

Wireless Enhanced 911:

*The State Has Successfully Begun
Implementation, but Better Monitoring of
Expenditures and Wireless 911 Wait Times
Is Needed*



August 2004
2004-106

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August 26, 2004

2004-106

The Governor of California
President pro Tempore of the Senate
Speaker of the Assembly
State Capitol
Sacramento, California 95814

Dear Governor and Legislative Leaders:

As requested by the Joint Legislative Audit Committee, the Bureau of State Audits presents its audit report concerning California's enhanced program for wireless 911 calls (wireless E911), which would communicate to emergency response dispatchers the locations and callback numbers of callers from mobile phones.

This report concludes that, under the leadership of the Department of General Services' 911 Office (General Services), California has addressed many of the concerns raised by two federal reports on the nationwide implementation of wireless E911. The implementation is a cooperative effort among various key players, including the California Highway Patrol (CHP), which currently answers most wireless 911 calls in the State; local answering points, some of which are opting to accept wireless E911 calls in their areas; and private wireless carriers and local exchange carriers. Although much work remains to be done, General Services expects to have wireless E911 implemented in most of the State by December 2005.

The CHP currently cannot determine if all its communications centers (centers) answer wireless calls promptly because it lacks a system to track wait times in 15 of its 24 centers. However, six of the nine centers that do collect wait-time information did not meet the state goal of answering 911 calls within 10 seconds. Wait times were high, in part, because dispatchers at CHP centers answered significantly more 911 calls per dispatcher than did the local answering points we contacted. Unfilled dispatcher positions at CHP centers contributed not only to longer wait times, but also to significant overtime costs for the CHP. To establish a benchmark for the number of staff to answer calls, the CHP needs a more reliable system to track the number of calls. The CHP does not expect the number of wireless E911 calls diverted to local answering points to exceed 20 percent statewide.

Respectfully submitted,

ELAINE M. HOWLE
State Auditor

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SUMMARY

Audit Highlights . . .

Our review of the State's wireless enhanced 911 (wireless E911) program revealed that:

- Under the leadership of the Department of General Services' 911 Office (General Services), California has addressed many of the concerns raised by two federal reports on nationwide implementation of wireless E911.*
- Although much work remains to be done, General Services plans to have wireless E911 implemented throughout most of the State by December 2005.*
- Most California Highway Patrol (CHP) centers do not have systems to monitor how long they take to answer 911 calls, and more than half the centers that tracked wait times did not meet the State's goal to answer 911 calls within 10 seconds.*
- Wait times were high, in part, because dispatchers at CHP centers handled significantly more 911 calls per dispatcher than did local answering points we contacted.*

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RESULTS IN BRIEF

Since 1993, Californians have relied on a landline enhanced 911 (landline E911) system for fast, lifesaving responses from police, fire, and emergency medical services. The landline E911 system improved on the original basic 911 system by routing calls to dispatchers at the appropriate public safety answering points (answering points) and providing the callers' locations and telephone numbers on dispatchers' computer screens. However, the increasing use of mobile phones for 911 calls has created the need for a wireless emergency call system. Duplicating the features of the landline E911 system in a wireless emergency call system requires a coordinated technological response from various governmental and private entities.

According to a 2002 report from the Federal Communications Commission (Hatfield report), national progress toward a fully functioning wireless enhanced 911 (wireless E911) system has been delayed, with many states lacking the central coordination and the dedicated funding source to implement such a system. Thus, 911 callers using mobile phones may have trouble connecting to appropriate answering points and may not have their locations or mobile-phone numbers transmitted to dispatchers. With time being of the essence in an emergency response, such problems with wireless emergency calls can compromise the success of emergency response teams in protecting life and property.

Fortunately, under the leadership of the Department of General Services' 911 Office (General Services), the implementation of wireless E911 in California has been smoother than in many other states. Although partial implementation of wireless E911 has taken place in only three of the State's seven regions, California has addressed most of the Hatfield report's concerns as well as similar concerns voiced by the federal Government Accountability Office. Moreover, the National Governors Association has pointed to California as a model for other states because of its strategies to coordinate wireless E911 implementation. General Services has facilitated the completion of the initial strategic planning, and to date, the State has been meeting its ambitious schedule for implementing wireless E911

- ☑ *Unfilled dispatcher positions at CHP centers contributed not only to longer wait times but also to significant overtime costs for the CHP.*
 - ☑ *The CHP does not expect the number of wireless 911 calls diverted to local answering points to exceed 20 percent statewide.*
-

throughout the State by December 2005. However, the State is at a crucial stage of implementation. Should one region fall behind schedule, implementation in the other regions could be delayed.

The State's success so far has largely come from General Services' coordination of all the parties needed to implement wireless E911—including wireless service providers, incumbent local exchange carriers, the California Highway Patrol (CHP), and public safety answering points (answering points)—despite its possessing no authority over these entities. Thus, the cooperation of these parties is also crucial. General Services has also ensured that answering points for wireless E911 calls have the necessary equipment to receive wireless emergency calls and pinpoint callers' locations. Another factor in California's success is its dedicated funding source: a surcharge consumers pay on intrastate phone calls for 911 purposes, including the implementation of wireless E911. However, because the State has diverted a net amount of more than \$150 million of these funds to its General Fund, future projects to further enhance the 911 system may have limited resources to tap. Additionally, General Services could better monitor its expenditures related to the wireless E911 project by separately tracking these costs.

The CHP is required by state law to answer all wireless 911 calls that are not routed to local answering points, such as city police departments. Therefore, through its 24 communications centers (centers), the CHP answers the majority of wireless 911 calls placed in the State. However, the CHP cannot determine if all its centers answer wireless calls promptly because it lacks a system to capture the information needed to track wait times in 15 of the 24 centers. For the nine centers that do collect wait-time information, six did not meet the state goal of answering 911 calls in 10 seconds or less. One reason wait times are high is that dispatchers at centers handled significantly more calls than did dispatchers at any of the four local answering points we reviewed. Disparities in staffing, however, do not fully explain the wide range in wait times. For example, the CHP's Orange County center had the highest number (1,733) of calls per dispatcher for the period January through March 2004, even though it had the lowest average wait time (4.7 seconds) for 911 calls during the same period. Nonetheless, the CHP should improve its system of tracking the total number of 911 calls received at each of its centers and develop a benchmark for the number of 911 calls per dispatcher that would allow it to answer 911 calls promptly.

Despite their efforts to recruit dispatchers, the centers have experienced difficulties in filling their authorized positions. In the first three quarters of fiscal year 2003–04, the average vacancy rate among dispatchers at the centers has been almost 9 percent. The CHP points to the State’s recent hiring freeze and a disparity between the wages the CHP pays dispatchers and the wages paid to dispatchers by local answering points as the biggest obstacles in filling dispatcher positions. Unfilled positions have contributed not only to long wait times but also to significant overtime costs for the CHP. To staff its centers with sufficient numbers of dispatchers, the CHP spent nearly \$4.2 million in overtime costs in fiscal year 2002–03 and more than \$3.5 million through the first 10 months of fiscal year 2003–04. Finally, although one of the expected benefits of the selective routing feature of the wireless E911 system is that some of the wireless 911 calls will be diverted from the CHP to local answering points, thereby offering some relief to the CHP’s workload, the CHP’s 911 coordinator does not expect the number of calls diverted to exceed 20 percent statewide.

RECOMMENDATIONS

To ensure that adequate funding is available for future upgrades of the 911 system infrastructure, General Services should complete its conceptual plan for the project and, if it determines significant upgrades are needed, complete a financial plan for the project.

The Legislature should consider the effects on future 911 projects when diverting funds from the 911 program.

To adequately monitor the funding and progress of the implementation of wireless E911, General Services should separately track expenditures related to the wireless E911 project, comparing actual to anticipated expenditures.

To assist it in answering 911 calls promptly, the CHP should do the following:

- As it implements wireless E911, include a system to monitor wait times at the 15 centers currently without such a system.
- Implement a reliable system for monitoring the number of 911 calls its centers receive.

- Identify practices that enable some centers, such as Orange County, to answer 911 calls promptly despite high ratios of calls per dispatcher, and determine if other centers could adopt the practices.
- Develop a benchmark reflecting the number of 911 calls per dispatcher that would allow the CHP to answer 911 calls within the State's goal of 10 seconds.

To help attract and retain dispatchers at its centers, the CHP should request that the Department of Personnel Administration perform a statewide salary survey to determine the adequacy of the current salaries for CHP dispatchers.

AGENCY COMMENTS

The Department of General Services and the CHP agree with the findings of the report and note that they are already taking actions to address our recommendations. ■

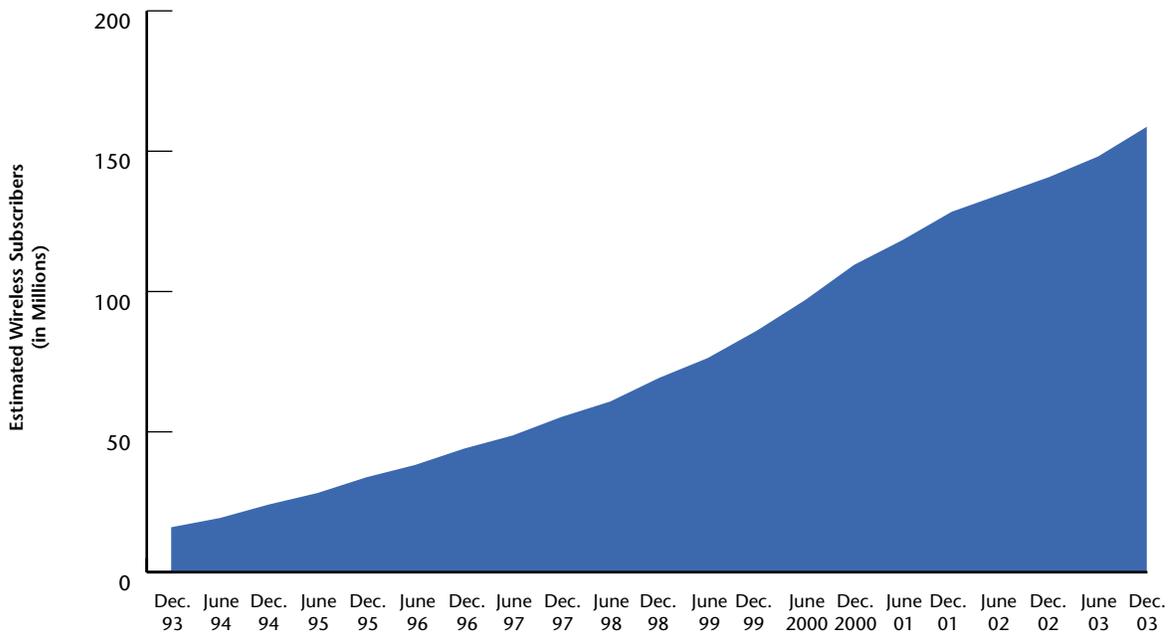
INTRODUCTION

BACKGROUND

Between December 1993 and December 2003, the number of wireless telephone customers in the United States grew from a reported 16 million to 159 million, as shown in Figure 1. As mobile phones have become more widespread, the percentage of wireless-originated 911 calls has risen dramatically. However, for mobile-phone callers, the State's 911 communications system is not yet able to provide the same level of service that exists for calls made from traditional landline telephones.

FIGURE 1

Growth of Wireless Phone Subscribers Nationwide



Source: Cellular Telecommunications and Internet Association (CTIA), which bases its information on surveys of wireless service subscribers and its estimates of subscriber figures for wireless carriers that do not respond to the surveys. The CTIA reported an 87.1 percent response rate for the December 31, 2003, survey.

Both the state and federal governments have a strong interest in implementing improvements to the wireless emergency call system. Such a system requires a complex technological response and the coordinated efforts of many entities, both governmental and private. Further, the regulatory framework is complicated, with no single agency having the authority to oversee the entire process or all the participants. Federal studies have found that many states are experiencing difficulty and delays in implementing an improved emergency call system for mobile-phone calls. Although the push for improvements began earlier, the terrorist attack on the United States in September 2001 highlighted the importance of an effective emergency call system.

OVERVIEW OF CALIFORNIA'S 911 CALL SYSTEM

Since January 1993, California has had a fully implemented landline enhanced 911 (landline E911) system for responding to calls for emergency assistance anywhere in the State. Landline E911 was built on the basic 911 system, which established the

telephone number used nationwide for landline emergency calls and automatically routed a call for assistance to the appropriate public safety answering point (answering point). Local answering points are typically city police, fire, or sheriff's departments with facilities equipped and staffed to receive 911 calls. Dispatchers at the answering points answer 911 calls and direct the proper emergency response agencies.

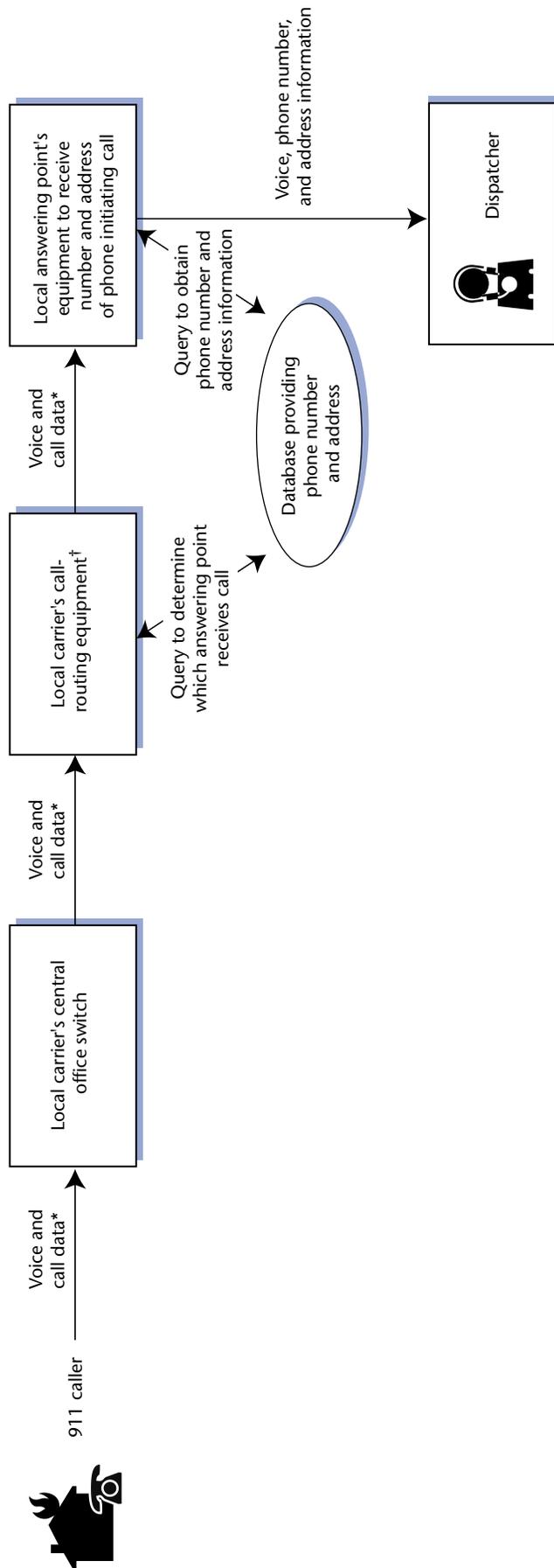
A landline E911 call is selectively routed to the appropriate answering point along transmittal lines dedicated solely to 911 use, and the dispatcher at the answering point receives a display on a computer monitor that automatically identifies the caller's address and telephone number, information that the basic 911 system could not provide. Thus, should the call be disconnected, the dispatcher has the necessary information to call back. Further, should the caller be unable to identify his or her location, the landline E911 system displays the address from which the call is made, enabling the dispatcher to send emergency response personnel. Figure 2 displays the routing for a landline E911 call.

Landline E911 Selective Routing

The phone company routes a 911 call to the appropriate answering point based on the caller's address.

FIGURE 2

How a Landline E911 Call Gets to a Dispatcher



* Call data is an eight- or 10-digit code used for determining which answering point receives the call and looking up the phone number and address of the phone initiating the call.

† The call-routing equipment provides access to the E911 network. The caller's voice and call data from this point are routed to the appropriate answering point along transmittal lines dedicated solely to 911 calls.

Incumbent Local Exchange Carriers

Exchange carriers that historically have provided local telephone service in each of their respective territories. These telephone companies—such as SBC and Verizon—are regulated by the California Public Utilities Commission.

