

# APCO Project



# Evaluating Wireless E9-1-1 System Performance at the PSAP

**A Manual for PSAP/AHJ Managers  
July 2008**

**APCO International**  
*Association of Public-Safety Communications Officials - International, Inc.*





# Project LOCATE

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# WIRELESS E9-1-1 SYSTEM PERFORMANCE AT THE PSAP

## Letter from the Project Chair



As Chair of APCO Project LOCATE (Locate Our Citizens At Times of Emergency) and on behalf of the Project LOCATE Team, I am pleased to present to the Association of Public-Safety Communications Officials (APCO) International Board of Officers, the APCO Executive Council, and the APCO membership the Performance Testing Guide for the PSAP.

With funding from the Public Safety Foundation of America (PSFA), and with knowledge gained from the performance tests in ten Public Safety Answering Points (PSAPs) across the country and discussions with the wireless service providers, this Performance Testing Guide for the PSAP is designed to increase the Public Safety Answering Point Managers' understanding of the need to conduct performance testing and to better evaluate the value of the location data provided with the Wireless 9-1-1 call. This Guide will also increase the PSAP's ability to manage the wireless calls received in their jurisdiction. Further, it is hoped that the Guide will serve to increase the PSAP's ability to deal with public and responder expectations in an effort to more effectively process response to a wireless 9-1-1 call incident.

The Guide outlines benefits of performance testing, provides analysis tools, discusses the importance of appropriate and adequate testing, offers testing methods that are most appropriate for your PSAP, and illustrates examples of various testing levels. The benefits and value of greater understanding of wireless technologies and the ability to understand the location data in the PSAP's jurisdiction are clearly demonstrated among highly effective organizations.

Project LOCATE wishes to thank the PSFA Board of Directors who shared the vision of Project LOCATE and provided the financial support to obtain the results necessary to educate our membership through this Performance Testing Guide for the PSAP.

A special thank you to the PSAPs who have assisted in this project and who have helped to educate us further on the unique applications of testing and allowed us to use their experiences to assist other APCO members.

Thanks also to the Project LOCATE Team members, including staff and subject matter expert consultants, whose unwavering focus demonstrated in this project has been significant. They consistently sought to achieve the highest standards for development of the Performance Testing Guide with their eye on assisting our members and PSAP Managers, call-takers, responders and the public. They have been persistent in their resolve to seek the most illustrative experiences that will assist APCO members in better understanding the need for testing and the tools to assist us do our jobs more effectively for the safety of the public we serve. The APCO membership is truly fortunate to have such dedicated individuals working on their behalf.

Thank you for the opportunity to work with such a fine group of professionals and for the chance to provide our membership with a useful management tool.

*Nancy A. Pallock*

Nancy A. Pallock  
Chair



# Project LOCATE

## **PURPOSE AND BENEFITS**

The Association of Public Safety Communications Officials (APCO), representing the public safety professionals who must promptly and competently process wireless E9-1-1 calls for service has, through Project LOCATE, sought to assist Public Safety Answering Point (PSAP) staff to better understand the value of location data provided at the PSAP, with Phase II wireless E9-1-1 calls for dispatch purposes.

The recommendation of Project LOCATE to conduct PSAP Service Area performance testing is based on the practical benefits to the effective management of wireless E9-1-1 calls. Performance testing, as defined herein, at the PSAP Service Area level is not required of the Wireless Service Provider (WSP) or the PSAP. However, should the PSAP choose to conduct performance testing, this Effective Practice has multiple direct benefits to the PSAP and all those it serves. In its simplest form, performance testing at all levels seeks to determine how useful the location data delivered to the calltaker/dispatcher is for emergency response purposes, when compared to the actual location data.

### **Benefits of Performance Testing Data and Analysis at the PSAP Level**

- Improved understanding that a calltaker/dispatcher may attach to the location data provided with a wireless E9-1-1 call, during instances when the caller cannot adequately describe their location.
- The relationship of the displayed Uncertainty value to the delivered location data.
- Enhanced PSAP calltaker/dispatcher wireless call processing methods
- Improved PSAP Staff training as actual performance understanding develops and as performance parameters modify over time.
- Expanded staff assessment of the advantage of the Rebid process at the designated interval.
- Improved awareness of location data value for dispatch purposes by first responders, who seek to make effective and efficient response decisions necessary to locate the emergency in time to save life and property, reduce suffering, prevent secondary emergency events and minimize unnecessary risk by reducing unwarranted responses.
- Better informed PSAP or Authority Having Jurisdiction (AHJ) executive leadership which supports understanding of how the wireless E9-1-1 systems are actually performing within the jurisdiction.
- Managing the expectations of the public regarding wireless E9-1-1 by a concise and appropriate description of the results from the performance testing effort.
- Providing an ongoing assessment for the PSAP and the WSPs of the operational impact of all deployed wireless 9-1-1 systems.
- Alerting the PSAP to previously unknown problems within the deployed system, including routing decisions as well as PSAP elements, ex: mapping.

