its MSAG database maintenance. Arcata indicates that it uses a Phase II-Wireless complaint GIS solution that is updated annually. They further indicate that their city-specific GIS layers are underused and are trail maps but did not indicate that any public-safety-specific data layers are being used.

MCP has extensive expertise in this area and recommends the following as a best practice that agencies should strive to achieve. GIS technology combines a powerful relational database with the unique ability to display the database information on a map. This ability to visualize information on a map enables quick analysis of information, which makes GIS invaluable to public safety. By referencing GIS data to a location on the earth's surface, maps are displayable, location information is visualized, and decisions are made quickly.

A CAD/GIS database allows for the storage of spatial information regarding features and all of their attribute information. Spatial information defines how an object relates to other objects by location and provides information about the object itself. The information contained in each database represents a separate data layer. Streets, creeks, hydrants, city boundaries, and cell tower locations are each a different data layer. The streets data layer has road names and address ranges; similarly, the city boundaries data layer has city and town names, while the emergency service zone (ESZ) data layer has the emergency service numbers (ESNs) and responder information. The ability to retrieve and display data, and the ability to turn on or off layers as needed, is one benefit of a GIS map over a paper map. The ability to plot wireless call locations—along with street and boundary information related to counties, cities and ESZs pushed GIS into PSAPs.

Connectivity of road centerlines is required for routing emergency services to the correct location and when using AVL or automatic vehicle route recommendation (AVRR). AVL and AVRR software determine the closest available unit for dispatch as well as turn-by-turn directions for moving from one location to another. The CAD system map may not properly display critical information when GIS road centerline data contains connectivity issues.

It is recommended that GIS layers be maintained by a single entity or that the County develops a countywide repository that contains one master data set. With NG911 on the horizon, GIS will play an integral role in wireless 911 location services.

In California, the Cal OES's 911 office recently awarded a contract to Digital Data Technologies, Inc. (DDTI), which is facilitating the statewide GIS mapping system that will comply with the NENA i3 standard; this is to accurately route wireless emergency calls in an NG911 environment. Currently, DDTI's tasks include:

- De-conflicting shape files to define PSAP boundaries
- MSAG and ALI data currently being processed (reverse geo-coding)
- Gathering road centerline data and address points from local GIS authorities

- Working with a commercial dataset for statewide road centerline and address point data
- Implementing a reconciliation-and-validation process to ensure that data can be used to route 911 calls
- Validating all data provided to ensure that its supports NENA i3 call-routing and can be used for the emergency call-routing function (ECRF), which is a functional element of next-generation core services (NGCS), which are used to deliver emergency calls to the correct PSAP in an NG911 environment

Per Cal OES, the end state will be a dataset that can be used for NG911 call-routing. To that end, the State's GIS Task Force is guiding this process by contacting regions and facilitating meetings to ensure that this process is known and that agencies participate in this initiative.

11.1 GIS NENA Standards

In June 2018, NENA published NENA-STA-006.1-2018, *NENA Standard for NG9-1-1 GIS Data Model*, which provides requirements and recommendations regarding the development of schemas for NG911 data layers. MCP highly encourages local addressing authorities to adopt this data model and transition their current foundational datasets to the recommended schemas.

This NENA standard is designed to meet the needs of an i3-compliant NG911 system and be backwards compatible with today's Enhance 911 (E911) systems. Within an NG911 system, the ability to validate locations and route emergency calls will depend on the standardization, quality and accuracy of the GIS data.

In addition to this standard, NENA has developed many standards and documents during the past 20 years to provide PSAP and GIS professionals with guidelines for building and maintaining GIS data layers.

Other NENA documents that are recommended for review and reference include the following:

- NENA-STA-012.2-2017, *NG9-1-1 Additional Data*
- NENA-STA-004.1-2014, *NENA Next Generation United States Civic Location Data Exchange Format* (CLDXF)
- NENA 02-014, *GIS and Data Collection Standard*
- NENA 71-501, *Standard for Synchronizing GIS with MSAG & ALI*
- NENA-INF-014.1-2015, *Information Doc – Development of Site/Structure Address Point GIS Data for 9-1-1*
- NENA-STA-015.10-2018 (Originally 02-010), *NENA Standard Data Formats for E9-1-1 Data Exchange & GIS Mapping*

All of these documents are available for download at www.nena.org.

11.2 NENA Required/Recommended Data Layers

The *GIS Data Model for NG9-1-1* standard provides data layer requirements and recommendations, as well as standardized data fields, that will allow data across the United States to be used within all response systems. The data layers are as follows:

Required Foundational Data Layers

- Road Centerline
- Site/Structure Address Point
- PSAP Boundary
- Emergency Service Boundary
- Provisioning Boundary

Strongly Recommended Data Layers

- Street Name Alias Table
- Landmark Name Part Table
- Complete Landmark Name Alias Table
- State or Equivalents
- Counties or Equivalents
- Incorporated Municipal Boundary
- Unincorporated Community Boundary
- Neighborhood Community Boundary

Recommended Data Layers

- Railroad Centerline
- Hydrology Line
- Hydrology Polygon
- Cell Sector Location
- Mile Marker Location

Other boundaries may be created for different types of emergency services, such as poison control, forestry services and the U.S. Coast Guard. The PSAP boundary and basic emergency services boundaries can be created from the existing ESZ boundary data layer if these data layers do not already exist within the county.

11.2.1 NENA Required/Recommended Data Schemas

MCP highly recommends that the County transitions to NENA and any additional attributes required by Cal OES.

For all schemas, please note the following items.

The projection required by NENA for all geodetic data is WGS_1984. Currently, all counties are using NAD_1983_State Plane projections for their local data and this data is re-projected into WGS84 for the Motorola CAD system. MCP recommends that each county continue to use State Plane and MCP will develop a process like the Motorola database update when data is required for upload to a state-wide database.

For each attribute listed, the “M/C/O” column is used to indicate whether including data for the specific field is Mandatory (M), Conditional (C) or Optional (O). In each case, the attribute must be included in the schema; however, if including data is mandatory, then the data field must be populated for each feature. If including data is conditional, if data exists for that feature then it must be populated; however, it is ok to have a blank field if no data exists. If including data is optional, data may or may not be provided for that feature.

For additional information regarding each attribute, please refer to NENA-STA-006.1-2018.

11.2.2 NENA Globally Unique ID

The database schema for each layer contains a required NENA Globally Unique ID. This attribute is built by combining an agency-assigned identification (ID) for the feature with the Agency Identifier. NENA recommends that the agency-assigned ID be an abbreviation of the data layer followed by the feature ID, i.e. RCL1 or AP1525. The agency Identifier should be the domain name of the PSAP, i.e. county.pa.us.