For landline E911 calls, the phone transmits to the central office switch of the incumbent local exchange carrier (local carrier) not only the caller's voice but also data later used to identify the caller's address and phone number (call data). After its call-routing equipment accesses a database to determine which answering point should get the call, the local carrier forwards the voice and call data. Special equipment installed at the answering point retrieves the address, phone number, and registered name of the calling party from the same database. This information, with the caller's voice, is then routed to a dispatcher and displayed on the dispatcher's computer screen. According to the wireless enhanced 911 (wireless E911) coordinator at the Department of General Services, the entire routing process takes place in a very short time, usually a few seconds.

In contrast, under the method California initially developed for handling 911 calls made from mobile phones, each call is routed through the public switched telephone network, which converts the three-digit 911 call to a designated seven-digit emergency number for the answering point serving the region from which the call was made. This method can be cumbersome because it does not use dedicated lines and does not automatically provide the dispatcher with call data. Reflecting the original intent of mobile phones to be used primarily from automobiles for travel emergencies, this method assigns the responsibility of receiving all wireless 911 calls to the California Highway Patrol (CHP), which has established 24 communications centers (centers) throughout the State as answering points for wireless calls.

Public Switched Telephone Network

Refers to the networks typically used to route nonemergency call traffic by public telephone companies.

However, only a few centers have begun to implement the State's wireless E911 system, which, like landline E911, generally uses dedicated transmission lines. Unconnected to the State's wireless E911 system, the calls received by most CHP centers are routed through the transmittal lines of the public switched telephone network and therefore must compete with public call traffic for network capacity.

The wireless E911 system the State is currently implementing is generally establishing dedicated transmittal lines for wireless E911 calls and is being designed to send computer displays of call data to dispatchers at local answering points and CHP centers. As summarized in the 2002 report by the Federal Communications Commission (FCC) on the national

implementation of wireless E911 (Hatfield report), the wireless E911 system has to complete four tasks: locate the caller, identify the answering point serving that location, route the voice conversation to the answering point, and provide call data to the answering point. Currently, without wireless E911's automatic display of the caller's telephone number and location, the dispatcher must query a mobile-phone caller about his or her location, a process that can delay an emergency response and make it difficult to respond to a disconnected call or a caller who is unable to identify his or her location. Although disconnected calls or callers who cannot identify their locations may not be common, the State is committed to establishing the wireless E911 system to deal with those instances.

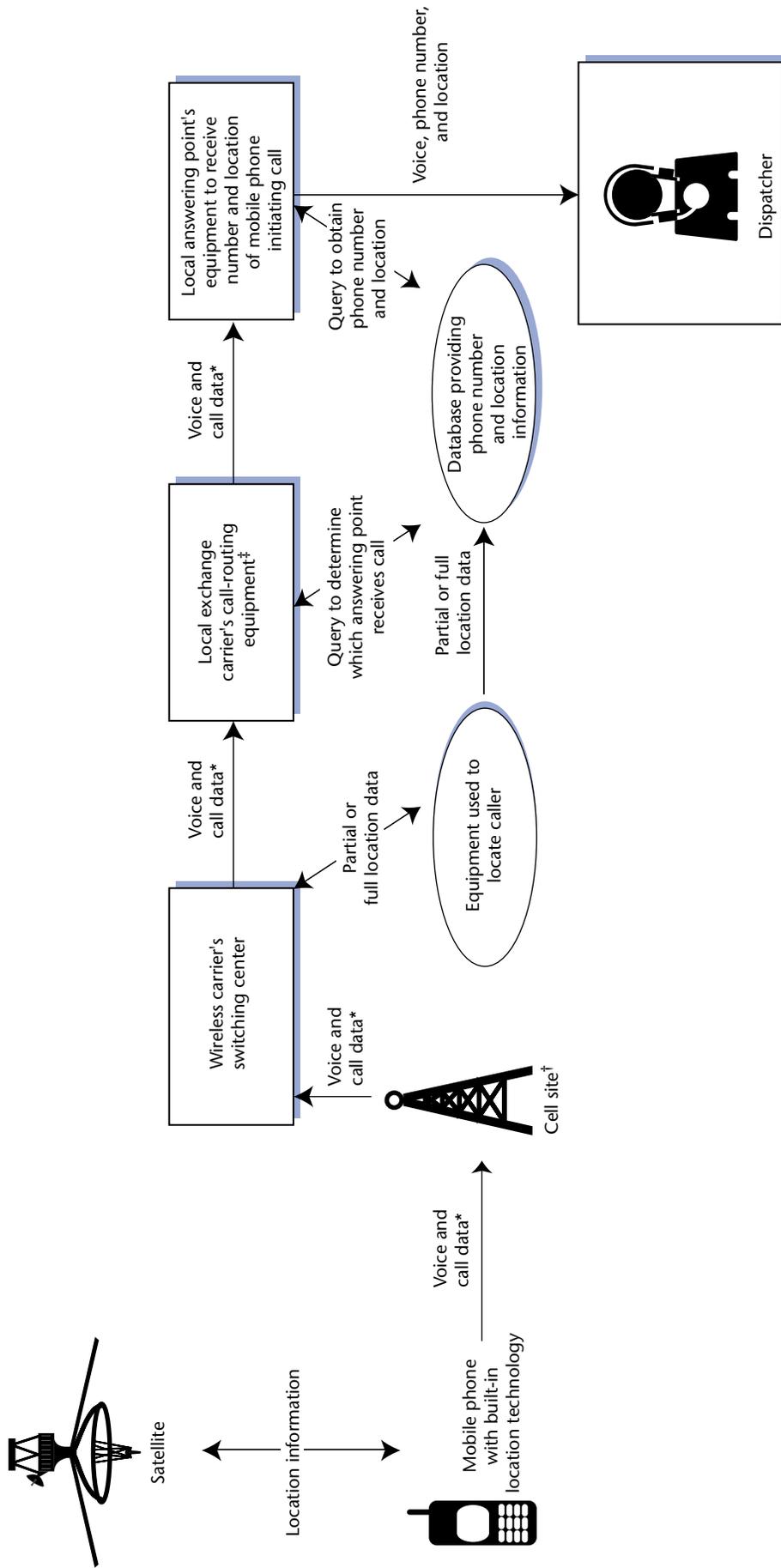
Unlike landline calls, calls from a single mobile phone do not necessarily originate from the same location because the phone travels with the caller. Therefore, locating a mobile-phone caller is difficult and requires a method far different from that used for landline calls. Currently, wireless service providers (wireless carriers) use one of two technologies. In the first, the mobile phone itself has a built-in system for establishing its location by satellite. In the second, the caller's location is determined through reference to three transmittal towers, referred to as cell sites, at known locations. Figure 3 on the following page depicts the process of locating and transmitting a 911 call from a mobile phone with a built-in system.

Cell Site
The antenna array, base station equipment, and supporting structure (usually a tower) that is the local point of interface between a wireless phone device and a wireless network.

When a caller uses a mobile phone to make an E911 call, the location and transmission processes are more complex than they are with landline E911. The mobile phone communicates with satellites or cell sites (depending on the wireless carrier's technology) to create the data that is later used to determine the location of the mobile phone. The caller's voice and call data are then sent through a cell site to the wireless carrier's switching center. The switching center performs two tasks. First, it forwards the call data to equipment that establishes the latitude and longitude of both the caller and the cell site that transmitted the call; this information is then forwarded to a database from which it will later be retrieved by the answering point. Second, the switching center sends the caller's voice and call data that the answering point will later use to retrieve the caller's location and phone number from the local carrier's call-routing equipment. The routing equipment queries the centralized database to determine the most appropriate answering point to

FIGURE 3

How a Wireless E911 Call Gets to a Dispatcher Under the State's New System



* Call data is an eight- or 10-digit code used to determine which answering point gets the call and to look up the phone number and location of the phone initiating the call.

† This figure presents the location technology that uses a computer chip built into the mobile phone to obtain location information from satellites. An alternative location technology uses cell sites instead of satellites. Once the call leaves the cell sites, both technologies route the calls the same way.

‡ The call-routing equipment provides access to the E911 network. The caller's voice and call data from this point are routed to the appropriate answering point along transmittal lines dedicated solely to 911 calls.

receive the call and then forwards the voice and the call data to that answering point. Special equipment installed at the answering point accesses the centralized database to retrieve the caller's phone number and the location expressed in latitude and longitude. This information, with the caller's voice, is routed to a dispatcher, who hears the caller's voice and sees the caller's phone number and location information on a computer screen. If the answering point has installed specialized software, it can display the location information as a map to assist the dispatcher in locating the calling party. According to the wireless E911 coordinator at the Department of General Services, because it comprises more steps, this process takes longer than does the transmission of a landline call, but the information usually gets to a dispatcher within a few seconds of when the call is answered.

With the use of mobile phones and the number of wireless 911 calls rising, some of the 24 CHP centers have had difficulty answering emergency calls promptly, potentially jeopardizing the effectiveness of the emergency response. Consequently, the State allows local answering points that agree to do so to accept direct wireless E911 calls in their areas, in the hope that some of the burden will be lifted from the CHP centers.

KEY PLAYERS IN THE IMPLEMENTATION OF WIRELESS E911

The Hatfield report characterizes the deployment of the wireless E911 system as an extremely complex undertaking. The implementation of the wireless E911 system in California requires the work of many players, both governmental and private. Each has a unique but indispensable role. The key players include the Department of General Services' 911 Office (General Services), the CHP, local answering points throughout the State, wireless carriers, and local carriers.

Department of General Services

General Services oversees the State's 911 system as a whole and has the primary responsibility for coordinating the implementation of wireless E911 in the State. State law regulating emergency assistance directs General Services to coordinate the implementation of the State's 911 system; to assist local public agencies in obtaining financial help to establish emergency telephone service; and to aid local public agencies in the formulation of concepts, methods,

and procedures to improve the operation of both landline and wireless E911 systems. To fund the 911 system, state law imposes a telephone user surcharge, which is collected by the State Board of Equalization (Equalization) and disbursed by General Services. General Services is responsible for annually reviewing the surcharge rate and proposing rate adjustments as needed. Equalization fixes the rate and notifies telephone companies about changes. These funds are used to maintain existing 911 systems, to purchase the equipment CHP centers and local answering points need to implement wireless E911, and to reimburse wireless and local carriers for costs they incur implementing and operating wireless E911. Using a list of vendors that are approved by General Services and agree to guarantee their equipment for five years, an answering point can purchase equipment and submit a claim to General Services for reimbursement based on the answering point's call volume. General Services reviews the claims and authorizes disbursements for approved claims. General Services does not fund the salaries of the dispatchers needed to field 911 calls. General Services' financial plan for fiscal years 2004–05 and 2005–06 anticipates the State will collect nearly \$144 million in surcharges in each of those fiscal years.

California Highway Patrol

Until January 2001, state law required that all 911 calls from mobile phones be routed to the nearest CHP center. With a change in law effective January 1, 2001, wireless 911 calls not originating within a CHP jurisdiction could be routed to a local answering point—such as a local police or fire department—if General Services, CHP, and the proposed local answering point all determine that it is in the best interest of the public, is economically and technologically feasible, and will provide better emergency service. Currently, the CHP receives all but a small percentage of wireless E911 calls and is expected to continue to receive the majority—an estimated 80 percent to 90 percent—of the calls even after local answering points throughout the State participate in the wireless E911 system. To receive the wireless E911 calls, the CHP is upgrading its equipment in its 24 centers.

Local Answering Points

Local jurisdictions are required by state law regulating emergency assistance to establish answering points equipped and staffed to answer landline E911 calls. In contrast, rather

than requiring answering points to directly accept wireless E911 calls, state law gives answering points the option of choosing to take wireless E911 calls directly or not. Before local answering points can accept wireless E911 calls, they must upgrade their equipment appropriately and work with wireless and local carriers to connect the wireless network. Some local answering points in the Los Angeles and San Francisco Bay Area regions already accept wireless E911 calls.

Wireless Carriers

Wireless carriers, such as Verizon Wireless, AT&T Wireless, and Cingular Wireless, are responsible for transmitting wireless E911 calls to the local carriers, which in turn route the calls to CHP centers or local answering points. In addition to the caller's voice, a wireless carrier is required by the FCC to transmit information such as the number of the mobile phone initiating the call (callback number), location of the mobile phone expressed in latitude and longitude, and information quantifying the wireless carriers' level of certainty of the location information provided. Wireless carriers meeting FCC guidelines and adhering to the State's minimum requirements are eligible for reimbursements from General Services for costs incurred in implementing wireless E911 in the State. Specifically, General Services pays wireless carriers a special one-time reimbursement for start-up costs up to \$1 per subscriber in the eligible region and ongoing reimbursements for recurring costs up to 5 cents per subscriber per month.

Incumbent Local Exchange Carriers

As previously defined, local carriers are the large, regulated telephone companies, such as SBC and Verizon, that act as bridges between wireless carriers and local answering points, providing facilities and equipment to route landline and wireless E911 calls to the proper local answering points. General Services reimburses local carriers for providing wireless E911 services to local answering points. Local carriers' wireless E911 service tariffs—or charges—are approved by the California Public Utilities Commission and paid for by General Services on behalf of local answering points.

IMPORTANT LEGISLATION AND REGULATIONS AFFECTING WIRELESS E911 IN CALIFORNIA

California has taken legislative and executive action to establish a wireless E911 system and reflect federal mandates for emergency call systems. Table 1 shows the significant legislative and regulatory actions related to the 911 system. In 1976, the Warren-911 Emergency Assistance Act (emergency assistance act) became effective, establishing 911 as the primary emergency telephone number for use in the State, requiring local public agencies to establish and have in operation a basic 911 system by December 1985, and directing General Services to coordinate the implementation of the State's 911 system.

To fund the State's 911 system, California passed the Emergency Telephone Users Surcharge Act (surcharge act) in 1976. The surcharge act imposes a minimum surcharge rate of 0.5 percent and a maximum rate of 0.75 percent of charges in any year for intrastate telephone communications, to be collected by Equalization. Additionally, the surcharge act authorizes General Services to annually review the appropriateness of the surcharge rate and submit to Equalization the rate for the next year. Once it fixes a rate change, Equalization notifies telephone companies of the new rate. Finally, the surcharge act states that the money collected is for the sole purpose of establishing and maintaining the State's 911 system. For example, the surcharges collected can be used for Equalization's administrative costs for collecting the surcharge, paying General Services' administrative costs for the 911 program, and paying bills submitted to General Services by service providers or communications equipment companies for the installation of the State's landline and wireless E911 systems and their ongoing expenses.

To promote the safety of life and property through the use of mobile communication, the FCC released Order 94-102 and subsequent revisions beginning in 1996, instituting two phases of the wireless E911 implementation. In phase I, wireless carriers were required to create a system capable of transmitting 911 calls, with callback numbers and general locations of the cell sites, to designated local answering points. The FCC required wireless carriers to be capable of providing phase I information by December 1997. In phase II of the implementation, the FCC order requires the transmission of 911 calls to include the latitude and longitude of the mobile phone making the call, within a specified distance and level of certainty. In its initial order, the FCC required wireless carriers to provide

TABLE 1**Summary of Significant Legislative and Regulatory Actions for the Emergency Call System**

Date	Legislation or Regulatory Action	Effect
1976	The Warren-911 Emergency Assistance Act	Establishes 911 as the primary emergency telephone number in California and establishes responsibilities of local public agencies and the Department of General Services' 911 Office (General Services).
1976	Emergency Telephone Users Surcharge Act	Imposes a surcharge to fund California's 911 system.
1996	Federal Communications Commission's (FCC) Order 94-102 and subsequent orders revising 94-102	Require wireless carriers to provide wireless E911 to local answering points within specified time frames. The orders identify two phases: phase I requires wireless carriers to transmit the caller's phone number and the location of the cell site receiving the call, and phase II requires wireless carriers to transmit the location information of the caller.
December 1998	Executive Order W-186-98	Commits the State to wireless E911 development.
October 1999	The federal Wireless Communications and Public Safety Act of 1999	Established 911 as the designated universal emergency telephone number within the United States for both landline and wireless telephone service.
January 2001	Assembly Bill 1263	Allows a local answering point to answer wireless 911 calls when the California Highway Patrol, General Services, and the local agency agree it is in the best interests of public safety.
June 2001	Original FCC deadline for phase II implementation	Requires wireless carriers to be capable of sending wireless E911 data to answering points.
December 31, 2005	Current FCC deadline for phase II implementation.	

phase II information within five years. Subsequently, the FCC has revised the phase II deadlines twice. Each wireless carrier's deadline is different, depending on the type of solution used to configure the location, but the latest overall deadline for phase II implementation capability is December 31, 2005.

Partially in response to FCC orders requiring wireless carriers to provide mobile-phone callers with wireless E911 services, Governor Wilson signed Executive Order W-186-98 in December 1998, officially committing the State to wireless E911 deployment. The Executive Order directs General Services to suggest changing existing laws that might hinder technological improvements of the wireless E911 project and to encourage and support all viable technological means of distributing wireless E911 calls among and between the CHP and local answering points.