The benefits of PSAP/AHJ level performance testing are many. The PSAP, when conducting local testing in accordance within the parameters offered in this document, will be able to evaluate actual performance based upon average consumer use and expectation, under normal conditions and patterns of the PSAP and caller's actual wireless E9-1-1 experience.

This document offers a range of optional methods, varying in the cost and time resources required by the PSAP/AHJ. These methods can be used to assess the performance of wireless location data for dispatching emergency services within the PSAP Service Area. In addition, the results of the performance testing regimen can provide an opportunity to demonstrate for every call taker the influence upon location data created by variances such as, location solution choice, local topography, building structural design and population density within the PSAP Service Area.

# WIRELESS E9-1-1 SYSTEM PERFORMANCE AT THE PSAP

## **PURPOSE AND BENEFITS (cont.)**

It is understood that there is a joint responsibility of the PSAP/AHJ and the WSP to educate their collective customer that they need to be better prepared when they make a wireless E9-1-1 call because, due to a variety of factors, the location technology may not always provide useful data for locating them in times of crisis.



# Project LOCATE

## DEFINITIONS

1. **PSAP/AHJ Performance Testing** is not accuracy testing for the purpose of assessing compliance with the current Federal Communications Commission (FCC) standards. The purpose of Performance Testing is to assess the delivery of location data from a wireless E9-1-1 call via the existing Wireless Service Provider (WSP) s deployed system, through to the PSAP, as captured in the Automatic Location Information (ALI) data display at a workstation. It further seeks to document the variance of the actual, delivered location data by measuring the difference between a location data determined by existing baseline map data or other typical survey methods or a differential GPS receiver and the location data actually presented to the PSAP, both initially and upon Rebid.
2. **Test Points** are specific locations from which test calls per WSP shall be made throughout the PSAP service area. The identification and designation of such specific test points requires documentation of the “known location value” or ground truth of the designated Test Point. It is recommended that multiple Test Points be designated and that these test points legitimately reflect the variable topography and typology within PSAP service area. Ground truth is used herein to define the processes by which the estimated location in terms of latitude and longitude of a location by remote processes is verified through various measurement efforts at the actual location. More Information in Test Points is provided in Section 2.1.
3. **Geocoding** is a process by which geographic identifiers are assigned (e.g. codes or geographic coordinates expressed as latitude-longitude) to any map features and other data records, such as street addresses.
4. **Test Calls** should only be made from the designated Test Points. Each performance testing occurrence may however, include all or any subset of the total Test Points within the PSAP Service Area. To maximize value of PSAP Level Performance Testing, the test calls should be made in a consistent manner from the assigned Test Point. Test calls should connect to the appropriate PSAP with verification of initial location data and at the appropriate interval, not less than 30 seconds, a Rebid made and the second ALI Data Display verified and collected. If more than one call per WSP is planned, it is important to allow adequate time between calls to allow system components which have “timers” to reset and purge any cached data. More information on Test Calls is provided in Section 2.2.
5. **Static data** are those elements which remain constant per Test Point. Once included on the Documentation Spreadsheet, they can be “fixed” and need not individually be reentered during each testing episode. Examples of Static Data per Test Point can include: test point identification data, ground truth of test point, topology of testing environment, in building or outside building, permanent man-made features, i.e., radio or water tower. More information on Static data is provided in Section 2.4.
6. **Dynamic data** includes those data elements per Test Call per WSP that will be entered on the Documentation Spreadsheet which are observable, subject to change and believed to be relevant to the overall performance testing process. Examples may include: weather (rain, snow, fog, thunder and lightning storm), foliage cover of deciduous trees, time of day, test call phone number. More information on Dynamic data is provided in Section 2.4.
7. **Rebid, Re-Query** is the action taken by the 9-1-1 calltaker to update the ALI data display after a minimum interval of 30 seconds from the first ALI data display to ascertain if there is any mid-call update to the original location data elements.
8. **Data Array** as used herein simply refers to the arrangement of data elements in the summary performance reports created per WSP, for Test Points and Test Calls, per PSAP/AHJ Service Area. It is recommended that such data be arranged and presented in a consistent manner to allow maximum utilization and benefit to the PSAP as well as the WSP.

# WIRELESS E9-1-1 SYSTEM PERFORMANCE AT THE PSAP

## FUNDAMENTALS OF PERFORMANCE TESTING PROCESS

### 1. FUNDAMENTALS OF TESTING PROCESSES

The PSAP Level Performance Testing will produce the most valuable results for assessing actual performance, as determined by what location data is delivered to the calltaker when consistent, well-defined testing procedures are used. The PSAP Performance Testing Process is not intended to confirm or describe accuracy compliance at the PSAP level, but rather provide the PSAP with actual data regarding the usefulness of delivered location data for dispatch purposes. This can be particularly helpful when selected test points represent a wide variety of locations, reflect common wireless E9-1-1 use patterns and mirror normal consumer calling behaviors within the PSAP Service Area.