Examples of NENA Globally Unique IDs: RCL1@eureka.ca.us, AP1525@ocgov.com.

GIS Recommendations

GIS data will be leveraged by NG911 systems in the future to more accurately locate emergency callers, ensure that the calls reach the correct PSAP and dispatch the appropriate emergency response.

Data generated by GIS will play a far more critical role within the NG911 environment. Today GIS data primarily is used within the dispatch mapping modules in CAD systems once the call reaches the PSAP. Increasingly, the integrity of 911 data is being put to the test as the emergency response community transitions to NG911. That is because such data will replace the legacy Master Street Address Guide (MSAG) and Automatic Location Identification (ALI) databases. Again, GIS data will be leveraged to locate callers, ensure that the 911 call reaches the correct PSAP, and dispatch the appropriate emergency response.

The legacy 911 system uses customer telephone records and tabular data contained in the MSAG and ALI databases—e.g., street names, address ranges—to determine 911 call-routing. In contrast, the NG911 system will use dynamic GIS data to make an emergency call-routing function (ECRF) and location-verification function (LVF) decisions. Specific NENA standards for this data are being finalized. The standards will ensure that all NG911 GIS data nationwide will be compatible.

Currently, numerous jurisdictions throughout the country maintain GIS location data at local or regional levels. These GIS datasets will become the base database for NG911, where all location-related data is derived. Aggregating GIS data from numerous sources–such as the county, municipal and PSAP jurisdictions–for provisioning within the ECRF and LVF components of an NG911 system presents unique challenges. It is imperative then to establish the process and mechanisms necessary to assess, improve and maintain the aggregated GIS data into a single NG911 dataset. It is very important to build rules, policies, and procedures to maintain authoritative boundaries for emergency service zones (ESZs), PSAPs and municipalities. It is equally important to establish a governance process for changing boundary files—

considering annexations and dissolutions—managing effective dates, resolving conflicts between neighboring PSAPs and generally enforcing topology rules for PSAPs.

GIS-enabled call-routing requires accurate and up-to-date GIS data. It is imperative that local GIS data adhere to the proper data standards and that an effective plan for data maintenance is implemented. A critical step during this evolution is synchronizing GIS databases with the MSAG and ALI data. These databases should be based on a common dataset and consistent with a single standard. The objective is to achieve the NENA-recommended 98 percent match between the MSAG, ALI and GIS databases, a less than 2 percent “no records found” rate, and minimal discrepancies.

11.2.3 GIS Best Practices

To maintain a favorable collective environment among all the GIS users within Humboldt County, it is imperative that jurisdictional leaders develop good business practices, both within each respective PSAP and county department.

MCP recommends that team leaders be honest and focused on the mission of the PSAP, region, and state to provide the best emergency response for their communities. This includes developing an open dialogue with industry peers as well as local team members, regional team members, state officials, and local community members. MCP further recommends that Humboldt county leadership and GIS professionals stay informed regarding developments at the statewide and national levels with California GIS initiatives, the National Emergency Number Association (NENA) and the Association of Public-Safety Communications Officials (APCO). Successes should be shared between PSAP leadership and GIS professionals.

The documentation of all processes is advised as this will make any transitions within the team(s) much easier. Keeping all documentation on a shared drive that is regularly backed up also is recommended. Accountability and transparency are key components in the continuation of a successful GIS program within the PSAP and the County.

GIS data maintenance is an ongoing process. It is important to take time when updating databases to ensure that all data is updated accordingly. For example, if a street name changes, care must be taken to update not only all affected centerlines, but also any structures, MSAG table entries, and ALI records using the same street name. The United States Postal Service (USPS) and the telephone company must be notified regarding the street name change. USPS maintains a database for mail sorting and delivery. For a customer to receive mail at a new location, USPS must be notified of the new address and add this address to its database. Telephone companies use their databases to ensure that the appropriate emergency response is notified when needed.

When adding new structure points and road centerlines, it is a best practice to flag the features or note that the location was not seen on the available imagery; after new orthoimagery is received, the added data can be double-checked for accuracy and any needed corrections made.

11.2.3.1 Street Centerline Best Practices

- All centerline records should contain range values for “From Address Left,” “To Address Left,” “From Address Right,” and “To Address Right” regardless of whether addressable structures exist on the centerline segment. Centerline segments not containing a range will not route properly if the CAD system can route calls based on location. There are certain cases where the range values can be zero (0), but generally, whole numbers must be used for these fields. Exceptions include limited access highways and cul-de-sacs where the inside value of the circle is zero.

- The centerline segments should be drawn in the direction of increasing addresses, which is not necessarily the same as the direction of travel.

- The “From Address” value should be lower than the “To Address” value. Depending on the CAD system and its associated routing functions, centerlines where the “From Address” is higher than the “To Address” may not be found by the system or a vehicle routed appropriately to that address. Any centerline records where the “From Address” is higher than the “To Address” should be corrected. Most likely, the centerline direction will need to be flipped, as well as all left and right values associated with the record.

- To avoid overlapping ranges, the “From Address” of a consequent centerline must show an increase of two from the previous centerline’s “To Address.” For example, if the first section of Sample St. ends at 133 and 134, the next section of Sample St. must start at 135 and 136. Exceptions to this rule are city-style block ranges, where each block starts at the hundred value, i.e., 100 and 101, then 200 and 201, etc.

- Both odd range values must be either on the left or right side of the centerline, with even values on the opposite side. A mixed range (i.e., Left from Address = 101 and Left to Address = 150) is an error and must be corrected.

- It is important to have the correct topology across all GIS datasets. Topology is defined as how point, line and polygon features in GIS share geometry, such as the spatial relationships between connecting and adjacent features.[26] Topology defines and enforces data integrity— for instance, road centerlines need to be connected where road segments share an intersection. Another example is where polygon features, such as PSAP boundaries or ESZs, are adjacent to each other; there should be no gaps between the boundaries. Roads that are also a boundary between two jurisdictions should match the same geometry as the jurisdictional boundary.

- Common topology errors include dangle errors (overshoots and undershoots), gaps and overlaps, and centerlines not being broken at intersections. Centerline segments must be split at all true (grade-level) intersections. Some exceptions include overpasses and underpasses where the centerlines should not be broken. In general, if one cannot access what appears to be an adjoining road at an intersection, the centerlines should not be broken.

- Each centerline segment must share an exact begin or end node with another centerline segment.