Effective January 2001, Assembly Bill 1263 (the wireless E911 law) requires wireless carriers to provide wireless E911 services in California. Unlike the emergency assistance act, which

requires local public agencies to answer landline 911 calls, the wireless E911 law does not require local answering points to take wireless E911 calls directly. In other words, local answering points can volunteer to implement wireless E911, but they are not required to do so. To encourage local answering points to participate in the wireless E911 implementation, the State offers financial incentives. Specifically, for local answering points that commit to implementing wireless E911, the State computes an equipment-funding allotment and pays a fixed amount per dispatcher position for purchase of a system to provide geographic information.

One important feature of wireless E911 implementation is the lack of a single federal or state entity with the authority to require coordinated action from all the key players. Instead, this authority is splintered, as Table 2 indicates.

The federal Government Accountability Office reported that this divided authority exists nationwide; the FCC has considerable authority over wireless carriers and retains some authority over local carriers' interconnection agreements with wireless carriers and other issues, whereas state public utility commissions have authority over local carriers' intrastate service rates. Answering point readiness has traditionally fallen under state or local jurisdiction nationally. Thus, the success of the implementation in any region depends heavily on cooperation among key players.

ACCURACY OF THE WIRELESS CARRIERS' LOCATION SYSTEMS

The main purpose of wireless E911 is to improve public safety, in part, by requiring that wireless carriers provide answering points with the locations of wireless 911 callers to enable answering points to promptly and accurately dispatch necessary emergency personnel to the callers' locations. To ensure that the location information wireless carriers provide to answering points is accurate, the FCC has entered binding agreements with wireless carriers. In these binding agreements, the wireless carriers state the technology they will use to provide caller location information, and the FCC states the standards for accuracy for the location information. These binding agreements put the FCC in a position to enforce wireless carriers' compliance with the agreements and to ensure that wireless carriers provide

TABLE 2

Entities With Authority Over Key Players in the Implementation of Wireless E911

Key Players	Entities With Authority to Require or Regulate Action			
	Federal Communications Commission	Local Governments	California Public Utilities Commission	State Law
Department of General Services' 911 Office (General Services)				Government Code authorizes General Services to act as the coordinator of the entire 911 system, including wireless E911 implementation, but General Services has no authority to compel any action.
Local Answering Points		Decide whether answering points will accept wireless E911 calls. Set answering points' budgets and staffing.		Government Code requires every local public agency to have a landline 911 system, and the Public Utilities Code allows them to have a wireless E911 system.
Wireless Carriers	Requires wireless carriers to be ready to provide wireless E911 information to answering points. Sets deadlines and standards for accuracy of location information.			Public Utilities Code prohibits wireless carriers from charging for 911 calls from mobile phones.
Local Carriers	Has some authority over interconnection agreements with wireless carriers.		Approves local carriers' wireless E911 service charges.	
California Highway Patrol				Public Utilities Code requires CHP to answer wireless E911 calls that local answering points do not accept.

Sources: Federal regulations and state law.

location information that meets FCC standards for accuracy. Consequently, General Services does not perform any testing to ensure the accuracy of location information.

According to an FCC representative, wireless carriers are required to certify that they comply with FCC rules, but the FCC does not require wireless carriers to report specific accuracy results. The representative said that nothing in the FCC rules requires states to test the accuracy of wireless carriers' systems, although at least one state, Vermont, does. A report prepared for the FCC

in 2002 notes that no well-accepted standardized test exists for determining whether wireless carriers' location systems comply with the FCC's accuracy requirements.

SCOPE AND METHODOLOGY

The Joint Legislative Audit Committee (audit committee) requested that the Bureau of State Audits review the State's emergency 911 response program to explore efficiency improvements and identify the cause of answering delays. We were also asked to determine the status of the State's implementation of the wireless E911 project and to identify obstacles that are contributing to any delays. Additionally, the audit committee asked us to identify the locations that have implemented the wireless E911 project and determine whether these locations have measured the outcomes of the implementation. Further, the audit committee asked us to identify the locations in the State where wireless 911 call wait times are longest and to determine the factors that contribute to the delays.

To determine if the State has developed adequate policies and procedures for implementing the wireless E911 project, we reviewed related laws and regulations. Based on our review of these documents, we identified the areas of responsibility of General Services, the CHP, and local answering points. We clarified our understanding of General Services' responsibility through interviews and documentary evidence of the processes in place to implement wireless E911. We also reviewed the FCC orders that called for wireless E911 implementation nationwide. Further, we identified policies, plans, and procedures General Services developed to implement wireless E911. To gain perspective on General Services' implementation, we interviewed industry organizations representing local answering points and wireless carriers. We also spoke with a representative from the FCC to determine its perceptions of California's progress in implementing wireless E911 compared to the rest of the nation.

To determine the status of the State's implementation of wireless E911, we interviewed staff at General Services. We also attended one of the monthly meetings General Services holds with wireless carriers, local carriers, the CHP, local answering points, and others. To identify barriers the State has experienced in implementing wireless E911 and identify General Services'

efforts to overcome them, we reviewed the approved monthly meeting minutes. Further, we reviewed charts General Services prepared showing the status of wireless E911 implementation by answering point. We also surveyed four local answering points that have implemented wireless E911 to determine its impact on their 911 operations. Moreover, we contacted four local answering points that have not agreed to accept wireless E911 calls to understand why they were hesitant to implement wireless E911. A representative of one of these answering points, the East Los Angeles Sheriff's Department, stated it could not provide the information we requested within the time frames of our audit and therefore could not respond. Additionally, one answering point that did provide information advised us subsequent to our inquiries that it has decided to accept wireless E911 calls.

To determine what obstacles contribute to delays in wireless E911 implementation, we contacted industry organizations representing answering points and wireless carriers to solicit their perspectives. We also reviewed financial plans, statements, and records to assess the adequacy of the funding structure of wireless E911. Additionally, we reviewed the Hatfield report and a similar report by the federal Government Accountability Office that discuss the nationwide implementation of wireless E911. We evaluated California's efforts to implement wireless E911 in light of the concerns and information about effective implementation contained in these reports. We also reviewed documentation and conducted interviews with staff at General Services to assess its efforts to mitigate obstacles the reports identify.

We attempted to determine if answering points and CHP centers that have implemented wireless E911 have established and calculated measurable outcomes to determine the success of wireless E911 by surveying four answering points and two CHP centers and interviewing staff at General Services. Representatives of two CHP centers that have begun implementing wireless E911 indicated that it was too early in the process to identify and monitor performance measures. We also interviewed representatives of four local answering points that had begun implementation, two of whom offered suggestions for outcomes to measure, including the accuracy of the location information wireless carriers provide and call wait times. Only one of these two answering points routinely tracks certain measures, but it has not established standards to evaluate those measures.

Finally, to determine what factors contribute to some CHP centers having longer wait times than others, we attempted to obtain detailed wireless 911 call data from the CHP. However, because the CHP does not have a system to track wait times at 15 of its 24 centers and does not maintain data for prior periods for centers that are able to track wait times, we were unable to review the call data. Instead, we reviewed summary reports compiled by the CHP's nine centers that track their wait times to determine those with long and short wait times. Because detailed historical data supporting these summary reports were no longer available, we were unable to assess the accuracy of the reports. However, at two centers, we were able to test the accuracy of wait times calculated by their current systems by placing a call and simultaneously tracking the systems' recording of the call. We interviewed staff from the four CHP centers to identify factors contributing to long wait times.

To determine the reasonableness of the CHP's methods for monitoring 911 call volumes, we interviewed CHP staff and assessed the reasonableness of their procedures. We also analyzed the staffing levels at the CHP's 24 centers and identified the CHP's recruiting efforts to fill vacant positions. Further, we reviewed staffing levels and call volumes to determine if current authorized staffing levels at the CHP are comparable to those at selected local answering points that generally meet the State's goal of answering 911 calls within 10 seconds. ■

CHAPTER 1

The Department of General Services Has Helped California Avoid Problems Other States Face in Implementing Wireless Enhanced 911

CHAPTER SUMMARY

As described in the Introduction, wireless enhanced 911 (wireless E911) will eventually provide the benefits of landline enhanced 911 (landline E911): selective routing of emergency calls—with callers' voices and locations and the number of the mobile phone initiating the call (callback number)—to a dispatcher at the appropriate answering point. Under the leadership of the Department of General Services' 911 Office (General Services), California has experienced a relatively smooth implementation process in the limited number of phone sectors that have implemented wireless E911 to date. In contrast, some states have struggled to coordinate and fund the implementation of wireless E911. Specifically, the federal Government Accountability Office (GAO) and the Federal Communications Commission (FCC) found that many states lacked the following elements to successfully implement wireless E911:

- A central coordinator for implementing wireless E911, resulting in a variety of policies and technologies within the states.
- A process to ensure that public safety answering points (answering points) were actually ready to receive wireless E911 calls when they requested them from wireless service providers (wireless carriers).
- A dedicated funding source for wireless E911.

California has addressed all these concerns to some extent. General Services has generally coordinated the efforts of all the required parties to successfully implement wireless E911, including answering points, wireless carriers, incumbent local exchange carriers (local carriers), and others. General Services also facilitated the development of a standard for reporting wireless E911 call information, ensuring that all wireless carriers provide data similarly to all answering points. Additionally,

General Services has established a process to ensure that answering points have the equipment to receive the wireless E911 call information before they request service from wireless carriers.

California also has created a dedicated funding source with legislation establishing a telephone consumer surcharge that provides the funds to purchase the infrastructure and cover certain other costs needed to implement wireless E911. Although until recently it had not tracked the discrete costs of the two E911 systems, General Services believes the surcharges provide enough money both to pay for the State's implementation of wireless E911 and to cover the ongoing costs of its established landline system. However, because the State has diverted more than \$150 million of these funds to its General Fund, we believe money could be limited for future projects to further enhance the E911 systems, including an upgrade of the outdated infrastructure of landline E911. Moreover, General Services could improve its tracking of expenditures related to the wireless E911 project and use the information to continuously assess the reasonableness of its estimate of the total disbursements and to monitor project progress.

Although General Services has established an ambitious plan for implementing wireless E911 throughout the State by December 2005, wireless E911 has been implemented in varying degrees in only three of the State's seven regions, and as of July 2004, relatively few wireless phone sectors in the State had implemented wireless E911. General Services indicates that the State is at a crucial point in implementation, when delays in one region can create delays in others. Despite possessing no authority over the entities working to implement wireless E911, General Services has effectively coordinated the implementation effort and has convinced a majority of local answering points to receive wireless E911 calls. However, according to estimates by the 911 coordinator at the California Highway Patrol (CHP), even when the wireless E911 system is fully implemented, local answering points will receive only about 10 percent to 20 percent of all wireless emergency calls, leaving the CHP responsible for answering as much as 90 percent of wireless emergency calls.

TWO FEDERAL REPORTS HIGHLIGHT MANY CHALLENGES IN THE NATIONWIDE IMPLEMENTATION OF WIRELESS E911

Reports by the FCC and the GAO focus on the complexity of wireless E911 implementations, identifying common barriers and operational issues affecting efforts to deploy wireless E911 services in the United States. By revealing the major barriers to implementation, the reports help explain the delays that many states have experienced. The GAO report indicates that a survey of states shows that only 24 states said they will finish wireless E911 implementations by the end of 2005. According to its wireless E911 project coordinator, General Services is currently hoping to implement wireless E911 throughout the

State by the end of 2005, but would be satisfied if implementation was complete in 75 percent of the State by that time. The remaining states estimated their implementation dates to be beyond 2005 or were unable to estimate a date. Many states have encountered problems with project coordination, funding, and readiness of answering points, with some answering points lacking the required equipment and software to receive wireless E911 information.

Primary Effects of Obstacles Described in the Two Federal Reports

- Delayed implementation.
- Incompatible technologies and policies resulting from the lack of established technical and operational standards.
- Technology that is designed on an as-needed basis and thus is costly, difficult to use, and inefficient.
- Difficulty in coordinating implementation activities.
- Dispatchers' confusion in reading a variety of computer displays resulting from the lack of a standard reporting format for wireless E911 call information.
- Inadequate money to pay for wireless E911 implementation.
- Waste of wireless carriers' time and resources when unprepared answering points request service.

In April 2002, six years after the original FCC order began establishing nationwide wireless E911 service requirements, an independent consultant hired by the FCC started inquiring into the technical and operational issues affecting the deployment of wireless E911 services in the United States. The resulting report, referred to as the Hatfield report, identifies key issues hampering the nationwide wireless E911 implementation. Among the issues are the lack of a devoted coordinator overseeing system implementation, the lack of an established process to ensure that answering points are actually ready to receive

wireless E911 calls when they request service from wireless carriers, and the lack of a dedicated revenue source to pay for implementing wireless E911 or the use of dedicated E911 funds for other purposes. In November 2003, the GAO issued a report to a U.S. Senate subcommittee on the status of the nationwide wireless E911 implementations, including factors affecting the states' progress. The GAO report expresses concerns similar to those identified in the Hatfield report.

The Lack of an Effective Statewide Coordinator Hampers Many States' Implementation of Wireless E911

A major barrier that both reports identify is the failure of some states to establish a dedicated coordinating body for the deployment of wireless E911. As mentioned in the Introduction to this report, a reliable wireless E911 system requires the involvement and cooperation of wireless carriers, local carriers, answering points, database service providers, equipment vendors, and others. Therefore, as the Hatfield report concludes, effective coordination of all parties is necessary in three areas: overall systems engineering, implementation management, and development and adoption of standards.

Deploying a wireless E911 system is an extremely complex undertaking that involves various technical and operational choices, including critical decisions relating to the structure of the system's information network. The Hatfield and GAO reports conclude that a state must have an effective, devoted coordinator—a single entity with the expertise and resources needed for planning, sharing information, coordinating implementation activities, and developing and adopting standards. A seamless wireless E911 implementation requires not only the cooperation of various parties but also technical and operational standards to ensure that all parts of the network interact reliably using consistent data formats and software interactions. Without standards, the necessary technological interfaces must be designed and implemented on an as-needed basis, which makes wireless E911 implementation difficult, costly, and time-consuming. On the other hand, standardization and establishing a routine for implementing wireless E911 can simplify the process, reduce costs, and increase efficiency.

Without technical and operational standards, implementing wireless E911 is more difficult, costly, and time-consuming.

According to the GAO report, one problem that arose from not having a devoted coordinator is that the parties have difficulty integrating their activities and working together. For example, two answering points in one state describe their difficulty in determining the number of wireless carriers servicing their respective jurisdictions. To get a complete list of wireless carriers before sending out a request for wireless E911 service, one answering point had to have an employee drive around the affected region to identify the cell-site owners and contact them to obtain the identities of the wireless carriers leasing space on the towers. Finally, the answering point had to track down the right contact person at the wireless carriers, which was also difficult. This cumbersome process is only a small part

of implementation, and it probably contributed to that answering point's delayed deployment of wireless E911. Central coordination of all parties could have made this process more efficient.

In Some States, Answering Points Are Not Always Ready to Receive Wireless E911 Calls When They Request Services From Wireless Carriers

Depending on the technology wireless carriers use, federal regulations require wireless carriers to be ready to send a wireless E911 call, complete with the caller's location and callback number, to an answering point within a specified time after the answering point's request. However, the Hatfield and GAO reports cite the lack of readiness of the answering points themselves as a common problem. To route a wireless E911 call from the caller to the proper answering point, all three parties—the wireless carrier, the local carriers, and the answering point—must have the proper equipment and software. The reports point out that some answering points lack sufficient understanding of what equipment and software upgrades are necessary to receive wireless E911 information. If answering points do not possess the required equipment and software, they will not realize the benefits that wireless E911 was intended to provide and will place premature demands on wireless carriers when requesting wireless E911 service. Both reports cite examples of wireless carriers that received requests for wireless E911 service from answering points that were not ready to receive wireless E911 information because they had not installed the proper equipment upgrades. Because these wireless carriers could not always afford to keep their installation teams in the areas while the answering points installed and tested equipment upgrades, implementation of wireless E911 was delayed.

The Lack of Dedicated Funding Mechanisms Remains a Major Issue for Some States

According to both the Hatfield and GAO reports, not all states have established mechanisms for funding wireless E911, and as a result, having sufficient money for equipment upgrades at answering points remains a major issue hampering wireless E911 implementations nationwide. The GAO report states that as of October 2003, the National Emergency Number Association estimated that over the next five years, the nationwide cost to fully deploy wireless E911 would be between \$8 billion and \$9 billion, including capital and incremental operating expenses.