[26] Dictionary of GIS Terminology, 2001 ESRI Press, page 101.

- If segments intersect without begin or end nodes, (e.g., overpasses or underpasses) a street intersection is not established.

- Line (road) segments shall be split at intersections and ESZ boundaries. Road segments can be split at city and country boundaries as well.

- Consider splitting at railroad tracks and streams for intersection searches.

11.2.4 Address Point Best Practices

- House numbers should fall within the range of the centerline segment from which the driveway is accessed and must be given the exact naming convention of the centerline segment. For “corner lot” structures where the front door is facing the street opposite of the driveway access, it is permissible to address from the front door providing there is accessibility for an emergency vehicle to park and use the front door.

- House numbers must be sequential, with odd numbers on one side of the street and even numbers on the opposite side of the street.

- House numbers should be whole numbers. House number suffixes such as ½ or R should be avoided.

- Addresses assigned to structure points/polygons in a structured dataset must match the address assigned by the telephone company in the ALI dataset, both by house number and street name. Every effort should be made to maintain consistency between these two datasets.

- New addresses should be approved by USPS prior to resident notification of their new address. Typically, regional USPS address management offices are charged with approving new addresses and will let the appropriate local post office know of the new delivery customer and assigned address. If the resident is not requesting mail delivery, it is still recommended that USPS is alerted of the new address.

- House numbers must validate within the MSAG database. This means that the house number must fall within the range assigned to the street centerline and follow the exact naming convention.

- In general, multiple-unit structures having individual outside doors (e.g., townhouses, strip malls) should be given separate house numbers. Multiple-unit structures where there is one main door and individual units have separate doors inside (e.g., apartment buildings, traditional malls) should be assigned one house number for the entire building and the individual units assigned apartment numbers (residences) or suite numbers (businesses). USPS does not like apartment or suite values to be alphanumeric, e.g., 1A, 201B. Numeric-only is preferred.

- Trailer courts may be addressed in one of two ways. The roads within the trailer court can be named and assigned ranges, with each trailer receiving an individual house number. Or, the entire trailer court can be given one house number and each individual trailer assigned a lot number. The recommended practice is to assign individual street names and house numbers for each trailer within the trailer court.

- When field-verifying a new structure point, take time to verify that surrounding house numbers and street signs are correct. Taking a laptop into the field is the best option due to the ease of using ortho-imagery to help with location. Printing paper maps and taking them into the field is also an option.

- Encourage county residents to post their house numbers in a visible location.

Regardless of consolidation, MCP recommends the county establish an NG911 Working Group to focus on developing the GIS datasets needed for NG911 compliance. MCP further advises to contact the State OES 9-1-1 Branch, to provide input on next steps and what, if any involvement in the statewide GIS development the county can have.

12 Associated Technologies

As next-generation technology continues to enter PSAPs, more-streamlined and -efficient support mechanisms need to be implemented to minimize administrative duties.

In MCP's analysis of associated technology, none of the systems used needs to be universal to all stakeholder agencies. However, MCP recommends implementation of a common, web-based scheduling system so that all staff members in a consolidated PSAP can access the system while off duty, submit their time-off, and look at upcoming schedules that may include overtime or lateral assignments. Arcata currently uses Telestaff (Kronos) staffing software, which could be evaluated for increasing accounts.

12.1 Operational Functions

Consolidations provide the opportunity to revisit how the new center will conduct business. There should be no inconsistencies regarding the type of business to be conducted, and who should be conducting it. For example, animal-control services and call-outs to city/county services after hours is typical in 24 x 7 communications centers. Fitting animal-control services into the mix can be done when measuring console load and determining the hours of operation.

12.1.1 Next Generation 911

The National 911 Program has defined NG911 so that public-safety leaders easily can understand what it is and take the fear out of migrating toward its functions and features. "Next Generation 911 (NG911) provides the ability to share voice and data-rich information that will improve first responders' ability to save lives, ensure responder safety and protect property."[27]

Because most 911 systems originally were built using analog rather than digital technologies, PSAPs across the country need to be upgraded to a digital, IP-based 911 system, commonly referred to as NG911. While the technology to implement these new IP-based 911 systems is available now, the transition to NG911 will involve much more than just new computer hardware and software. Implementing

[27] www.911.gov - Next Generation 911

NG911 in states and counties nationwide will require the coordination of a variety of emergency communication, public safety, legislative and governing entities.

In California, the current 911 system is unable to efficiently integrate with today's newer technologies and lacks the reliability and monitoring capabilities needed to support today's increased disaster environment.[28] Due to the aging technology of the legacy 911 system, the number of outages continues to climb, resulting in an increasingly unreliable 911 system. As such, there is an urgent need to transform California's legacy 911 system into an NG911 system. Modernizing California's outdated 911 funding formula is crucial to protecting the state's 911 system. This year, the California legislature approved SB 96/AB 96, which call for updating the SETNA funding model that will provide the revenue needed to implement NG911. NG911 systems will provide multilayered redundancy and a common technology platform for alerts and warnings. The advantages of NG911 include:

- Allow agencies to reroute 911 calls to each other during disasters
- Increases resiliency by hardening the system to withstand natural and human-caused disasters
- Provides a statewide common technology delivery system for alerts and warnings
- Ensures that emergency calls are quickly and accurately delivered – in three seconds or less
- Supports text-to-911 call delivery into the PSAP
- Delivers increased location accuracy for wireless calls
- Allows agencies to utilize state-of-the-art mapping in to more accurately locate callers
- Integrates with the First Responder Network Authority (FirstNet) nationwide wireless broadband network (NPSBN) initiative
- Reduces 911 system downtime—911 outages are an ongoing problem with the aging infrastructure being used in California

Technology under this model can be difficult to sort out. Ownership, current value versus the initial investment, and how it all fits into a new business model all are factors to be addressed. To date, the stakeholder agencies have taken a significant step toward a consolidation, which would leverage the same CAD/MDS/RMS platform. Other technologies can follow with appropriate agreements in place.

12.2 Redundancy, Failover and Backup

- CAD – Bay Comm would operate under one CAD platform. This places ultimate importance on ensuring that a backup server or redundant "mini-CAD" is in place to ensure continuity of operations.

- CHE – Diverse network paths represent a best practice in all mission-critical facilities. However, a consolidated PSAP presents the unique challenge of ensuring connectivity to the 911 network, considering that few alternative centers exist that can handle the associated workload capacity and human-resources demands. Nevertheless, dual paths into a new facility are warranted in this case, which will provide redundancy and ensure continuity of service.

- Radio – Redundancy with a trunked system is built-in, by virtue of how it is engineered. However, if the path from the hub is a fiber connection, then redundancy should be engineered to ensure connectivity to the new PSAP.

[28] www.caloes-911branch – Next Generation 911 Technology

Backup PSAP facility – Vulnerability to the new center, given the built-in redundancy, becomes low when the aforementioned recommendations are acted upon. While new centers have generator backup, what is connected to it generally is limited to mission-critical operations and only for periods of less than a week. Should the occupants need to evacuate due to odor, smoke, building compromise or another factor, a backup facility should be equipped to handle minimal operations. What is in place can be scaled down even more to keep this footprint small. Generally, one or two law-enforcement primary dispatchers who consolidate operations, the fire/rescue/EMS primary dispatcher, and one or two call-takers who have access to the IP-based equipment would ensure continuity of operations.

Appendix A: Line Item Budget List

The following are typical items in a salary-and-benefits budget, but there may be more depending on negotiated labor agreements.

- Hourly pay
- Differentials – e.g., nightshift, training, bilingual
- On-call pay
- Sick leave
- Vacation pay
- Holiday pay
- Compensatory-time pay
- Jury-duty pay
- Military paid leave
- Administrative overtime pay (management)
- Termination pay
- Extra-help hours
- Overtime pay (including premium pay)
- FICA
- Medicare
- Retirement contribution
- Annuity contribution
- Health plans contribution, including vision and dental
- Life and long-term care insurance contributions
- Unemployment insurance
- Workers' compensations insurance

Services, Supplies and Charges

Services, supplies and charges are those items that are general expenditures in a typical PSAP. This list is not exhaustive but does identify local line items that might be applied. Typical budgets include:

- Safety equipment
- Printing and copying
- Paper products
- General office supplies
- Books, manuals and literature
- Subscriptions and periodicals
- Photocopy lease and usage
- Postage and mailing expense
- Computer supplies
- Computer equipment
- PC/LAN equipment
- Proprietary software
- Software license and maintenance expenses

- Professional tools and equipment
- Office furniture and equipment
- Memberships
- Professional groups and associations
- Consultant fees and contracts
- Computer/electronics equipment maintenance agreements
- Miscellaneous repairs and maintenance
- UPS/emergency power systems – replacement
- Office equipment rental
- Rents and leases
- Employee recognition and awards
- Uniform allowance
- Food and beverage services
- Motor-vehicle replacement charges
- Human-resources services
- Official bond insurance
- General liability insurance
- Automobile liability insurance
- Motor-vehicle mileage charges
- Facility-rental charges
- Automation services
- Third-party telephone services
- Third-Party Radio Services
- Mileage reimbursements and allowance
- Airfare and vehicle rental
- Meetings and conferences expenses
- Other business-travel expenses
- Employee training expenses
- Trainer and workshop expenses
- Training and education materials
- Professional contractual services
- Fingerprinting
- Moving and relocation

Appendix B: Staffing Methodology

A staffing analysis is conducted to determine whether a PSAP has an adequate number of personnel to assure efficient processing of emergency calls now and/or to determine the number of personnel that may be needed in the future—although the farther into the future one looks, the more difficult it is to predict. A forward-looking staffing analysis considers projected population growth to assure that the agency is well-positioned in its future planning efforts and that it meets the expectations of the public and the agencies it serves. Operational efficiency is gauged by comparing statistical data and personnel utilization to appropriate national standards.

Additionally, a staffing analysis often is conducted to assess the number of physical console positions required for PSAP operations and how many of these positions should be routinely staffed throughout the day. The number of required positions can be used to assist in programming any future facility to ensure that adequate space is allotted.

Industry tools are available to assist with determining baseline staffing requirements for call-takers, dispatchers, and supervisors. APCO offers Project RETAINS,[29] developed by the University of Denver Research Institute in 2004. The RETAINS toolkit 2.0 expanded its functionalities and capabilities.[30] NENA offers a Communications Center Staffing Tool, which is available through a staffing workshop or the Center Manager Certification Program (CMCP).[31] Both tools utilize agency-specific data, such as call and incident volumes and other data, such as employee leave, to calculate baseline staffing requirements. One difference between the tools is that NENA considers the workload in terms of incidents that a dispatcher can or should be able to handle at one time, whereas RETAINS does not. While this is a subjective number, the agency itself defines the parameters.

MCP's staffing analysis involves a multimodal approach that considers workload, volume- and coverage-based staffing and performance metrics. Volume-based staffing calculates the number of staff required to handle the volume of the respective data, while coverage-based staffing calculates the number of personnel required to staff one position 24 x 7, regardless of volume. MCP uses these calculations in tandem. Statistical calculations are balanced with operational logistics to identify how many personnel are needed for a PSAP to achieve its performance goals while providing efficient and effective service. In addition, MCP uses Erlang C calculations and its experience in the 911 community to assist in projecting the number of staff required to efficiently answer and dispatch emergency and non-emergency calls for law enforcement, fire/rescue, and EMS agencies. MCP analyzes resulting data with a respective center's operational configuration to approximate staffing requirements. The value of any resulting staff projections depends on the accuracy of the data and statistics provided by the PSAP. The four agencies involved in this assessment provided statistical data, including incident volume, call volume, and personnel data for review.

---

[29] "APCO Project RETAINS," APCO International, 2018, https://www.apcointl.org/resources/staffing-and-retention/retains.html.
[30] RETAINS is available for a subscription. From appearances, the last update was in 2009.
[31] Both the workshop and the center manager program are available for a cost. NENA notes that the workshop is hands-on, that has "you using the Tool during the workshop to determine your center's staffing needs at a high-level. You will use a combination of facilitator-provided practice data and your PSAP's actual data to determine the staffing needs of your center." http://www.nena.org/?page=CommCenterStaffing.

Many factors play a role in determining appropriate staffing levels, including available work hours, utilization, and attrition rates. Available work hours are the number of hours a telecommunicator (call-takers and dispatchers) is available to work during a year. There are many subfactors to this calculation, including leave usage, i.e., any time that the employee is away from his or her assigned duties. This time includes vacation, holiday, sick, and personal leave; training; military leave; and other activities. All four agencies—Arcata Police Communications, Eureka Police Communications, Fortuna Police Communications, and the Humboldt County Sheriff's Office Communications—operate with a schedule that utilizes 12-hour shifts.

In 2018, telecommunicators[32] with each agency utilized the following average leave amounts, denoted in hours in the table below.