The GAO reports that some states have not adopted legislation to fund wireless E911 and other states have used dedicated E911 funds for unrelated purposes.

Wireless E911 deployment is costly. Wireless carriers incur costs to upgrade their mobile phones and networks, local carriers incur costs to upgrade their networks, and answering points incur costs to upgrade their equipment and purchase new software to receive and display caller location information. Because the federal government offers no funding to these three key players, they must tap other sources. However, according to the GAO report, some states have not adopted legislation to fund wireless E911. Further, in other states, dedicated E911 funds have been used for unrelated purposes. The reports cautioned that without adequate funding for the nonrecurring and recurring costs involved, the rollout of wireless E911 will be delayed, perhaps significantly. This concern was demonstrated by an example cited in the GAO report that one state's use of dedicated E911 funds for unrelated purposes had hindered the ability of answering points to purchase necessary computer upgrades and mapping software.

CALIFORNIA HAS ADDRESSED MANY OF THE CONCERNS RAISED BY THE GAO AND HATFIELD REPORTS

By identifying barriers to the implementation of wireless E911, the Hatfield and GAO reports provide valuable information on what constitutes an effective approach to implementation and a basis for assessing California's efforts. As a result of its extensive planning and the establishment of a dedicated funding source, California has avoided many of the significant problems encountered in other states in the implementation of its wireless E911 system. Specifically, the State has designated an entity to help establish standards and coordinate the efforts of local carriers, wireless carriers, and answering points. It also has established a process to ensure that answering points have the equipment and software they need to receive wireless E911 information they request from wireless carriers. California has also established a specific funding source for 911 purposes. Although the State has transferred some of this money to its General Fund for unrelated purposes, General Services believes that funding will be adequate for implementing wireless E911. General Services did not separately track wireless E911 costs, but has recently begun work on a project to capture these costs. The Appendix summarizes the concerns raised by the GAO and Hatfield reports and the State's actions to address those concerns.

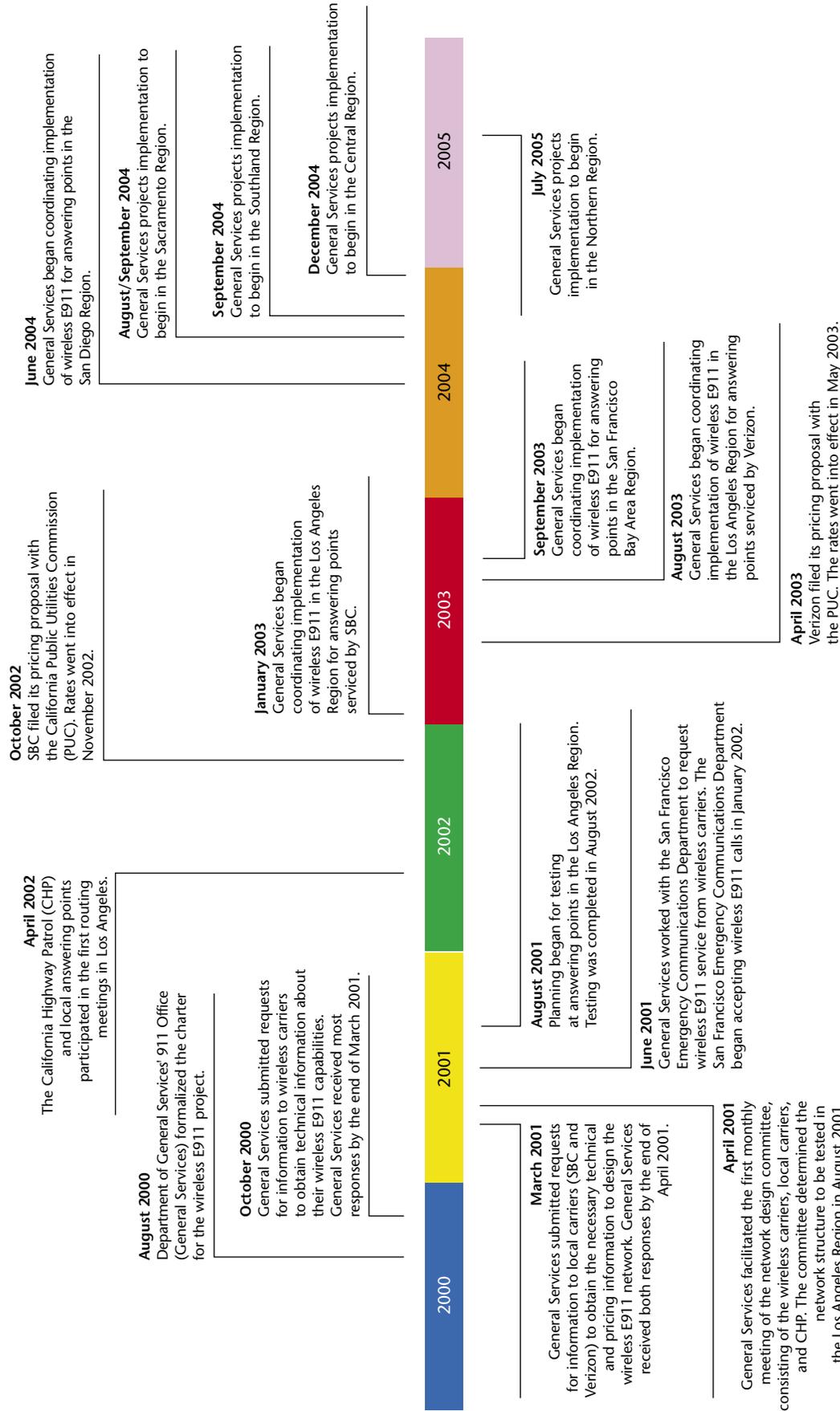
General Services Has Effectively Coordinated the Wireless E911 Implementation

Through its timely actions, use of regional coordinators, a regional implementation plan, and monthly meetings with wireless and local carriers, the CHP, and local answering points, General Services is proactively helping to implement wireless E911 in the State.

Through its timely actions, use of regional coordinators, a regional implementation plan, and monthly meetings with wireless carriers, local carriers, the CHP, and answering points, General Services is proactively helping to implement wireless E911 in the State. As a result, although a great deal of work remains, as of June 2004, it was progressing in accordance with its schedule to complete implementation in most of the State by December 2005. In August 2000, to facilitate the implementation of wireless E911, General Services formalized the charter for the wireless E911 project, designating a unit to coordinate the implementation statewide. General Services quickly began planning the wireless E911 network. As Figure 4 on the following page shows, within three months of chartering the program, General Services sent out requests for information to wireless carriers to obtain information on their technological capabilities and readiness to implement wireless E911; within another six months, General Services sent out similar requests for information to local carriers.

Once General Services gathered information from the wireless carriers and local carriers, it began coordinating implementation. As previously noted, the Hatfield report concludes that without the coordinated efforts of all involved entities to establish standards, key players have to design and implement the necessary network technology on an as-needed basis, making it difficult, costly, and time consuming to roll out wireless E911. To prevent this from happening in California, in April 2001—the same month it received the local carriers' responses—General Services facilitated the first network design committee meeting with local carriers, wireless carriers, and the CHP. The network design committee's purpose was to determine the initial network configuration to test in the Los Angeles Region. As Figure 3 on page 10 shows, the network configuration allows a wireless carrier to transmit a mobile-phone caller's voice, location, and callback number to a cell site, through a switching center, to the local carrier's routing equipment, and finally to the local answering point designated to receive wireless E911 calls from the caller's geographic area.

Chronology of Wireless E911 Implementation



Sources: Department of General Services' 911 Office, minutes from monthly meetings, requests for information, the PUC, and local carriers' pricing proposals.

In August 2001, the network design committee finished developing the basic network standards, and General Services, along with wireless carriers, local carriers, and the CHP, began testing the design in the Los Angeles Region. The purpose of testing was to determine whether the network could successfully transmit wireless E911 information to answering points in the region. Testing in the Los Angeles Region was completed in August 2002, and the local carriers, as the bridge between the wireless carriers and the answering points, needed to install the hardware and software required to upgrade the network. To cover the costs for this work, state law requires the local carriers to justify their pricing and rate proposals to the California Public Utilities Commission (PUC). The two primary local carriers in California, SBC and Verizon, submitted their pricing proposals to the PUC in October 2002 and April 2003, respectively, and the rate changes for each went into effect within two months or less of being submitted. The State began implementing wireless E911 in the Los Angeles Region by January 2003 at an answering point serviced by SBC and by October 2003 at answering points serviced by Verizon.

Beginning in June 2001, General Services also coordinated meetings with wireless carriers, local carriers, the CHP, and answering points to develop the standard format for displaying wireless E911 information so that wireless carriers would consistently report homogeneous E911 data to answering points throughout the State. Further, as the State has begun to implement wireless E911, General Services facilitates monthly meetings and continues to work with wireless carriers, local carriers, the CHP, and answering points to improve the standard E911 format and identify and discuss problems answering points experience as they receive wireless E911 calls. The meetings provide all parties involved with status updates of implementation as well as a forum for identifying and discussing any problems that arise. General Services maintains minutes of the meetings that include any items needing action to ensure that the responsible party completes the tasks.

As further assurance that all necessary tasks are completed, General Services coordinates the actual implementation of wireless E911 throughout the State. General Services has designated regional coordinators who are often affiliated with local answering points, such as local police, fire, or sheriff's departments. The State reimburses local answering points for the coordinators' time implementing wireless E911. General Services educates the regional coordinators, who can then pass on

information to the answering points in their regions. According to the wireless E911 project coordinator at General Services, the regional coordinator is usually the first point of contact when an answering point has a question or problem.

Representatives of a wireless carrier and two national organizations have commended California's approach to implementing wireless E911.

The president of the National Emergency Number Association commended General Services for its coordination efforts. The only concern he raised dealt with General Services' lack of guidance in a system for mapping a caller's location, an issue he indicated was industry-wide. In October 2003, a representative of AT&T Wireless, a wireless carrier, similarly commended California at a public FCC hearing, saying that without a statewide plan, the E911 wireless system would be a "train wreck." Further, the National Governors Association identified California's effort as a model for designing strategies to expedite wireless E911 implementation, specifically citing California's approach to designating a statewide coordinator, establishing a baseline of needed resources, and providing education and training to state and local answering points. We spoke to the managers of two local answering points who also commended General Services' help in implementation of wireless E911.

General Services Ensures That Local Answering Points and CHP Communication Centers Are Ready to Receive Wireless E911 Before They Make Requests From Wireless Carriers

The State has procedures to avoid another problem that has troubled other states: local answering points requesting wireless E911 services from wireless carriers before they are technologically ready to receive the calls. Wireless carriers, local carriers, and answering points must be properly interconnected and have certain equipment in place before wireless E911 calls and caller location information can be correctly routed. General Services has procedures to ensure that both local answering points and CHP communications centers (centers) are able to receive location information when they ask wireless carriers to provide it. According to its wireless E911 project coordinator, General Services uses the regional coordinators to help local answering points gain an understanding of the technological requirements of implementing wireless E911. Further, General Services reviews and approves answering points' requests to wireless carriers for wireless E911 services, as well as requests for equipment purchases and upgrades, and maintains a database to track this information. As a result, General Services can readily access data regarding which answering points need equipment upgrades to implement wireless E911. Moreover,

General Services completes an industry standard checklist for each answering point to ensure that answering points install the proper equipment to ensure efficient implementation of wireless E911. We contacted the Cellular Telecommunications and Internet Association (CTIA) to obtain its opinion on California's wireless E911 implementation and, according to its senior vice president and general counsel, although it has concerns about certain local and national practices, the CTIA is unaware of any issues that have arisen specific to the State's implementation.

General Services Believes the State Has Adequate Funds in Its State Emergency Telephone Number Account Despite Inadequate Expense Tracking and Transfers

Both federal reports on the nationwide implementation of wireless E911 raised questions about the adequacy of funding. According to the GAO report, some states do not have dedicated funding sources for wireless E911 implementations, and some states have had the problem of inadequate financial resources. However, California has a dedicated funding source for its 911 emergency number system, including the wireless implementation. Specifically, the Revenue and Taxation Code imposes a surcharge on every intrastate telephone bill, landline and wireless, to pay for the State's 911 system. These revenues are deposited in the State Emergency Telephone Number Account (emergency account). Although General Services estimates that the emergency account has adequate funds for wireless E911 implementation, General Services did not separately track its wireless and landline expenditures to ensure that its projections are reasonable. Further, the State has made multiple transfers and loans that could jeopardize future projects.

California law imposes a surcharge on every intrastate telephone bill to pay for the State's 911 system.

Section 41030 of the Revenue and Taxation Code directs General Services to determine the rate of the surcharge annually at no less than 0.5 percent and no more than 0.75 percent of intrastate phone charges. Based on revenue projections and anticipated expenditures for fiscal year 2003–04, the current rate is 0.72 percent, close to the maximum the law allows. As Table 3 on the following page shows, General Services projects it will have enough money available in the emergency account for wireless E911 implementation and operation, as well as for the ongoing operation of the State's established 911 system. The chief of General Services' 911 Office estimates the total

TABLE 3

**Revenues and Expenditures of the State Emergency
Telephone Number Account, Actual and Projected
(in Thousands)**

	Actual	Projected by General Services			
	Fiscal Year 2002-03	Fiscal Year 2003-04	Fiscal Year 2004-05	Fiscal Year 2005-06	Fiscal Year 2006-07
Beginning fund balance	\$ 38,233	\$ 62,144	\$ 53,869	\$ 42,624	\$ 50,429
Revenues	139,274	143,870	143,870	143,870	143,870
Expenditures					
<i>Administration</i>	4,894	5,296	7,190	7,190	7,190
<i>Local assistance</i>					
Wireless E911 implementation		42,326	43,402	24,352	17,048
All other 911 related costs	110,469	104,523	104,523	104,523	104,523
Total expenditures	115,363	152,145	155,115	136,065	128,761
Year-end fund balance	\$ 62,144	\$ 53,869	\$ 42,624	\$ 50,429	\$ 65,538

Source: Financial plan of Department of General Services' Telecommunications Division, Fiscal Years 2004-05 and 2005-06.

cost to implement wireless E911 will be \$134 million, including expenditures for equipment upgrades, network costs, and reimbursements to wireless carriers.

General Services enters expenditures from the 911 program into an expenditure database it maintains, enabling it to track its costs and manage the 911 program as a whole. However, General Services does not include elements in its database that would enable it to readily differentiate expenditures for the wireless E911 project from those for the landline E911 program. Rather, General Services can easily determine only its expenditures for the entire 911 program. As a result, when we asked General Services how much it had spent to date on the wireless E911 project, it could not provide us with that information. We analyzed data from General Services' database and determined it had spent approximately \$4.7 million on wireless E911 as of June 2004. Although the chief of General Services' 911 Office told us a report that captures monthly costs for wireless E911 costs is under way, the report may not completely capture all wireless E911 costs because of the missing data elements in the database. Adding data elements to uniquely identify costs as wireless or landline would enable General Services to produce accurate expenditure information for both the landline and wireless E911 systems, use the information to make ongoing

comparisons of actual expenditures and planned spending, and monitor the wireless E911 project to determine if its cost estimates are reasonable.

Although the Revenue and Taxation Code states that the money collected from the telephone surcharge must be used solely for the 911 program, the emergency account has been tapped for other purposes. As Table 4 shows, in six fiscal years since 1981–82, a total of almost \$177 million has been transferred from the emergency account to the State’s General Fund, and only \$24.6 million has been transferred back. The latest transfer was in fiscal year 2001–02 for more than \$63 million. The State does not appear to intend to repay these transfers because it does not show any amounts receivable from the General Fund on its financial statements for the emergency account.

TABLE 4
History of Transfers Between the State Emergency Telephone Number Account and the General Fund
(in Thousands)

Fiscal Year	Transfer to General Fund	Transfer From General Fund	Balance of Transfer to General Fund
1981–82	\$ 20,000		\$ 20,000
1982–83	48,800		68,800
1984–85		\$14,495	54,305
1985–86		764	53,541
1986–87		9,300	44,241
1991–92	23,400		67,641
1992–93	6,471		74,112
1993–94	15,000		89,112
2001–02	63,117*		152,229
Totals	\$176,788	\$24,559	\$152,229

Sources: Schedule prepared by the Department of General Services’ 911 Office and related governor’s budgets, final budget summaries, and accounting records.

* Budgeted in fiscal year 2001–02, transferred in fiscal year 2002–03.