Table 37: Average Leave Usage

Agency	Approximate Total Leave	Average Leave per Person
Arcata Police Communications	2,880	80
Eureka Police Communications	94	15
Fortuna Police Communications	2,880	80
Humboldt County Sheriff's Office Communications	3,182	39

Based on a 12-hour day, on average this ranges from 1 day to 7 days of leave per person per year. This is not to say that each person used this amount of leave; some may have used less, and some may have used more.

Utilization is a subjective number, designed to provide an estimate of the time per shift that a telecommunicator should be busy providing call-handling and dispatching services.[33] Breaks and meals are subtracted from the shift length, as is time spent doing other work-related activities, such as filing paperwork or decompressing after a stressful incident. Due to staffing levels, all four agencies reported that they do not provide dedicated time for breaks and meals per shift. In MCP's experience, telecommunicators may spend four to seven minutes per hour on other work-related activities. No time was reported by management of any agency for these activities; an assumption of five minutes per hour for each agency. This results in a utilization rate for each agency of 92 percent (due to no time other than the five minutes per hour accomplishing other tasks reported).

As APCO notes, "Researchers in commercial call centers report increased employee turnover and 'undesirable' agent behaviors when agent occupancy rates exceed 85 to 90 percent over extended periods of time." Conversely, always trying to maintain utilization below 85 percent can lead to overstaffing.

[32] Those whose primary assignment is shift work.
[33] Utilization should not be confused with agent occupancy. Utilization is the total time an employee is at work and able to do their respective tasks, such as call take and dispatch. (This would not occur on breaks, for example.) Occupancy is the actual time at work busy on assigned tasks. This link (http://www.thinkhdi.com/~/media/HDICorp/Files/Library-Archive/Insider%20Articles/agent-occupancy.pdf) provides good information.

MCP has seen an average processing time for 911 calls of approximately 3 minutes and 30 seconds. Each of the agencies reported call-processing times well below this average, resulting in higher availability overall.

Calculating the net work hours (scheduled hours less leave) and the utilization rate results in the true availability of an employee. The true availability (in total hours per year) for each agency is as follows:

Table 38: Agency True Availability

Agency	True Availability
Arcata Police Communications	1,562.00
Eureka Police Communications	1,893.93
Fortuna Police Communications	1,562.00
Humboldt County Sheriff's Office Communications	1,677.93

In the case of Eureka Police Communications, for example, this means that a telecommunicator is scheduled to work 2,184 hours, but subtracting leave and call-processing factors, an employee may only work 1,630 hours during a year.

Attrition, also referred to as turnover, is a factor that must be considered. The attrition data includes the highest number of employees for a given year as well as the number of staff that left voluntarily or involuntarily. The result is the attrition rate. The national average for recent years is estimated to be approximately 13 percent; however, MCP is aware of several PSAPs nationally whose attrition rate has been higher than 15 percent, and some upwards of 25 percent. The APCO RETAINS retention report does not have a current turnover rate, reporting 2009 data as its latest reference. In its report, APCO RETAINS identifies the national turnover rate at 17 percent for 2005 and 19 percent for 2009.[34] The average attrition rate for each agency is as follows:

[34] According to the APCO RETAINS retention document, the comparison rates were derived from Project RETAINS Study I and the RETAINS Next Generation Study.

Table 39: Agency Attrition Rates

Agency	Attrition Rates
Arcata Police Communications	10.26%
Eureka Police Communications	3.33%
Fortuna Police Communications	10.26%
Humboldt County Sheriff's Office Communications	39.60%

Staffing calculations also should consider performance metrics, which measure the operational efficiency of a PSAP compared with targeted goals and established standards. MCP uses performance metrics and national standards to ascertain how staffing may be positively or negatively affecting PSAP operations.

The most common metric involves the average time it takes a PSAP to answer its incoming emergency calls. PSAPs typically try to align their call-answering goals with either NENA[35] or NFPA[36] standards.

Another metric is the abandoned-call rate. Every center will experience abandoned calls; the goal is to keep them as low as possible. There are many reasons for abandoned calls, including those who realized they have misdialed. When telecommunicators are on another line, incoming calls cannot be answered immediately. Regardless of the reason, this creates additional work as telecommunicators must try to reestablish contact with the caller to determine whether there is an actual emergency. There is no industry metric for a "normal" number of abandoned calls. In MCP's experience, an abandoned-call rate of 8 percent or less is ideal and attainable when a center is appropriately staffed.

MetricNet, a performance-benchmarking company in McLean, Virginia, for IT and call centers, suggests an abandoned-call rate of 4 percent to 7 percent.[37] While their focus is on the service industry, not the 911 community, there is a correlation between the two. Arcata Police Communications, Fortuna Police Communications and the Humboldt County Sheriff's Office Communications are within a reasonable deviation of the national average, while Eureka Police Communications' rate is above the average (just over 10 percent). Many factors can contribute to a high abandoned-call rate, including a lack of available call-takers to answer incoming 911 calls. Eureka Police Communications' staffing levels likely are a contributing factor to this statistic.

[35] NENA: 90 percent of 9-1-1 calls answered within 10 seconds during the busy hour and 95 percent 9-1-1 calls answered within 20 seconds
[36] NFPA: 90 percent answered within 15 seconds and 95 percent answered within 20 seconds
[37] "Call Abandonment Rate," MetricNet, May 23, 2012, http://www.metricnet.com/call-abandonment-rate.

Appendix C: Industry Standards/Best Practices and State Statutes/Rules

Several professional organizations have developed standards and best practices concerning PSAP operations. Communications centers can decide to voluntarily adopt them to enhance effectiveness. Measurable standards create an objective measure of PSAP operations and the effectiveness and efficiency of the technologies and systems in use. Adoption of, and adherence to, recognized standards provides PSAP managers with the ability to assess their organization's service delivery.

National and International Standards Organizations

National organizations that develop public-safety communications standards and best practices include the following:

1. Association of Public-Safety Communications Officials (APCO)
   APCO "is the world's oldest and largest organization of public safety communications professionals and supports the largest United States membership base of any public safety association. It serves the needs of public safety communications practitioners worldwide – and the welfare of the public as a whole – by providing complete expertise, professional development, technical assistance, advocacy and outreach."[38] APCO has undertaken many projects over the years. Two notable projects are Project 25 (P25), development of standards for digital telecommunications technology, and Project 33, development of a telecommunications training standard. In Project 33, APCO collaborated with the National Emergency Number Association (NENA) "to evaluate what type of standardized training programs (if any) each state had. The information gathered helped APCO build the foundation for the National Public Safety Telecommunicator Training Standard, which is the minimum standard used today."[39]

2. National Emergency Number Association (NENA)
   NENA is a non-profit corporation dedicated to a "public made safer and more secure through universally-available state-of-the-art 911 systems and trained 911 professionals."[40] NENA's mission is to improve "911 through research, standards development, training, education, outreach, and advocacy."[41] NENA has several topic-specific committees that develop recommended 911 center model recommendations and/or standards and other operational information documents. NENA model recommendations/standards give 911 centers the tools needed to maintain a consistent level of service and work in relation to their peers in neighboring counties and states.