Although General Services believes these transfers will not adversely affect its ability to implement wireless E911, we believe the transfers could jeopardize future improvements to the 911 system. The Hatfield report raises serious questions about the nation’s 911 infrastructure. Specifically, the report states that the existing landline E911 infrastructure, although generally reliable,

is seriously antiquated and built on outdated technology. To be effective in an overwhelmingly digital world, the analog infrastructure may need major upgrades to extend E911 access to a rapidly growing number of nontraditional devices. In response to these issues, General Services has indicated it is currently in the conceptual stages of a project to update the State's landline E911 infrastructure, but it does not have a financial plan or cost estimate for such a project at this time. Should the State decide it is necessary to upgrade the infrastructure, the \$152 million in net transfers may hamper its efforts. Moreover, because the current surcharge is close to the legal maximum, if additional revenue is needed, legislation would be necessary to authorize that increase.

GENERAL SERVICES' AMBITIOUS PLAN IS TO IMPLEMENT WIRELESS E911 THROUGHOUT MOST OF THE STATE BY DECEMBER 2005

Cell Sectors

One or more geographic areas from which cell towers receive calls from mobile phones.

Once General Services coordinated completion of the initial strategic planning—including establishing standards for the network design—it began facilitating implementation of wireless E911 by region, a strategy that appears to be effective. As Table 5 shows, General Services is still in the early stages of implementation, with wireless E911 implemented at an estimated 14 percent of the State's estimated 70,000 cell sectors. However, General Services has set an ambitious schedule for having wireless E911 implemented in most of the State by the end of 2005, when all wireless carriers must be capable of transmitting a mobile-phone caller's voice, location, and callback number to answering points. The wireless E911 project coordinator at General Services has indicated that the State is at a crucial stage in the implementation and, should one region fall behind schedule, implementation in other areas can be delayed. In particular, the limited number of wireless carrier personnel who have the skills needed for the implementation job may not be available when expected. Further, the project coordinator states that General Services is hoping to complete implementation statewide by the end of 2005, but it depends primarily on when most of the CHP centers in Northern California are ready to implement wireless E911 and how many resources the key parties can deploy simultaneously. As a result, the project coordinator states General Services will be satisfied if 75 percent of the State is complete by the end of 2005.

TABLE 5**Number and Percentage of Cell Sectors Where Wireless E911 Has Been Implemented, by Region, as of July 2004**

Region	Cell Sectors for Which Wireless E911 Has Been Implemented	General Services' Estimate of Percentage Complete in Each Region
Los Angeles	8,287	55.3%
San Francisco Bay Area	1,496	10.0
San Diego	245	4.9
Sacramento*	0	0.0
Southland*	0	0.0
Central*	0	0.0
Northern*	0	0.0
Total	10,028[†]	

Source: Department of General Services' 911 Office (General Services).

* See Figure 5 on page 37 for Sacramento, Southland, Central, and Northern region implementation schedule.

† General Services estimates that this is approximately 14 percent of the State's 70,000 cell sectors.

Regional Implementation Appears to Be an Effective Strategy

According to General Services' telecommunications engineer for the wireless E911 project, General Services decided to implement wireless E911 regionally because it ensures network and E911 screen consistency statewide and allows wireless carriers, local carriers, the CHP, answering points, and General Services to focus their efforts to install the necessary equipment and software to provide wireless E911 to answering points in one region of the State at a time. This strategy, which helps prevent each entity's resources from stretching too thin, so far appears to be effective. According to the president of the National Emergency Number Association, "General Services' regional deployment of wireless E911 has been a masterpiece and made all the difference in the world." He further stated that the alternative, implementing the system answering point by answering point, would have slowed down the process and made it more difficult for all parties involved.

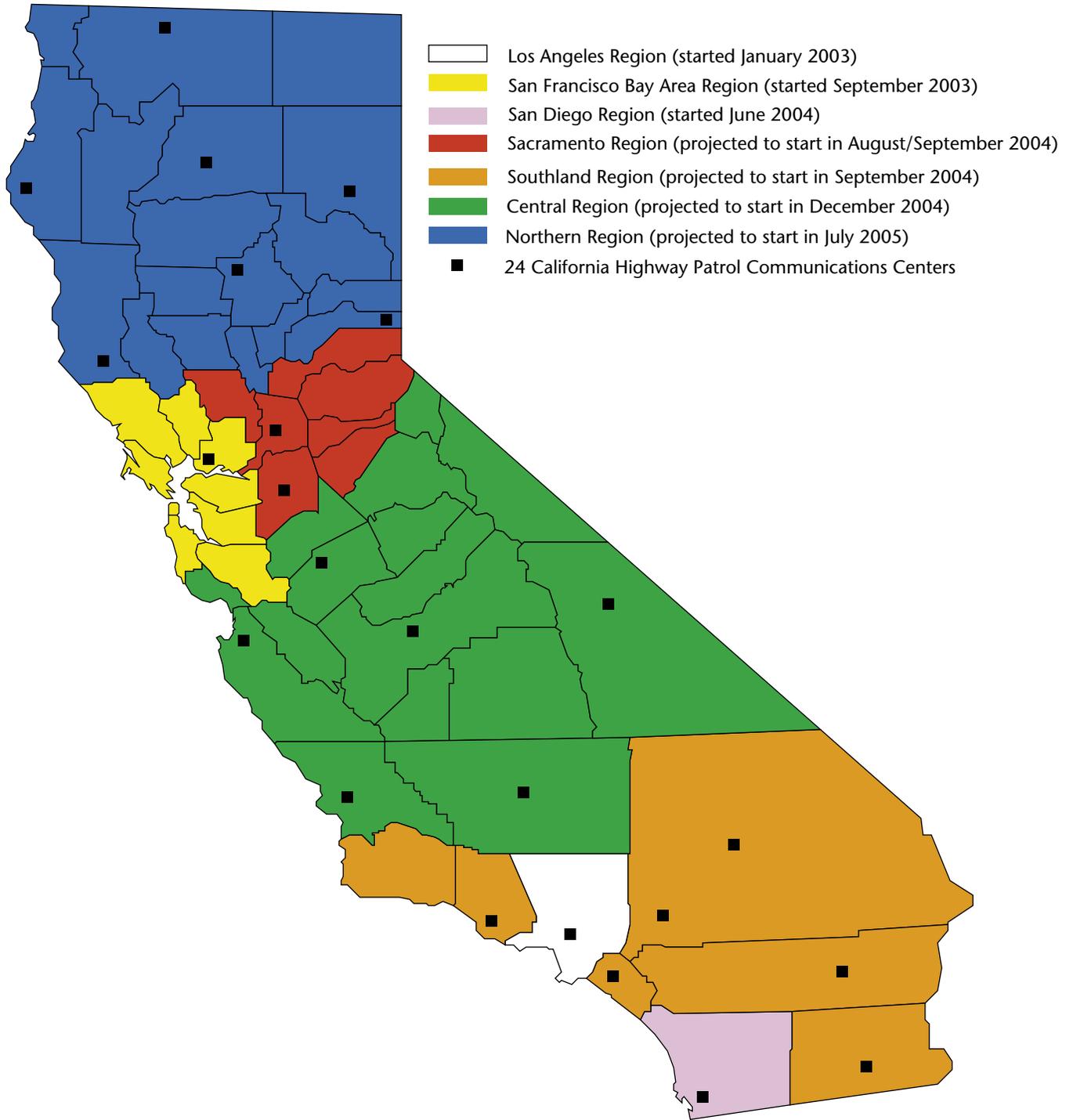
The process of implementing wireless E911 comprises the following steps:

1. Local governments must decide whether they are willing to have their answering points accept wireless E911 calls and notify General Services. With the answering points' authorization, General Services represents the answering points in discussions with local and wireless carriers.
2. General Services notifies the wireless carriers of the local answering points' intent to accept wireless E911 calls. Depending on their technology, the wireless carriers have a certain amount of time from the date of notification to get ready to provide services.
3. Representatives from the answering points, the CHP, and the wireless carriers meet to determine which wireless E911 calls will be routed to the local answering points and which the CHP will continue to receive.
4. Answering points make any necessary equipment or software upgrades to receive wireless E911 information.
5. Wireless carriers and answering points complete functional testing to ensure that the system and network connections are working.
6. Wireless carriers and answering points complete operational testing to validate that routing from each cell sector is correct—that is, that the system automatically routes calls to the appropriate answering points.
7. Answering points can begin receiving wireless E911 calls.

General Services anticipates that this implementation process will be completed for most cell sectors in the State by the end of 2005. Figure 5 shows the actual or projected start-up dates for the seven regions.

FIGURE 5

California Wireless E911 Statewide Plan Map



Source: Department of General Services' 911 Office.

Although General Services Has Successfully Recruited Local Answering Points, the CHP Will Still Answer Most Wireless E911 Calls

Unlike the laws governing landline E911, the state law regulating wireless E911 does not mandate that local answering points answer wireless E911 calls, giving the local answering points the option to refuse to accept the calls. General Services attempts to convince local answering points to answer wireless E911 calls directly because doing so can reduce response times and possibly save lives. As Table 6 shows, more than half the State's local answering points have agreed to answer wireless E911 calls directly.

TABLE 6

Percentage of Local Answering Points That Have Agreed to Answer Wireless E911 Calls as of July 2004

Region	Total Number of Local Answering Points	Local Answering Points Agreeing to Answer Wireless E911 Calls	
		Number	Percentage
Los Angeles	71	32	45%
San Francisco Bay Area	90	47	52
San Diego	13	8	62
Sacramento	28	24	86
Southland	76	60	79
Central	73	66	90
Northern	37	1	3*
Totals	388	238	61%

Sources: Department of General Services' 911 Office (General Services), Bureau of State Audits' calculated percentages.

* According to General Services, because it is implementing the Northern Region last, it has not yet actively attempted to get local answering points to agree to accept wireless calls.

Various factors have caused some local answering points not to accept wireless E911 calls. We spoke with the administrators at three local answering points that have not yet agreed to answer wireless E911 calls directly. All three expressed concern that they do not have adequate staff to handle the increase in call volume that would occur if the local answering points received wireless E911 calls. Because the State does not provide funding for personnel, the administrators said, paying for additional staff

would increase the burden on local government budgets that may already be stretched thin. We also contacted the Sheriff's Department in East Los Angeles, another local answering point that has not yet elected to accept wireless E911 calls, but it was not able to provide the requested information within the time frame of our audit.

Three local answering points we spoke to that had not yet agreed to answer wireless E911 calls raised concerns that the technology is not as good as it should be.

Further, the three answering points we spoke to that had not yet agreed to answer wireless E911 calls raised concerns that the technology is not as good as it should be. For example, one administrator expressed concerns that the wireless E911 system might misroute calls under specific conditions, and that a certain wireless E911 technology might block a caller's ability to communicate for as much as 40 seconds while the mobile phone communicates with satellites to determine its location and sends the location information to the local answering point. General Services' project manager for wireless E911 told us that the administrator's first concern is based on a misunderstanding of the state law relating to the specific routing circumstances the administrator described. Regarding the administrator's second concern, the project manager said General Services has recently heard about the problem and is working with wireless carriers and other parties to determine the cause of blocked calls and to develop solutions.

A CHP center alerted us to another technical problem that one of the wireless carriers experienced recently with wireless E911 calls. Specifically, wireless E911 calls initiated from a wireless carrier's mobile phones using a particular location technology were terminated 10 to 15 seconds into the call. The wireless carrier characterized the problem as a "software issue" and indicated the problem only occurred with certain mobile phones manufactured by a specific company. According to the wireless carrier, as of July 23, 2004, the mobile phone manufacturer had identified the root cause of the problem and was testing the remedy.

When we spoke to administrators at four local answering points that have begun accepting wireless E911 calls, they generally said wireless E911 was meeting their expectations. However, two of the four administrators raised concerns about occasional errors in call routing. For example, the Beverly Hills Police Department reported that it received a wireless E911 call from a caller located more than 60 miles away and had to transfer the call to the appropriate local answering point. This type of error causes delays in 911 service that could jeopardize the effectiveness of a 911 response. The Beverly Hills Police

Department also stated that the location information should be more dynamic in terms of updating the caller's location automatically without the dispatcher's manual involvement. Currently, the technology is limited in that when a dispatcher receives a wireless E911 call, the location information that was originally delivered with the caller's voice remains the same on the computer screen even if the caller is mobile during the call. The location information is updated only when the dispatcher manually clicks a button to tell the system to give the current location of the caller. None of the four local answering points had yet hired additional staff to handle the increase in call volume. However, when we talked with them, only two of the four local answering points had implemented wireless E911 with all their wireless carriers. Thus, it is possible they will need additional staff after all wireless carriers are providing wireless E911 service in their areas.

Even though most of the local answering points have agreed to answer wireless E911 calls directly, Table 7 shows that local answering points will answer wireless calls from approximately 31 percent of the cell sectors in the San Diego and San Francisco Bay Area regions—the two regions for which the CHP was able to provide data—once implementation is complete. The 911 coordinator at the CHP estimates that when the State's wireless E911 system is fully implemented, the percentage of calls routed to local answering points statewide will be less than 30 percent. The 911 coordinator explained that the number of wireless E911 calls routed to a local answering point depends on the jurisdictional and geographical layout of the location. Because regions outside major metropolitan areas have fewer cell sectors that cover cities, the focus of wireless E911 service becomes freeways or throughways. As a result, although wireless E911 calls from approximately 30 percent of cell sectors in the San Diego and San Francisco Bay Area regions will be routed to local answering points, she expects wireless E911 calls from a much lower percentage of the cell sectors in rural areas to be routed to local answering points. Thus, the CHP's 911 coordinator estimates that approximately 10 percent to 20 percent of all wireless E911 calls in the State will be routed to local answering points once implementation is complete.

The CHP's 911 coordinator estimates that approximately 10 percent to 20 percent of all wireless E911 calls will be routed to local answering points once implementation is complete.

TABLE 7

Percentage of Cell Sectors From Which CHP Centers and Local Answering Points Will Answer Wireless E911 Calls Once Implementation Is Complete in Two Regions

Region	Cell Sectors	
	CHP Centers	Local Answering Points
San Francisco Bay Area*	8,560 (79%)	2,340 (21%)
San Diego	2,922 (52%)	2,730 (48%)
Totals†	11,482 (69%)	5,070 (31%)

Source: Wireless carrier routing spreadsheets compiled by the California Highway Patrol (CHP).

* CHP was unable to provide us routing information for one wireless carrier in San Francisco County.

† Although the answering points and CHP made routing decisions, the CHP was unable to provide Los Angeles Region data.

RECOMMENDATIONS

To ensure that adequate funding is available for future upgrades of the 911 system infrastructure, General Services should complete its conceptual plan for the project and, if it determines significant upgrades are needed, complete a financial plan for the project.

The Legislature should consider the effects on future 911 projects when diverting funds from the 911 program.

To adequately monitor the funding and progress of the implementation of wireless E911, General Services should separately track expenditures related to the wireless E911 project, comparing actual to anticipated expenditures. ■

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CHAPTER 2

Inadequate Monitoring and Difficulty Hiring Dispatchers Hinder the California Highway Patrol's Ability to Answer Wireless 911 Calls Promptly

CHAPTER SUMMARY

The California Highway Patrol (CHP) is required by state law to answer all wireless 911 calls that are not otherwise routed to local public safety answering points (answering points). The CHP answers most wireless 911 calls placed in the State, using its 24 communications centers (centers). However, the CHP does not have a system to determine if all its centers answer wireless calls promptly. The CHP does not capture the information needed for it to track wait times in 15 of the 24 centers. For the nine centers that do collect this information, six fail to meet the state goal of 10 seconds to answer 911 calls, with some centers having average wait times of more than 30 seconds. These long wait times potentially compromise the effectiveness of the 911 system, which is intended to save lives and protect property through fast emergency response.

One reason wait times at the centers are high is that the centers handle significantly more calls per dispatcher than do local answering points. According to the CHP's 911 coordinator, despite efforts by the centers to recruit dispatchers, the centers have experienced difficulties filling authorized positions. In the first three quarters of fiscal year 2003–04, the CHP has experienced an average dispatcher vacancy rate of almost 9 percent. Additionally, the CHP has not established a benchmark for the number of 911 calls per dispatcher that would allow the CHP to answer 911 calls promptly. If it had a benchmark, the CHP could compare its centers' current ratios of 911 calls per dispatcher against the benchmark to assess the need for additional dispatchers. However, to establish a reasonable benchmark, the CHP would need to develop a better system for tracking the total number of 911 calls received at each of its centers. Finally, staffing shortages have contributed

not only to long wait times but also to overtime costs for the CHP that exceeded \$4 million in fiscal year 2002–03 and \$3.5 million through the first 10 months of fiscal year 2003–04.