3. National Fire Protection Association (NFPA)
   NFPA is a United States-based trade association that creates and maintains private, copyrighted standards and codes for usage and adoption by local governments. NFPA 1221, *Standard for the Installation, Maintenance, and Use of Emergency Services Communication Systems* has been widely

[38] "About APCO," APCO International, 2017, https://www.apcointl.org/about-apco.html.
[39] "APCO Projects," APCO International, 2017, https://www.apcointl.org/about-apco/apco-projects.html.
[40] NENA's Mission," National Emergency Number Association, http://www.nena.org/?page=Mission.
[41] Ibid.

adopted and provides baseline criteria for the operations, facilities, and communication systems deployed in a PSAP.

4. International Academies of Emergency Dispatch (IAED)
   IAED is described as "a non-profit standard-setting organization promoting safe and effective emergency dispatch services worldwide. Comprising three allied academies for medical, fire, and police dispatching, the IAED supports first-responder-related research, unified protocol application, legislation for emergency call center regulation, and strengthening the emergency dispatch community through education, certification, and accreditation."[42]

   Entities that utilize IAED's internally recognized protocols, available through Priority Dispatch Corporation, can apply to become an Accredited Center for Excellence (ACE).

5. Insurance Services Office (ISO)
   The ISO has established criteria for assessing and grading fire-protection agencies. ISO's rating process includes an assessment of each aspect of a fire department including facilities, apparatus, training, dispatch services, water-delivery system, code adoption, and other criteria. Fire department accreditation and ISO ratings rely on compliance of communications centers, and infrastructure that is measured separately from fire department operations.

Accrediting Organizations

Accrediting organizations also develop standards with which agencies applying for respective accreditation must comply.

1. Commission on Accreditation for Law Enforcement Agencies (CALEA)
   Working in concert with APCO, CALEA designed a full-scale accreditation program specifically for public safety communications agencies. While this organization's standards could be applied to secondary PSAPs (fire/rescue and/or EMS), they are centered on law enforcement. To comply with CALEA standards, an agency must enroll with fees and follow the prescribed process for accreditation, which includes dedicating one staff member to assume the role of accreditation manager.

   CALEA is described as a "credentialing authority through the joint efforts of law enforcement's major executive associations."[43] It accredits law-enforcement agencies and 911 communications centers. CALEA's accreditation programs "provide public-safety agencies with an opportunity to voluntarily meet an established set of professional standards, which require:

   - Comprehensive and uniform written directives that clearly define authority, performance, and responsibilities
   - Reports and analyses to make fact-based and informed management decisions
   - Preparedness to address natural or manmade critical incidents
   - Community relationship-building and maintenance

[42] "Welcome the Academy," http://www.emergencydispatch.org.
[43] About Us," http://www.calea.org.

- Independent review by subject-matter experts
- Continuous pursuit of excellence through annual reviews and other assessment measures"[44]

CALEA standards define what needs to be done, not how agencies are to accomplish it. CALEA accreditation for law enforcement requires active participation from the respective communications center serving the agency, as there is an entire chapter (Chapter 81) dedicated to communications.[45]

California State Organizations

1. The California Governor's Office of Emergency Services (Cal OES)
   The Public Safety Communications Branch maintains the state's standards for PSAP call answering. This office administers funding for equipment and services related to the delivery and handling of 911 calls in California, which is based upon laws passed by the California State Legislature, as defined in CA Government Code, Sections 53100-53120 (known as the Warren-911-Emergency Assistance Act) and the CA Revenue and Taxation Code, Sections 41001 - 41176 (known as the Emergency Telephone Users Surcharge Act).

2. California Department of Justice, Commission on Peace Officers Standards and Training (POST)
   POST was established by the legislature in 1959 to set minimum selection and training standards for California law-enforcement personnel. It has more than 130 staff members who function under an executive director appointed by the commission.

Commonly Applied Operations Standards

Myriad standards and best practices have been established by the aforementioned agencies. This document references these standards throughout. The standards most often used for operational performance include the following:

1. NENA 56-005, *Call Answering Standard/Model Recommendation* – This standard states that, "Ninety percent of all 911 calls arriving at the public safety answering point (PSAP) shall be answered within ten seconds during the busy hour (the hour each day with the greatest call volume, as defined in the NENA Master Glossary 00-001). Ninety-five percent of all 911 calls should be answered within 20 seconds."[46] This standard is being updated and is expected to align with NFPA's call-answering standard.

2. NFPA has higher standards for call processing. NFPA 1221, *Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems*, Section 7.4.1, 2016 edition,

[44] "What is Accreditation," CALEA, http://www.calea.org/what-accreditation.
[45] "Law Enforcement - Standards Titles," CALEA, http://www.calea.org/law-enforcement/standards-titles.
[46] "9-1-1 Call Answering Standard," National Emergency Number Association," June 10, 2006, https://www.nena.org/?page=911CallAnswerStnd, page 8 of 12.

states, “Ninety-five percent of alarms[47] received on emergency lines shall be answered within 15 seconds, and 99 percent of alarms shall be answered within 40 seconds.”[48]

NFPA further defines call-processing times, which begin when the call is answered and end when dispatch starts. Section 7.4.2 states, “Apart from the call types identified in Section 7.4.2.2, 90 percent of emergency alarm processing shall be completed within 64 seconds, and 95 percent of alarm processing shall be completed within 106 seconds.”[49]

Further, Section 7.4.2.2 states, “Emergency alarm processing for the following call types shall be completed within 90 seconds, 90 percent of the time, and within 120 seconds, 99 percent of the time:

(1) Calls requiring emergency medical dispatch questioning and prearrival medical instructions
(2) Calls requiring language translation
(3) Calls requiring the use of a TTY/TDD[50] device or audio/video relay services
(4) Calls of criminal activity that require information vital to emergency responder safety prior to dispatching units
    a Hazardous material incidents
    b Technical rescue
    c Calls that require determining the location of the alarm due to insufficient information
    d Calls received by text message”[51]

3. Cal OES monitors compliance with its call-handling standards, which are among several mandatory PSAP and network standards documented in the State’s operating manual. The statewide call-handling standards are as follows:

- Automatic location identification (ALI) format – PSAPs shall accommodate the most current ALI standard for the State of California, currently Format 04, in any equipment replacement or upgrade.
- Call-answer time within 15 seconds – Ninety-five percent of incoming 911 calls shall be answered within 15 seconds. (The Public Safety Branch realizes that unpredictable spikes may occur and will take abnormalities into consideration when reviewing statistics.)

[47] NFPA 1221 defines an alarm as “a signal or message from a person or device indicating the existence of an emergency or other situation that requires action by an emergency response agency.”

[48] “NFPA 1221 Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems,” National Fire Protection Association, 2016, http://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codesand-standards/detail?code=1221.

[49] Ibid.

[50] Teletypewriter/Telecommunications Device for the Deaf

[51] Ibid.

Appendix D: OES Space Allocation Estimates

OES Administrative Offices

		Space Code	Area/ Unit (SF)	Proposed # Units	Net SF	Grossing Factor	GSF	Gross SF Total	Comments
1.0	OES Administrative Offices								
1.0	Office Area								
1.1	EM Coordinator		160	1	160	30%	48	208	
1.2	Assistant EM Coordinator		120	3	360	30%	108	468	
1.3	Intern		80	1	80	30%	24	104	
1.4	Printer/Copier Area		100	1	100	30%	30	130	
				Subtotal	700		210	910	

Emergency Operations Center (EOC)

		Space Code	Area/ Unit (SF)	Proposed # Units	Net SF	Grossing Factor	GSF	Gross SF Total	Comments
2.0	Emergency Operations Center								
2.0	EOC								
2.1	Operations Room		24	16	384	50%	192	576	
2.2	Policy Room		15	20	300	50%	150	450	Adjacent to Ops Room
2.3	Breakout Room – 1		15	12	180	50%	90	270	Adjacent to Ops Room
2.4	Breakout Room – 2		15	12	180	50%	90	270	Adjacent to Ops Room
2.5	Joint Information Center (JIC)		15	20	300	50%	150	450	Public Entry
2.6	Radio Room		24	5	120	100%	120	240	
				Subtotal	1,464			2,256	

These areas are exclusive to OES/EOC functions. The space that serves as the EOC can also be used for other purposes if staff members feel that EOC operations setup can be accomplished in a reasonable timeframe once activated. This space can be used as a training room or meeting space. MCP has included the flexibility of furnishings that can be moved or shared in these spaces.

OES Common Spaces

		Space Code	Area/ Unit (SF)	Proposed # Units	Net SF	Grossing Factor	Gross SF	Total	Comments
3.0	Common Spaces								
3.1	Vestibule/Waiting		15	6	90	50%	45	135	
3.2	Break Room/Kitchen		250	1	250	30%	75	325	
3.3	Restrooms		200	2	400	35%	140	540	
3.4	Lockers		1.5	24	36	45%	16	52	
3.5	Bunk Room		400	1	400	30%	120	520	
3.6	Storage		200	1	200	10%	20	220	
3.7	Power/Mechanical		200	1	200	10%	20	220	
3.8	Janitor Closet		50	1	50	10%	5	55	
				Subtotal	1,626			2,067	

OES IT/Computer Room

		Space Code	Area/ Unit (SF)	Proposed # Units	Net SF	Grossing Factor	GSF	Gross SF	Comments
4.0	OES IT Computer Room/MDF								
4.0	Equipment Room								
4.1	Computer Room IT Equipment Racks/Cabinets*		16	8	128	100%	125	256	Dedicated air-conditioning units
				Subtotal	128			256	

This space is itemized separately in the event that OES staff members want servers to be isolated from other equipment in generally accessible racks.

OES Vehicle Bay and Large Equipment Storage

		Space Code	Area/ Unit (SF)	Proposed # Units	NSF	Grossing Factor	Net SF	Total	Comments
5.0	Emergency Services Vehicle and Large Equipment Storage								
5.0	Vehicle Bays and Response Equipment Storage								
5.1	Vehicle Bays (2)		1,500	1	1,500	10%	150	1,650	24’ height
5.2	Secure Interior Storage		400	1	400	10%	40	440	
5.3	Work Area		140	1	140	10%	14	154	
				Subtotal	2,040		204	2,244	

OES Total Space Estimates

HC OES Space Needs Summary		
Function	Area	Space
1.0	Administrative Staff Offices	910
2.0	Emergency Operations Center	2256
3.0	OES Common Spaces	2067
4.0	IT/Equipment Spaces	256
5.0	Covered Vehicle and Large Storage	2224
	TOTAL Gross Square Feet	7713

Appendix E: Four PSAP Consolidation Space Allocation Estimates

Four PSAP space allocation estimates (assuming JPA configuration) plus OES space follows:

Four PSAP Administrative Offices

		Area/ Unit (SF)	Proposed # Units	NSF	Grossing Factor	GSF	Total
1.0	Four PSAP Consolidation (assuming a JPA Configuration)						
1.0	Administrative Staff and Space						
1.1	General Manager	120	1	160	30%	48	208
1.2	Managers/Administrators	120	3	360	30%	108	468
1.3	Executive Assistant	100	1	100	30%	30	130
1.4	Supervisor Offices	100	6	600	30%	180	780
1.5	Shift Leads Office*	75	2	150	30%	36	186
1.6	Sr. Systems Techs or Coordinator	120	4	480	30%	144	624
1.7	Tech Workbench	100	1	100	30%	36	136
1.8	Storage/File	100	1	100	25%	25	125
1.9	Academy Training /CAD Lab	600	1	600	25%	150	750
			Subtotal	**2,650**			**3,407**

*Shared space for one on-duty shift lead at a time, and one post position for QA Lead

Four PSAP Operations Floor/Adjacencies

2.0	Four PSAP Consolidation							
2.0	PSAP Operations Floor and adjacencies							
		Space Code	Area/ Unit (SF)	Proposed # Units	NSF	Grossing Factor	GSF	Total
2.1	Shift Supervisor		96	2	192	75%	144	336
2.2	Telecomm Workstations		64	15*	960	60%	576	1,536
2.3	Unisex Toilet		70	2	140	35%	49	189
2.4	Kitchen/Break Area		250	1	250	35%	87.5	337.5
2.5			100	1	100	30%	30	130
2.6	Quiet Room		75	1	75	30%	22.5	97.5
2.7	Printer/Copier/Work Area		50	1	50	25%	12.5	62.5
2.8	Mail/ Supplies		100	1	100	25%	25	125
2.9	Conf. Room		15	20	300	25%	75	375
2.10	Storage			1	200	25%	50	250
				Subtotal	**2,117**			**3,438**