MOST CHP CENTERS DO NOT HAVE SYSTEMS TO MONITOR HOW LONG THEY TAKE TO ANSWER CALLS

As required by state law, the CHP answers 911 emergency calls that originate from wireless phones and are not routed to local answering points, such as police, fire, or sheriffs’ departments. To respond to these calls, the CHP operates 24 centers that function as answering points for wireless 911 calls. Of the CHP’s 24 centers, 15 lack systems to track either the amount of time a caller waits before a dispatcher answers a call or how many calls are unable to get through because all the center’s lines are busy. Therefore, at these 15 centers, the CHP can neither determine how long a caller waits before reaching a dispatcher nor monitor its activities adequately to ensure that it answers 911 calls promptly. Thus, the CHP may be unaware that problems exist.

At nine of its 24 centers, the CHP has installed an automatic call distributor to improve its ability to answer calls. The call distributor routes incoming calls to available dispatchers and, when a dispatcher is not available, places the call in a queue until one becomes available. Typically, while the callers are in the queue, a recording is played that advises the callers that they have reached 911 and that a dispatcher will be available

as soon as possible. With these systems, the CHP is generally able to monitor how long callers must wait before being answered. However, according to its 911 coordinator, the CHP has not installed automatic call distributors in 15 of the 24 centers because it believes the volume of calls received by those centers does not merit the cost of installing and using the system. Rather, each of the 15 centers has a phone system with a certain number of phone lines. When a call comes into one of the centers, an available dispatcher answers the call. If no dispatcher is available, the call continues to ring until a dispatcher can pick up the line.

Additionally, if the number of calls coming into the center exceeds its number of phone lines, the caller receives a busy signal. This type of system is likely to leave already-distressed callers even more upset by the lack of assurance

CHP Communications Centers That Do Not Have a System to Monitor Call Wait Times	
Bakersfield	Redding
Barstow	San Luis Obispo
Bishop	Susanville
Chico	Truckee
El Centro	Ukiah
Humboldt	Ventura
Indio	Yreka
Monterey	

that someone is responding to their emergencies. Further, the system lacks a mechanism to track how long callers wait for dispatchers to answer. Although the CHP does not have a good system to monitor wait times, the chief of the CHP's Information Management Division has indicated that the CHP closely tracks citizen's complaints about its handling of 911 calls.

According to the CHP's 911 coordinator, as part of its implementation of wireless enhanced 911 (wireless E911), the CHP will be equipping each of these 15 centers with technology that will allow the CHP to monitor the amount of time callers wait before a dispatcher answers the call. The CHP expects to have the new systems in place by the end of 2005, consistent with the State's plan for implementation of wireless E911.

MORE THAN HALF THE CENTERS THAT TRACKED WAIT TIMES DID NOT MEET THE STATE'S GOAL OF 10 SECONDS OR LESS TO ANSWER 911 CALLS

Of the nine centers that track the amount of time that callers wait before reaching a dispatcher, six did not meet the state goal of 10 seconds during 2003. The State 911 Operations Manual stipulates that during the busiest hour of any shift, answering points should target 10 seconds as the maximum amount of time in which to answer incoming 911 calls. However, as shown in Table 8 on the following page, CHP data for 2003 show that six centers had average wait times for 911 calls that exceeded 10 seconds, and three of those centers experienced wait times averaging more than 30 seconds. To a 911 caller, time is crucial to receiving an effective emergency response. When the CHP does not answer 911 calls quickly, it hinders its ability to respond to potential emergencies.

One reason the CHP struggles to answer 911 calls promptly is that it is not staffed proportionally to the local answering points we contacted that are able to meet the State's 10-second goal.

THE CHP RECEIVES SIGNIFICANTLY MORE 911 CALLS PER DISPATCHER THAN DO CERTAIN LOCAL ANSWERING POINTS

One reason the CHP struggles to answer 911 calls promptly is that it is not staffed proportionally to the local answering points that are generally able to meet the State's 10-second goal. The CHP handles significantly more 911 calls per dispatcher than each of the four local answering points we interviewed. Although some wireless E911 calls will be diverted to local answering points as the State's wireless E911 system

TABLE 8**Average Wait Times for 911 Calls Answered at Nine CHP Centers**

Center	2003		January Through March 2004	
	Total 911 Calls Answered	Average Wait (in seconds)	Total 911 Calls Answered	Average Wait (in seconds)
Los Angeles	1,631,104	51.8	405,432	49.2
San Francisco Bay Area	1,317,858	39.6	79,573*	38.0*
San Diego	675,714	30.5	159,965	37.6
Inland	590,068	26.8	149,691	27.9
Sacramento	519,971	17.1	127,719	17.5
Fresno	292,091	14.5	70,686	14.0
Merced	263,819	8.8	67,807	9.3
Stockton	245,886	7.7	53,232	8.5
Orange County	872,054	6.4	218,354	4.7

Source: Unaudited automatic call distributor summary reports compiled by the California Highway Patrol.

* The San Francisco Bay Area center was unable to provide data for January and February 2004, due to its conversion to new phone equipment. Therefore, we present data from only March 2004 for this center.

is implemented, the CHP does not expect those diverted calls to relieve much of the CHP's load. Also, the CHP center in Los Angeles, which has begun converting to the new system, has not seen significant sustained reductions in its number of wireless 911 calls.

To determine why certain CHP centers have wait times that exceed 10 seconds, we compared the number of 911 calls received per dispatcher at the CHP centers from January through March 2004 to the ratio of calls to dispatchers at four local answering points during the same period. For comparison, we selected four local answering points in the Los Angeles and San Francisco Bay Area regions that had begun accepting large numbers of wireless E911 calls. We also interviewed representatives from selected centers and answering points to identify any practices or conditions that they believe shorten or lengthen their wait times.

The CHP handles significantly more 911 calls per dispatcher than any of the four local answering points we reviewed. As shown in Table 9, the CHP received between 598 and 1,733 calls per dispatcher each month from January through March 2004, whereas the local answering points received from 95 to 214 calls per dispatcher in the same period.

TABLE 9

**Comparison of Calls Handled by Certain CHP Centers and Local Answering Points
From January Through March 2004**

Center/Answering Point	Total Average Monthly 911 Calls Answered	Average Monthly 911 Calls Answered Per Dispatcher*
CHP Centers		
Orange County	72,785	1,733
San Diego	53,322	1,177
Inland	49,897	1,097
Merced	22,602	1,014
Fresno	23,562	970
Stockton	17,744	934
Los Angeles	135,144	862
Sacramento	42,573	687
San Francisco Bay Area	79,573	598 [†]
Local Answering Points		
Glendale Police Department	4,059	214
City and County of San Francisco Emergency Communications Department	34,755	197
Torrance Police Department	4,043	184
Beverly Hills Police Department	1,613	95

Sources: Unaudited automatic call distributor summary reports and center staffing reports compiled by the California Highway Patrol (CHP), local answering points.

* May 2004 staffing information used for local answering points. Staffing information for CHP centers is the average staffing level for three months, January through March 2004.

[†] The San Francisco Bay Area CHP center was unable to provide data for January and February 2004 due to its conversion to new phone equipment. Therefore, we present data from only March 2004 for this center.

The difference in the calls per dispatcher between the CHP and the local answering points is significant because even with the implementation of the wireless E911 project and its associated benefits, if the CHP does not have enough dispatchers to answer the wireless 911 calls it receives, it will likely continue to struggle to answer calls within the 10-second goal set by the State.

Disparities in staffing, however, do not fully explain the wide range in wait times at the nine CHP centers. For January through March 2004, the center with the highest average number of calls (1,733) per staff person, the Orange County Region, also had the shortest wait time, 4.7 seconds on average. On the other hand, the Los Angeles and San Francisco Bay Area regions had significantly fewer calls per staff and longer wait times—862 calls with a wait time of 49.2 seconds for Los Angeles and

598 calls with a wait time of 38.0 seconds for the San Francisco Bay Area Region. Dispatchers at CHP centers, as well as those at some local answering points, have duties other than answering emergency calls, such as answering nonemergency calls, but we do not know the relative impact on wait time of these additional duties at the various sites. The performances at the Los Angeles and San Francisco Bay Area CHP centers may also have been affected by their implementation of wireless E911. The 911 supervisor at the Los Angeles CHP center points out that implementation presented an additional challenge because the center's staff had to accustom themselves to the display information from the wireless E911 calls they answered while continuing to work with the original system on other calls. Further, he indicated that test calls for wireless E911 implementation take up time, as the dispatcher has to confirm that various data are correctly transmitted.

When we asked representatives of certain CHP centers about practices or conditions that affect their wait times, some suggestions, after staffing issues, were the high number of unintentionally dialed 911 calls, the additional time needed to obtain translators for callers who do not speak English, and the time spent on hold at large local answering points when transferring 911 calls. However, data are not available to quantify the effects of these events on wait times at all the centers.

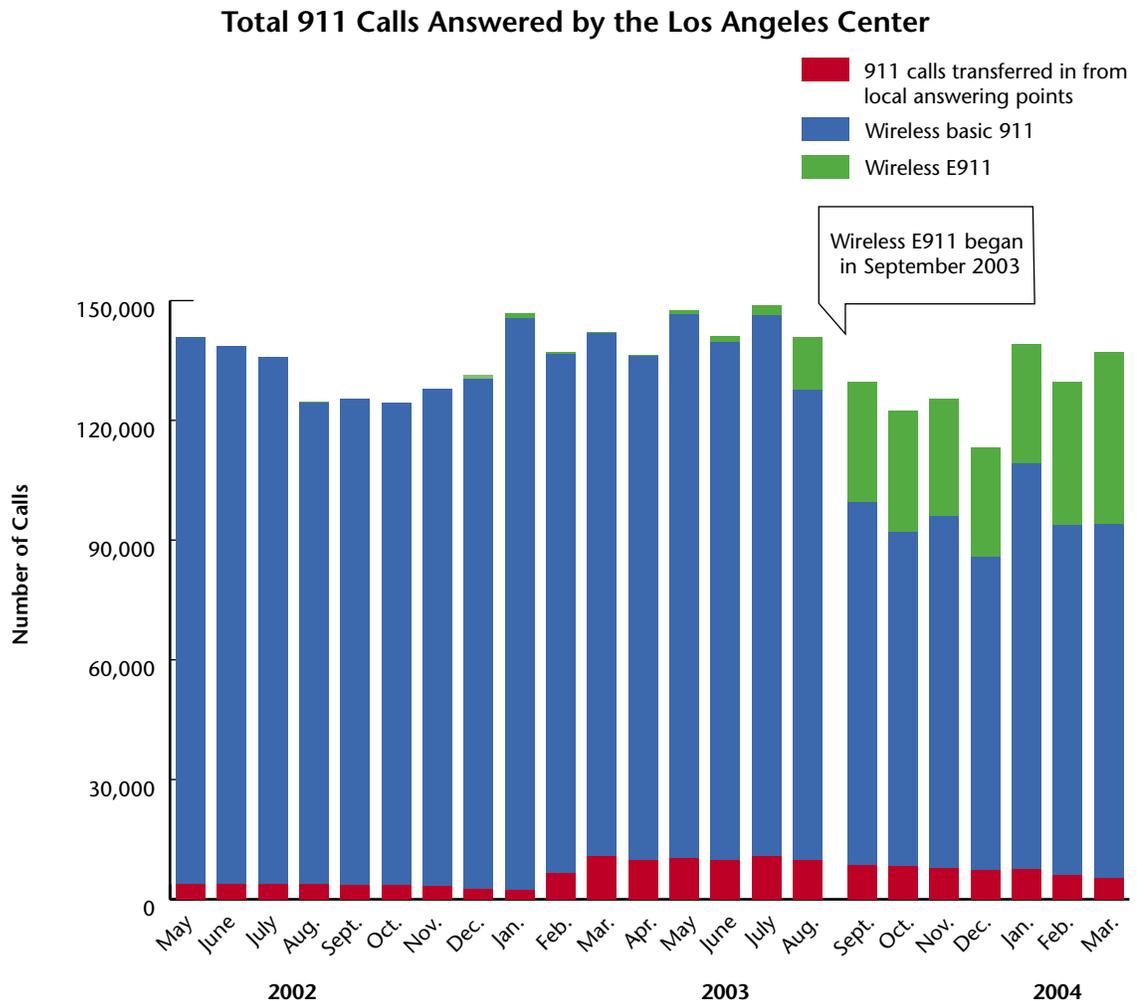
The CHP installed a system at its San Francisco Bay Area center to filter out unintentionally dialed 911 calls, which represent as many as 60 percent of the calls the CHP handles, before they reach dispatchers.

One CHP center has taken steps to reduce the number of inadvertent wireless 911 calls it receives. According to the CHP, as many as 60 percent of the wireless calls it handles are unintentionally dialed calls from phones equipped with one-button emergency dialing features. The CHP indicates that in December 2003, it installed a system at its San Francisco Bay Area center to filter out unintentionally dialed 911 calls before they reach dispatchers. This system prompts callers in English and Spanish to push any key or speak into their phones to reach a dispatcher. If no response is received, the call is terminated. According to the CHP, this system has reduced the number of unintentional calls it receives by 30 percent. The CHP plans to install this system at all its large centers in the near future.

Even after the State fully implements wireless E911, it appears that the volume of 911 calls handled by the CHP will remain high. Although one of the expected benefits of the selective routing feature of the wireless E911 system is that some of the wireless 911 calls will be diverted from the CHP to local answering points, thereby offering some relief to the CHP's

workload, the CHP's 911 coordinator does not expect the number of calls diverted to exceed 20 percent statewide. Figure 6 shows that at the Los Angeles center, the first CHP center to accept wireless E911 calls, the total number of 911 calls dropped slightly as local answering points began to receive wireless E911 calls, but it has not experienced any sustained significant reductions. As we discussed in the Introduction, before wireless E911, the CHP received wireless 911 calls through the public switched telephone network—the network typically used for nonemergency calls by public telephone companies. In Figure 6 we refer to these calls as wireless basic 911 calls.

FIGURE 6



Source: Unaudited automated call distributor reports compiled by the Los Angeles California Highway Patrol (CHP) center .

Note: As the CHP converts to the wireless E911 system, its basic 911 calls will be converted to enhanced 911 calls. The Los Angeles center received some wireless E911 calls before September 2003 as part of the testing of its ability to receive E911 calls from wireless carriers.

The supervisor of the Los Angeles center is uncertain why the center has not realized a larger decrease in total 911 calls as local answering points have begun to divert wireless E911 calls away from the CHP. One possible explanation he provided was that the three largest local answering points in the Los Angeles area were not yet receiving wireless E911 calls directly. In addition, he suggested, and the chief of the CHP's Information Management Division agreed, that the calls the center is now receiving are calls that in the past may not have been completed because the phone circuits were busy.

THE CHP DOES NOT HAVE A BENCHMARK FOR THE NUMBER OF STAFF NEEDED TO ANSWER CALLS

Although staffing disparities are not the only explanation for the range of wait times, they are an important factor. However, according to the assistant commander of its Telecommunications Division, the CHP has not established a benchmark for the number of 911 calls per dispatcher that would allow the CHP to answer 911 calls promptly. If it had a benchmark, the CHP could compare its centers' current ratios of 911 calls per dispatcher against the benchmark to assess the need for additional dispatchers. To establish a reasonable benchmark, the CHP would need to develop a better system for tracking the total number of 911 calls received at each of its centers.

The CHP's current process for monitoring the number of 911 calls it receives has produced unreliable data.

Currently, to monitor the number of 911 calls it receives, the CHP requires each center to track the number of 911 calls it handles during one day each month and report these counts to the CHP's Telecommunications Division. The CHP then multiplies the counts by the number of days in that month to arrive at an estimate of the total 911 calls the CHP answered for the month. However, this process has resulted in unreliable data. The CHP used a fully manual tally system to count 911 calls in 19 of the 24 centers. In these centers, the CHP relied on dispatchers to make tally marks on a sheet each time they completed a 911 call. However, administrators at several centers told us this process did not produce accurate results because it is difficult for dispatchers to remember to tally after each call. In fact, four of the 19 centers preparing manual counts had automatic call distributors, which enable the centers to produce automated reports detailing the number of 911 calls they receive each month. According to the 911 supervisor at one center, the

center continued to produce manual tallies of 911 calls instead of using the automated alternative because the CHP policy manual required it to complete the tally once each month.

Additionally, this process assumes that the activity level of one day will be representative of the entire month. However, the volume of 911 calls the CHP receives is affected by factors that are highly variable, such as weather and major incidents. Therefore, one day would not necessarily be representative of others. This is also true for the three centers that used information from their automatic call distributors to develop their tally of calls rather than using a manual process. Because these centers report the number of 911 calls for only one day each month, the results are not necessarily reliable and may result in an overstatement or understatement of call activity. Only the San Diego center reported calls for each month based on its automated call distributor data. Additionally, another center with the automated call distributor, Stockton, had not submitted tally reports during 2003.