*Four spare positions are recommended for surge and growth

Four PSAP Technology-Equipment Space

3.0	4 PSAP Technology/Equipment Space								
3.1	Communications Center IT Equipment								
3.1.1	Computer Room – MDF/Demarcation Point								
3.1.1.2	PSAP Racks		16	10	160	100%	160	320	320
3.1.1.3	911 Computer Racks		16	2	32	100%	64	64	64
3.1.1.4	Uninterruptible Power Supply (UPS)		16	2	32	100%	32	64	64
3.2	**Equipment Rooms**								
3.2.1	Power and Mechanical		250	1	250	10%	25	275	275
3.2.2	IDF Space		16	2	32	100%	32	64	64
				Subtotal	**506**				**787**

Four PSAP Consolidation and OES/EOC Program Summary

Function	Area	Gross SF
1.0	PSAP Administrative Spaces	3,407
2.0	PSAP Communications Center	3,438
3.0	Technology/Equipment	787
4.0	Total OES / EOC Space	7713
	Total Net Square Feet	**15,345**

Four PSAP/OES Colocation Totals

Function	Area	Space (rounded)
1.0	PSAP Administrative Spaces	3,407
2.0	PSAP Communications Center	3,438
3.0	Technology/Equipment	787
	Total Net Square Feet	**7,632**

Appendix F: HCSO PSAP and OES Colocation Space Allocation Estimates

Humboldt County Sheriffs PSAP and OES		Area/ Unit (SF)	Proposed # Units	NSF	Grossing Factor	GSF	Total
1.	Humboldt County Sheriff's PSAP and OES						
1.0	Administrative Staff and Space						
1.1	Comm Center Manager	120	1	160	30%	48	208
1.2	OES Admin Spaces	700	1	700	30%	210	910
1.3	Supervisor Offices	100	3	360	30%	36	396
1.4	Shift Leads Office	75	2*	150	30%	36	186
1.5	Sr. Systems Techs	120	3	360	30%	36	396
1.6	Tech Workbench	100	1	100	30%	36	136
1.7	Storage/File	100	1	100	25%	25	125
1.8	Academy Training /CAD Lab	400	1	400	25%	100	500
			Subtotal	2,330			2,857

*Four leads rotate through shifts at 2 workstations

2.	Humboldt County Sheriff's Dispatch							
2.1	PSAP Operations							
		Space Code	Area/ Unit (SF)	Proposed # Units	NSF	Grossing Factor	GSF	Total
2.1	Shift Supervisor		96	1	96	75%	72	168
2.2	Telecomm Workstations		64	7	448	60%	269	717
2.3	Unisex Toilet		70	1	140	35%	49	189
2.4	Lactation Room		100	1	100	30%	30	130
2.5	Quiet Room		75	1	75	30%	22.5	97.5
2.6	Printer/Copier/Work Area		50	1	50	25%	12.5	62.5
2.7	Storage/ Supplies		100	1	100	25%	25	125
2.8	Conf. Room		15	20	300	25%	75	375
2.9	Storage			1	200	25%	50	250
				Subtotal	1,509			2,114

Sheriff's PSAP and OES Colocation

		Space Code	Area/ Unit (SF)	Proposed # Units	NSF	Grossing Factor	GSF	Total	Comments
3.0	Emergency Operations Center								
3.0	EOC								
3.1	Operations Room		24	16	384	50%	192	576	
3.2	Policy Room		15	20	300	50%	150	450	Adjacent to Ops Room
3.3	Breakout Room – 1		15	12	180	50%	90	270	Adjacent to Ops Room
3.4	Breakout Room – 2		15	12	180	50%	90	270	Adjacent to Ops Room
3.5	Joint Information Center (JIC)		15	20	300	50%	150	450	Public Entry
3.6	Radio Room		24	5	120	100%	120	240	
				Subtotal	1,464			2,256	

Sheriff's Colocation Equipment Room

4.0	Equipment/Technology Space								
		Space Code	Area/ Unit (SF)	Proposed # Units	NSF	Grossing Factor	GSF	Total	Comments
4.1	Communications Center IT Equipment								
4.1.1	Computer Room – MDF/Demarcation Point								
4.1.1.1	PSAP IT Racks		16	10	160	100%	160	320	
4.1.1.2	911 IT Racks		16	2	32	100%	64	64	
4.1.1.3	OES IT Racks		16	2	32	100%	64	64	
4.1.4	Uninterruptible Power Supply (UPS)		16	2	32	100%	32	64	
4.2	Equipment Rooms								
4.2.1	Power and Mechanical		250	1	250	10%	25	275	
4.2.2	IDF Space		16	2	32	100%	32	64	
				Subtotal	554			1,235	

Sheriff's Colocation Common Space

		Space Code	Area/ Unit (SF)	Proposed # Units	NSF	Grossing Factor	GSF	Total	Comments
5.0	Common Spaces								
5.1	Vestibule/Waiting		15	6	90	50%	45	135	
5.2	Break Room/Kitchen		250	1	250	30%	75	325	
5.3	Restrooms		200	2	400	35%	140	540	
5.4	Lockers		1.5	24	36	45%	16	52	
5.5	Bunk Room		400	1	400	30%	120	520	
5.6	Storage		200	1	200	10%	20	220	
5.7	Janitor Closet		50	1	50	10%	5	55	
				Subtotal	1,426			1,847	

Sheriff's Colocation OES Vehicle Space

		Space Code	Area/ Unit (SF)	Proposed # Units	NSF	Grossing Factor	GSF	Total	Comments
6.0	Emergency Services Vehicle and Large Equipment Storage								
6.0	Vehicle Bays and Response Equipment Storage								
6.1	Vehicle Bays (2)		1,500	1	1,500	10%	150	1,650	24’ height
6.2	Secure Interior Storage		400	1	400	10%	40	440	
6.3	Work Area		140	1	140	10%	14	154	
				Subtotal	2,040		204	2,244	

Sheriff's Colocation Space Summary

Function	Area	Space (rounded)
1.0	PSAP and OES Administrative Spaces	2,857
2.0	PSAP Communications Center	2,114
3.0	Emergency Operations Center	2,256
4.0	SHARED Technology/Computer Room	1,235
5.0	SHARED Common Spaces	1,847
6.0	Vehicle/Large Equipment Storage	2,224
	Total Gross Square Feet	12,553