To determine the accuracy of the counts, we looked at the number of 911 calls received each month in 2003 by the seven centers that have automated call distributors but used manual tallies at least partially and compared it with the number of 911 calls indicated for the same period on call detail reports from the centers' automated call distributors. Table 10 shows that most of the tally counts were overstated.

TABLE 10

Comparison of Manual and Automated Counts of 911 Calls at CHP Centers With Automated Call Distributors for 2003

Center	Manual Tally Estimate	Automated Call Distributor Count	Difference	Percentage Difference
Fresno	514,036	292,094	221,942	76%
San Francisco Bay Area	1,477,550*	1,087,442*	390,108	36
Inland	874,313	589,068	285,245	48
Los Angeles	926,394	1,631,104	(704,710)	(43)
Merced	275,702*	166,884*	108,818	65
Orange County	863,701	872,054	(8,353)	(1)
Sacramento	552,851	519,971	32,880	6

Sources: Monthly call tallies and unaudited automatic call distributor summary reports compiled by the California Highway Patrol.

* The data for the Merced and San Francisco Bay Area centers reflect only a portion of information for 2003 because they did not file reports for June through September and May through June, respectively.

During 2003, the Los Angeles CHP center performed manual tallies of its 911 counts. However, these manual counts significantly understated its actual number of 911 calls—by almost 705,000, or 43 percent. On the other hand, the Fresno CHP center produced manual call tallies that significantly overstated its 911 calls—by almost 222,000, or 76 percent. Because the CHP does not track actual 911 calls at all its centers, we are unable to determine whether, in total, the CHP overstated or understated its 911 calls. Nonetheless, it is clear that the CHP's current process to develop an estimate of the number of 911 calls it receives produces unreliable results. Without reliable data relating to the number of 911 calls its centers answer, the CHP will have difficulty developing a benchmark for the number of 911 calls per dispatcher that would allow the CHP to answer 911 calls promptly.

THE CHP HAS BEEN UNABLE TO FILL ALL ITS DISPATCHER POSITIONS

The CHP points to relatively low dispatcher wages and the State's hiring freeze as contributing to its high vacancy rate for dispatcher positions.

Although 911 calls going to CHP centers often experience long wait times before they are answered, the CHP centers have not filled all authorized dispatcher positions to lower those wait times. According to the CHP's 911 coordinator, the CHP needs additional authorized dispatcher positions to answer wireless 911 calls promptly but has experienced difficulties filling the dispatcher positions it has been authorized. The coordinator and some CHP managers point to relatively low dispatcher wages and the State's hiring freeze as contributing to an overall vacancy rate averaging almost 9 percent. Further, the CHP uses costly overtime to make up for the lack of available dispatchers. From July 2003 through April 2004, the CHP incurred more than \$3.5 million in overtime costs to staff dispatchers at its centers.

Table 11 shows the average vacancy rate at CHP centers for the first nine months of fiscal year 2003–04, revealing that most of the largest centers averaged 9 percent or higher vacancy rates for dispatcher positions.

To determine the efforts that the CHP has made to fill its authorized dispatcher positions, we interviewed managers at five centers that had encountered vacancy rates of 8 percent or higher. Each center is responsible for recruiting dispatcher candidates to fill the center's authorized positions. Generally, the managers told us that to fill a vacant dispatcher position, they first look to dispatchers at other centers who have expressed interest in

transferring to that location. They then advertise publicly to recruit potential candidates for the positions. Additionally, the chief of the CHP's Information Management Division stated that the CHP has actively recruited at venues such as state and local fairs, job fairs, and military installations that are downsizing. However, the managers told us that their efforts have been hindered by the State's hiring freeze, a disparity between the wages the CHP pays dispatchers and the wages paid to dispatchers by local answering points, and the cost of living in some regions. In certain regions, including Los Angeles, the San Francisco Bay Area, and Sacramento, the CHP has indicated it offers dispatchers and supervisors "retention pay" as an incentive to continue working at those CHP centers.

TABLE 11

**Average Vacancy Rates for CHP Dispatcher Positions
July 2003 Through March 2004**

Center	Average Number of Positions		Average Vacancy Rate
	Authorized*	Vacant*	
Bakersfield	21	3.9	18.6%
San Diego	58	9.7	16.7
Orange County	50	5.8	11.6
Truckee	11	1.2	10.9
Sacramento	68	7.2	10.6
Monterey	22	2.3	10.5
San Francisco Bay Area	148	14.4	9.7
Merced	24	2.3	9.6
Los Angeles	176	16.4	9.3
Stockton	21	1.8	8.6
Susanville	10	0.8	8.0
Humboldt	11	0.8	7.3
Redding	13	0.9	6.9
All others	197	5.0	2.5
Totals	830	72.5	8.7

Source: Staffing reports compiled by the California Highway Patrol.

* Amounts shown are the averages for the nine months of July 2003 through March 2004.

According to the commander of the CHP's Hiring and Special Project Section, between May 2002 and March 2004, the CHP was subject to a hiring freeze imposed by the governor, and between July 2002 and March 2004, it submitted requests for exemptions. In March 2004, the CHP obtained an exemption

to allow it to begin hiring dispatchers, but attrition that occurred during the hiring freeze had increased the number of vacant positions at the centers. However, the CHP's 911 coordinator told us that the biggest obstacle the CHP faces in filling dispatcher positions is the lower wages the CHP pays its dispatchers compared with those paid by local answering points. Further, the work can sometimes be stressful, involve mandatory overtime, and have inconvenient hours. The chief of the CHP's Information Management Division has also pointed out that with the larger geographic regions the CHP centers cover, the learning curve for dispatchers and the demands made on them are greater at the CHP than at local answering points.

We compared the dispatcher salaries paid by the CHP in its Los Angeles and Sacramento centers with those paid by selected local answering points in the same areas. As shown in Table 12, the salaries of CHP dispatchers are generally lower than those of dispatchers at the local answering points we contacted. Although the starting pay for dispatchers at the Sacramento County Sheriff's Office is lower than the CHP's, all other local answering points we contacted paid starting salaries ranging from \$40 to \$842 per month more than the starting salaries for CHP dispatchers.

TABLE 12

Comparison of Dispatcher Pay in Two Regions

Agency	Monthly Dispatcher Salary Range	Beginning Pay Difference
Sacramento CHP center	\$2,787–3,324*	
Sacramento City Fire Department	2,970–3,611	\$183
Sacramento County Sheriff	2,712–3,297	(75)
Sacramento Police Department	2,827–3,608	40
Los Angeles CHP center	2,787–3,324*	
Los Angeles Police Department	3,560–4,421	773
Glendale Police Department	3,377–4,381†	590
Torrance Police Department	3,629–4,862‡	842

Sources: Position descriptions provided by the California Highway Patrol and local answering points.

* Includes \$300 per month retention pay incentive.

† Includes \$140 per month assignment pay incentive.

‡ We converted the hourly pay amounts provided by the Torrance Police Department to monthly salaries using a 168-hour work month. The salaries include a 10 percent premium paid to dispatchers for computer proficiency. Torrance has only one dispatcher classification, which includes newly hired dispatchers as well as experienced dispatchers.

To meet the workload and staffing needs of its centers, the CHP uses overtime when staff are not otherwise available. From July 2003 through April 2004, the CHP incurred more than \$3.5 million in overtime costs to staff dispatchers at its centers. For fiscal year 2002–03, the CHP incurred \$4.2 million in overtime costs. Table 13 on the following page shows the various amounts of overtime hours and pay required at CHP centers to meet dispatcher needs. Although dispatchers have responsibilities other than answering 911 calls, such as answering nonemergency calls or calls from allied agencies, their role as the initial link in the emergency response chain that a 911 caller experiences makes that responsibility critical.

If the CHP could fill the dispatcher positions currently authorized, it would likely be able to avoid substantial amounts of overtime while retaining the current level of service. As shown in Table 11 on page 53, from July 2003 through March 2004, the CHP averaged a total of 72.5 vacant dispatcher positions at its centers. By dividing the overtime hours that the CHP had incurred through April of fiscal year 2003–04 by its number of average vacant positions for a similar period, we determined that each newly hired dispatcher would have to work approximately 1,600 hours to cover the current overtime. Over the 10-month period, that would equate to approximately 160 hours per month, close to the hours in a normal work month. Nonetheless, it is not likely that the CHP would be able to avoid dispatcher overtime entirely. Factors such as leave, normal employee turnover, and significant emergencies will likely require the CHP to rely on overtime to some degree to fully meet its dispatcher needs. However, as the CHP fills its vacant dispatcher positions, it should be able to reduce its reliance on overtime and retain its current level of service. Alternatively, additional staff and continued overtime could help decrease the long wait times at some centers.

TABLE 13**CHP Overtime Hours and Pay**

Center	Overtime Amount Paid		Overtime Hours Paid	
	Fiscal Years		Fiscal Years	
	2003-04 (Through April)	2002-03	2003-04 (Through April)	2002-03
Los Angeles	\$1,200,716	\$1,403,997	37,763	46,272
San Francisco Bay Area	398,713	541,925	12,935	18,318
Sacramento	332,586	344,148	10,432	11,391
Inland	213,814	281,032	7,330	10,092
Orange County	208,207	176,416	7,014	6,346
San Diego	180,383	189,195	6,208	6,738
Merced	164,628	163,535	5,619	5,863
Fresno	158,315	193,996	5,243	6,820
Monterey	85,408	109,209	2,710	3,572
Ventura	82,534	115,994	2,830	4,137
Bakersfield	77,436	90,718	2,576	3,243
All others	413,490	568,631	14,295	20,501
Totals	\$3,516,230	\$4,178,796	114,955	143,293

Source: Overtime summary reports compiled by the California Highway Patrol.

RECOMMENDATIONS

To assist it in answering 911 calls in a timely manner, the CHP should do the following:

- As it implements wireless E911, include a system to monitor wait times at the 15 centers currently without such a system.
- Implement a reliable system for monitoring the number of 911 calls its centers receive.
- Identify practices that enable some centers, such as Orange County, to answer 911 calls promptly despite high ratios of calls per dispatcher, and determine if other centers could adopt the practices.
- Develop a benchmark reflecting the ratio of 911 calls per dispatcher that would allow the CHP to answer 911 calls within the State's goal of 10 seconds.

To help attract and retain dispatchers at its centers, the CHP should request that the Department of Personnel Administration perform a statewide salary survey to determine the adequacy of the current salaries for CHP dispatchers.

We conducted this review under the authority vested in the California State Auditor by Section 8543 et seq. of the California Government Code and according to generally accepted government auditing standards. We limited our review to those areas specified in the audit scope section of this report.

Respectfully submitted,



ELAINE M. HOWLE
State Auditor

Date: August 26, 2004

Staff: Lois Benson, CPA, Audit Principal
David E. Biggs, CPA
Avena DeMesa
Matt Espenshade
Sheryl Liu-Philo, CPA

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APPENDIX

California's Response to Nationwide Challenges and Obstacles Discussed in Two Federal Reports

In April 2002, the Federal Communications Commission (FCC) issued a report, referred to as the Hatfield report, identifying key issues hampering the nationwide implementation of wireless enhanced 911 (wireless E911). In November 2003, the Government Accountability Office (GAO) issued a report to a U.S. Senate subcommittee on the status of the nationwide wireless E911 implementations, including factors affecting the progress of all states. This GAO report expresses concerns similar to those identified in the Hatfield report and indicates that a survey of states shows only 24 states possibly finishing wireless E911 implementations by the end of 2005. According to its coordinator of the wireless E911 project, the Department of General Services' 911 Office (General Services) is planning to have wireless E911 implemented throughout the State by the end of 2005, but would be satisfied if implementation was complete in 75 percent of the State by then. As shown in Table A.1 on the following page, through extensive planning and the establishment of a dedicated funding source, California has avoided many of the problems other states encountered in implementing a wireless E911 system.

TABLE A.1

Nationally		
Challenges	Effect of Challenge	California Action Taken
Lack of coordination of key players	<ul style="list-style-type: none"> • Delayed implementation. • Incompatible technologies and policies resulting from lack of established technical and operational standards. • Technology designed on an as-needed basis, making it more costly, difficult, and less efficient. • Difficulty in coordinating implementation activities. • Dispatchers' confusion in reading multiple computer displays resulting from lack of a standard reporting format for wireless E911 call information. 	<ul style="list-style-type: none"> • State law assigned coordination responsibility to the Department of General Services, and its 911 Office (General Services) assumed the responsibility. • General Services coordinated wireless service providers (wireless carriers); incumbent local exchange carriers (local carriers); the California Highway Patrol (CHP); and public safety answering points (answering points), which includes local police and fire departments, to develop a standard E911 network design and computer display. • General Services facilitates monthly meetings with wireless carriers, local carriers, the CHP, and local answering points to provide status updates to all parties and facilitate problem solving. • General Services designated and trained coordinators in seven state regions to provide assistance to local answering points during implementation.
Lack of funding mechanism and/or use of dedicated E911 funds for unrelated purposes	Inadequate money to pay for wireless E911 implementation.	The Board of Equalization collects and General Services administers a surcharge on intrastate phone calls that funds the State Emergency Telephone Number Account (emergency account) to pay for 911 projects, including the wireless E911 project.*
Answering points' lack of understanding of technical requirements to implement wireless E911 (i.e., answering points lack readiness)	Waste of wireless carriers' time and resources when unprepared answering points request service.	<ul style="list-style-type: none"> • General Services designated and trained coordinators in each region to provide guidance to local answering points during implementation. • General Services approves and tracks answering points' requests for equipment purchases and upgrades. It also fills out an industry standard readiness checklist for each answering point during implementation. • Local answering points' requests for wireless E911 service from wireless carriers must be routed through General Services for approval to ensure that the answering points will be ready to receive wireless E911.

* California has diverted a net amount of more than \$152 million from the emergency account. Although General Services believes it has adequate resources for the implementation of wireless E911, it has not yet completed a conceptual or financial plan for potential future improvements to the 911 system. Thus, the adequacy of resources for these purposes is not clear.

Agency's comments provided as text only.

State and Consumer Services Agency
915 Capitol Mall, Suite 200
Sacramento, CA 95814

August 12, 2004

Elaine Howle, State Auditor
Bureau of State Audits
555 Capitol Mall, Suite 300
Sacramento, CA 95814

Dear Ms. Howle:

Enclosed is our response prepared by the Department of General Services to the Bureau of State Audits' Report No. 2004-106 entitled, *Wireless Enhanced 911: The State Has Successfully Begun Implementation, but Better Monitoring of Expenditures and Wireless 911 Wait Times Is Needed*. A copy of the response is also included on the enclosed diskette.

If you have any questions or need additional information, please contact me at (916) 653-4090.

Sincerely,

(Signed by: Fred Aguiar)

Fred Aguiar, Secretary

Enclosures

Department of General Services
The Ziggurat
707 Third Street
West Sacramento, California 95605

August 11, 2004

Fred Aguiar, Secretary
State and Consumer Services Agency
915 Capitol Mall, Room 200
Sacramento, CA 95814

Response to Bureau of State Audits' Report No. 2004-106 – “Wireless Enhanced 911: The State has Successfully Begun Implementation, but Better Monitoring of Expenditures and Wireless 911 Wait Times is Needed”

Thank you for the opportunity to respond to the Bureau of State Audits' (BSA) Report No. 2004-106 which addresses two recommendations to the Department of General Services (DGS). The following response addresses each of the recommendations contained in Chapter 1 of the report.

OVERVIEW OF THE REPORT

The DGS has reviewed the findings, conclusions and recommendations presented in Report No. 2004-106. The DGS will take appropriate actions to address the recommendations.

The DGS is pleased that the BSA concluded that the department has been successfully coordinating the implementation of wireless enhanced 911 (wireless E911) within California. This conclusion reflects favorably on the professionalism, commitment and diligence of the management and staff of the DGS Telecommunication Division's 911 Emergency Communications Office (911 Office). It also reflects favorably on the significant commitment and expertise shown by the other parties – including the California Highway Patrol, local answering points, wireless service providers and local exchange carriers – that are working to successfully implement wireless E911 within the State. As noted by the BSA, employing a wireless E911 system is an extremely complex undertaking that involves various technical and operational choices, including critical decisions relating to the structure of the system's information network. Upon completion, the DGS expects to be able to convince enough local agencies to take wireless E911 calls to improve service delivery to approximately one million 911 callers annually.

We are particularly pleased that the BSA found that the DGS has succeeded in encouraging and fostering a positive team environment for all parties in implementing the wireless E911 system, which has allowed a forum for continuous improvement to be maintained. As stated by the BSA, the success of system implementation in any region depends heavily on cooperation among key players. During its review the BSA contacted the various parties involved in the implementation of the wireless E911 system. As reflected in the report, uniformly these parties had favorable comments related to California's program for implementing this system.

To improve public safety, the State of California is firmly committed to implementing a wireless E911 system in an efficient and effective manner. The State's implementation process is serving as a role model for the rest of the Nation and has been widely recognized for its processes that avoid problems faced by other states. Of particular note is the DGS' strategy that provides for system implementation within regions of the State, instead of by answering point by answering point. The success of this approach is shown by the following quote from the president of the National Emergency Number Association that is presented in the BSA's report: *General Services' regional deployment of wireless E911 has been a masterpiece and made all the difference in the world.*

The following response only addresses the recommendations that were presented to the DGS. The DGS appreciates the in-depth and professional audit performed by the BSA. The actions recommended by the BSA have merit and will be promptly addressed.

RECOMMENDATIONS

CHAPTER 1

RECOMMENDATION # 1: *To ensure adequate funding is available for future upgrades of the 911 system infrastructure, General Services should complete its conceptual plan for the project and, if it determines significant upgrades are needed, complete a financial plan for the project.*

DGS RESPONSE # 1:

The DGS is actively studying the future needs of the 911 system. Specifically, to evaluate ways in which to incorporate emerging technologies with a more flexible, sophisticated and cost effective 911 system for California, the DGS has developed a project entitled *Next Generation E911 Network (NGEN)*. As a first step, the DGS hired a consultant to provide an analysis of the existing 911 infrastructure and to recommend a future path to meet changing public safety needs. From the results of that study which was completed in April 2003, it became clear that, given the size and complexity of California, NGEN would be an evolutionary project, unfolding over a period of years and potentially encompassing multiple stages.

Based on recommendations in the consultant's report, the DGS began looking first at addressing enhancements to the very large and complex database that is at the heart of California's 911 system. Subsequently, a Request for Information (RFI) was sent out to obtain industry feedback on the 911 database requirements. Currently, the DGS is evaluating responses to the RFI to determine the need for significant upgrades. Although it is expected that this evaluation will take approximately six months, the timeline for its completion depends on the quality of information provided by the industry and whether additional data will be needed before a decision can be made to move ahead. As recommended by the BSA, if it is determined that significant upgrades are ultimately needed, a financial plan will be completed for the database enhancement phase of the project.

RECOMMENDATION # 2: ***To adequately monitor the funding and progress of the implementation of wireless E911, General Services should separately track expenditures related to the wireless E911 project, comparing actual to anticipated expenditures.***

DGS RESPONSE # 2:

The 911 Office recognizes that this is an area for improvement and is working with the department's information technology staff to ensure that wireless E911 expenditures can be more readily identified and tracked within the 911 project database. Currently, it is planned that within six months the database will be revised to allow wireless E911 costs to be more easily identified, a reporting system developed to assist management in monitoring those costs and staff trained on new processes.

CONCLUSION

The DGS is firmly committed to effectively and efficiently implementing wireless E911 in California. As part of its continuing efforts to improve this process, the DGS will take appropriate actions to address the issues presented in the report.

If you need further information or assistance on this issue, please call me at 376-5012.

(Signed by: Ron Joseph)

Ron Joseph
Director

Agency's comments provided as text only.

Business, Transportation and Housing Agency
980 9th Street, Suite 2450
Sacramento, CA 95814

August 12, 2004

Elaine M. Howle, State Auditor*
Bureau of State Audits
555 Capitol Mall, Suite 300
Sacramento, CA 95814

Dear Ms. Howle:

Attached is the Department of the California Highway Patrol's (Department) response to your draft report, *Wireless Enhanced 911: The State Has Successfully Begun Implementation, but Better Monitoring of Expenditures and Wireless 911 Wait Times Is Needed* (#2004-106). Thank you for the opportunity to respond to your audit report.

I am extremely proud of the dedication and performance of the Department's Public Safety Dispatcher personnel (PSD), whose difficult and stressful work is critical to saving the lives of all persons in our state who find themselves in need of emergency assistance, as well as the lives of other emergency personnel responding to calls for help. Accordingly, I am pleased to join the Department in recognizing the outstanding work of the State's PSDs.

As your audit report notes, the Department has made many efforts to fill vacant PSD positions, but has been impeded by a number of obstacles, including the lengthy hiring freeze, wage disparities relative to local dispatchers, and the greater complexity and demanding nature of the positions. The Department will continue to recruit PSDs and will request that the Department of Personnel Administration survey statewide dispatcher salaries. Further, the Department recognizes the need to implement additional automation to improve its collection and monitoring of call-related data, and is already involved in acquiring the necessary information system.

We look forward to providing you future status updates on implementing your report's recommendations. If you need additional information, please do not hesitate to contact me, or Michael Tritz, Chief of the Office of Internal Audits within the Business, Transportation and Housing Agency, at (916) 324-7517.

Sincerely,

(Signed by: Michael A. Tritz)

SUNNE WRIGHT McPEAK
Secretary

Attachment

* California State Auditor's comment appears on page 71.

**California Highway Patrol Response to
the Bureau of State Audits Report on Wireless Enhanced 911**

Introduction

In responding to the Bureau of State Audits (BSA) review of wireless 911 call processing in our communication centers, the California Highway Patrol (CHP) would like to take this opportunity to recognize the outstanding efforts of our Public Safety Dispatchers (PSDs). Over the past ten years, we have witnessed an exponential increase in the number of wireless 911 calls placed within the State of California. In comparison, the 911 calls placed via landline, have increased little. Since the CHP is the public safety answering point for wireless 911 calls, our PSDs have experienced a tremendous growth in workload. While the Department is attempting to address this growth, the fact remains that it is the professionalism, hard work, and dedication of the PSDs that has allowed the CHP to continue to provide the best possible service to the citizens of California.

The CHP would also like to acknowledge the staff from BSA, who conducted the audit. The staff did their utmost to be unobtrusive so as not to interrupt the operations of the communication centers. Moreover, their conduct and demeanor was polite and professional and much appreciated by CHP staff with whom they dealt during the audit.

Finally, the CHP would like to thank the Joint Legislative Audit Committee for authorizing the expenditure of funds to allow an in-depth look at the rapidly expanding wireless 911 call environment in the state.

Additional Report Information

While the BSA report is factual and accurate, there are additional factors and information that add explanations and evidence to many of the points contained within the report.

The report does conclude that the CHP is not staffed appropriately to be able to address 911 calls within ten seconds, due to both the lack of sufficient numbers of positions and the difficulty in keeping the positions filled. As such, the report acknowledges that the CHP has submitted Budget Change Proposals (BCPs) over the years and has received additional dispatch personnel, as a result. Nevertheless, many more budget requests were actually prepared that were not funded, due to other fiscal priorities at the Department, Agency, and state level. For example, in the 1990's, the CHP developed a baseline staffing formula upon which to base position allocations. Budget requests were prepared, based in part on this formula. However, it was determined that the staffing formula did not provide a convincing argument for additional positions, and so its use was discontinued. Specifically, from 1992 through 2002, CHP repeatedly prepared budget requests, ranging from a low of 19 additional positions to a high of 226 additional positions, in a given year. Nevertheless, a majority of these additional positions were never realized. In fact, from December 1993 until December 2003, total dispatch personnel increased by 47, only 6 percent. During the same period, the BSA report indicates wireless subscribers increased approximately 1,000 percent.

**California Highway Patrol Response to
the Bureau of State Audits Report on Wireless Enhanced 911**

The report adequately states that there is a disparity in salaries, with CHP PSDs receiving smaller salaries than dispatch staff in local agencies, which is a disincentive for recruitment. The report cites a couple of examples. Nevertheless, it does not include the most notable disparities that occur in the large metropolitan areas surrounding San Diego and San Francisco. A dispatcher in Santa Clara county commands a monthly salary of \$4,026 to \$6,234 as compared to a CHP PSD II, whose monthly salary, with incentive pay, will range from \$2,815 to \$3,720. In this case, the local dispatchers receive a salary twice that of CHP dispatchers. Likewise, in the San Diego Area, where CHP staff do not receive incentive pay, San Diego county salaries range from \$2,888 to \$3,870 and San Diego city salaries range from \$2,579 to \$4,341. The CHP PSD IIs in that area receive \$2,515 to \$3,420, which is several hundred dollars less per month.

Any recruitment discussion needs to include some of the reasons that create the vacancies that must be filled. While salary differences may account for some of the attrition, a more important factor is the complexity and amount of workload of CHP PSDs as compared to dispatchers for local agencies, with whom the CHP must compete for staff resources. The CHP operates large communication centers, which dispatch for multiple counties. A PSD in one of our large centers must become familiar with the street guides, emergency services, and landmarks for a large number of cities and counties. This is often volumes of information that takes months, or even years, to become completely proficient with. This is in contrast to dispatchers in individual counties and cities, where only the locations and services in that confined area are involved. Furthermore, unlike local agency dispatchers, CHP PSDs are tasked with additional work requirements related to freeway call boxes; freeway service patrol; and numerous other state agencies including CalTrans, Fish and Game, State Parks, Department of Motor Vehicles, Alcohol Beverage Control, California Department of Corrections, Inspector General's Office, Department of Justice, and approximately fifteen other agencies. In fact, the complexities of the job require that a beginning PSD train for six months before being allowed to work alone at a dispatch position, although the probationary period for PSD is a full year. Therefore, it is understandable that someone living in Santa Clara county, where dispatch salaries are twice the CHP salaries, would prefer to work in the county center, rather than having to be proficient with information covering a nine-county region in the Bay Area.

Regarding CHP's specific efforts to keep its budgeted positions filled, while the report states that the CHP actively recruits at state and county fairs, job fairs, and military installations that are downsizing, it does not mention the proactive program the CHP has for recruiting dispatch personnel. That program includes ongoing production of brochures, posters, and other publications, which are distributed at a number of public gatherings, where CHP staff extol the advantages of a career as a CHP dispatcher. These venues also include college campuses, car shows, and advocacy groups. The CHP runs advertisements in local newspapers and displays recruitment information on highway billboards. In addition, the CHP public website includes recruitment information on dispatching. Moreover, persons calling any CHP office, who are put on hold for any reason, often hear a recruitment message that details opportunities for careers in dispatching.

**California Highway Patrol Response to
the Bureau of State Audits Report on Wireless Enhanced 911**

Despite all the CHP's recruitment efforts, the turnover rate in the communication centers has remained fairly consistent.

Response to Recommendations

Recommendation 1: Implement a wait time monitoring system at the 15 centers without one.

Despite the fact that the CHP has employed an electronic mechanism for wait time monitoring in only nine of its centers to date, all centers have been monitored using other means, such as supervisory review and oversight, and proactive tracking of citizen complaints. In fact, during the past 18 months, the 15 communication centers without automated call distributors have received no citizen complaints about wait times on 911 calls.

The CHP is already in the process of purchasing a management information system (MIS) for all communication centers, in conjunction with the installation of intelligent workstations (IWS). The MIS tracks call activity through the IWS and provides detailed call reports for supervisory and management use. Wait time information will be available at all sites, not just the centers with automated call distributors, at the completion of this project, currently targeted for December 2005. Also, with the addition of 911 trunks for the enhanced 911 network, the Department of General Services (DGS) will provide access to a Frame Relay Network Information System and a Compliance Analysis and Review System Network, which provide additional methods of call accounting. These systems track 911 calls on the enhanced network and provide complete activity reports to include cell sector and transfers, if they occur.

Recommendation 2: Implement a reliable system for monitoring the number of 911 calls received by its centers.

The CHP agrees that a more reliable system to monitor total call volume would be beneficial in determining staffing levels in each of its communication centers. The CHP communication centers provide public safety support to both rural and metropolitan regions. Communication center sizes range from a staff exceeding one hundred to a staff of less than ten. Although the CHP installed systems, with the ability to monitor call volumes, in the larger communication centers, it was decided that the smaller centers did not warrant a similar expenditure of public funds. Accordingly, the CHP requested 911 funding for those technologies which would provide the greatest level of public service, such as the voice interaction system to identify and reduce inadvertent calls, which interfere with the emergency calls.

The MIS and new DGS systems described above provide detailed call statistics on the number of calls at each center, in addition to the statistics from the automated call distributors already installed in the larger centers. Utilizing the new MIS, by December 2005, the CHP will be able to monitor the call volume at each of its communication centers.

**California Highway Patrol Response to
the Bureau of State Audits Report on Wireless Enhanced 911**

Recommendation 3: Identify additional practices that enable some centers, such as Orange County, to answer 911 calls in a timely manner despite high calls to staff ratios and determine if practices can be incorporated at other centers.

One reason for the Orange County performance is that this particular center benefits from a more tenured staff. The majority of Orange County staff have greater than seven years performing the duties of a PSD, as compared to most large communication centers whose staff tenure is largely under the seven year mark. Tenured PSDs are able to respond to telephone and radio traffic more efficiently and effectively thereby handling more call or radio volume in less time. With a greater number of experienced staff, supervisors and managers are better able to provide support to the newer PSDs to improve their work performance.

In any event, the CHP plans to address this recommendation through our well-established Command Assessment Program. This is a program that requires biennial evaluation of the management practices and the essential critical functions of each CHP command. The communication centers undergo these assessments. Normally, the outcome of the assessment is a list of recommendations for improvement and acknowledgements of successful and innovative practices within the command. The list becomes a performance evaluation factor for the commander and progress is tracked on areas where improvement is needed. Since the CHP administers a statewide Dispatch Academy, the innovations noted in future assessments of Orange County, and other centers, will be incorporated into the training materials and curriculum. In addition, successful practices will be added to the agenda for future Communication Center Commander conferences.

Recommendation 4: Develop a benchmark reflecting the ratio of 911 calls per dispatcher that would allow the CHP to answer 911 calls within the state goal of ten seconds.

The report states that some of the CHP communication centers already meet or exceed the ten second call answering goal. The larger centers do not meet that goal; however, these centers have been fairly consistent in the time it takes to answer the calls, despite a dramatic increase in call volume with only a small increase in staffing. To address the call volume during peak times, the CHP has already pursued a number of staffing methods, including split shifts, alternate work weeks, alternate work hours, retired annuitants, part-time staff, limited duty personnel, and temporary assignment of staff from other communication centers. However, the timing of wireless 911 calls does not come in patterns that can easily be addressed by these types of staffing methods. Despite this, the CHP does understand the importance of a benchmark for staffing that would allow us to routinely address 911 calls within ten seconds. Although a previous staffing formula was not accepted, the CHP intends to develop a benchmark that will consider call volume data, communication center size, and incorporate shift parameters that effect high traffic volumes, along with seasonal and special events that can induce peaks. The CHP is already familiar with a staffing benchmark published in **Dispatch Monthly**, a national magazine. Once call volume statistics are available from all centers, the CHP will assess this benchmark for applicability.

**California Highway Patrol Response to
the Bureau of State Audits Report on Wireless Enhanced 911**

To help attract and retain dispatchers at its centers, the CHP should request the Department of Personnel Administration to perform a statewide salary survey to determine the adequacy of current dispatcher salaries.

Although Public Safety Dispatcher salaries are negotiated through the collective bargaining process, the CHP will request the Department of Personnel Administration (DPA) conduct a statewide survey of dispatcher salaries and assist DPA, as appropriate, in so doing.

Summary

The California Highway Patrol strives to provide the very best in service to the public in California. As such, we embrace the recommendations provided by the Bureau of State Audits and will immediately embark on the actions necessary to implement those recommendations.

COMMENT

California State Auditor's Comment on the Response From the California Highway Patrol

To provide clarity and perspective, we are commenting on the California Highway Patrol's (CHP) response to our audit. The number corresponds to the number we have placed in CHP's response.

- Although we conclude on pages 45 to 47 that the CHP answered significantly more calls per dispatcher than local answering points, we do not conclude in our report that the CHP is not staffed appropriately to be able to answer 911 calls within 10 seconds. In fact, on pages 47 to 48 we state that disparities in staffing do not fully explain the wide range in wait times at the nine CHP centers. Accordingly, we recommend that the CHP identify practices that enable some centers, such as Orange County, to answer 911 calls promptly despite high ratios of calls per dispatcher, and determine if other centers could adopt the practices. Furthermore, we point out on pages 50 to 52 that the CHP does not have a benchmark for the number of staff needed to answer calls within the State's 10-second goal to answer 911 calls.

cc: Members of the Legislature
Office of the Lieutenant Governor
Milton Marks Commission on California State
Government Organization and Economy
Department of Finance
Attorney General
State Controller
State Treasurer
Legislative Analyst
Senate Office of Research
California Research Bureau
Capitol Press