In all testing processes, the need to identify and control the many variables/conditions that may influence the results is important to the final data, as well as the integrity of the testing process. In addition, the value to the PSAP of being able to discuss the results with the appropriate WSP and determine if incremental improvements can be made in performance, is maximized when a clearly defined, consistent and documented testing program is used.

In every case, well-documented methods and reports of each occurrence of the process should be completed and maintained. It is recognized and accepted that given the differential resources of existing PSAPs, several levels of Performance Testing may be reasonable, each consisting of a minimum set of basic testing processes to ensure data value and competency.



# Project LOCATE

## **2. PERFORMANCE TESTING BASIC ELEMENTS FOR ALL LEVELS**

The PSAP Level Performance Testing process for all levels of such testing should include, at a minimum, the following:

### **2.1 Test Points**

- The identification and designation of specific test points within the PSAP Service Area which have a “known location value” or ground truth in sufficient number (N=X) and which reflect common topography and use patterns is a preliminary requirement. This may include points at existing locations that have been used by others. The Test points may include any safely accessible, confirmed geo-coded reference points within the PSAP Service Area, which have been previously designated by a federal, state, county and local government entity.
- Local educational institutions, military installations, public utility services, local airport authorities and others are likely sources of potential sites with confirmed ground truth latitude and longitude.
- Public safety and other tower locations which have been properly registered with the FCC include required Latitude/Longitude data.
- Local highway departments and private survey service providers are also likely to have known fixed location points that have an established ground truth through professionally accepted means.
- The designated Test Point must allow access for the period long enough to make all the desired Test Calls per WSP.
- In addition, location points derived from the development of public safety and service base mapping which consistently have a location error of less than 10 meters may be used as reference points as well. This capability is, however, limited to those PSAPs that have documented the verification of such information regarding the actual relative ground position to displayed map locations.

### **2.2 Test Calls**

- All Test Calls should be fully documented, providing a fair assessment of the completed call, both generally and specifically, at the time of call.
- Test Calls should be made using devices commonly available to the consumer of the WSP service being tested, with no supplemental equipment to enhance or inhibit the performance of the device.
- Test Calls should be made from the same position relative to the Test Point during each testing episode for each WSP.
- Test Calls should be made only when available signal strength is adequate to allow the voice portion of the Test Call to be completed.
- Dropped calls or calls which are not clearly audible to the caller or the PSAP should be documented, but not used to assess the performance of deployed systems for location data purposes.
- Test Calls should, to the degree possible, mimic normal consumer use patterns, including such things as the position of the device adjacent to and within vehicles, if applicable and documented.

For Test Calls made from inside buildings, the PSAP should develop baseline data supporting the percentage of inside building calls versus outside calls within the PSAP Service Area. In the absence of such data, the nominal inside building test call parameter is 5%.

# WIRELESS E9-1-1 SYSTEM PERFORMANCE AT THE PSAP

## 2. PERFORMANCE TESTING BASIC ELEMENTS FOR ALL LEVELS

### 2.3 Documentation of Test Calls

Test Calls should be made per call and per WSP, each call being assigned a unique identifier (character/number designation). Basic elements per call should include: Test Point ID, Test Phone TN, Time of Call, Time of answer, initial ALI display data (COS, Lat/Log, Unc, Conf) and also the time of Rebid after the appropriate interval, the secondary ALI display data (COS, Lat/Log, Unc, Conf), the overall length of the call, which should not be less than 60 seconds. The actual test Call location data should be shown as well as any deviance in meters. Additional fields for comments ref environmental, equipment, specific use data are suggested as well.

PSAPs which use a synchronized timing device for on premise equipment (ex: Netclock) should note that in the comment field.

- Documentation per Test Call, per WSP, should include appropriate descriptive information, arranged in a manner which allows prompt review and correlation/comparison of both static and dynamic data elements.
- A separate field report form per WSP is recommended.
- Test Point and Test Call Data may be either static or dynamic.
- Test Point specific identification data, which may be referenced by a unique number or character designation, has a set of static elements which includes the reference point location data and source.
- A comment field should be included in documentation per call/per WSP for free text entry of notes concerning the test call, the calling environment, routing, and/or call experience issues.

A sample Test Call Documentation Spreadsheet is in the Appendices.



# Project LOCATE

## STATIC AND DYNAMIC TEST POINT DATA

### **2.4 Static and Dynamic Test Point Data**

For each Test Point selected for use in Performance Testing, some descriptive elements will remain constant (static) and some will change (dynamic) per testing occurrence. Elements which are believed to be relevant to the overall performance by a WSP should be included in the testing data or offered as comments in the per test occurrence report.

#### **2.4.1 Static**

Data may include such information as rural, urban, suburban, highway, indoor building, and building structure type as well as natural environmental features ex: mountains, hilltop, valley, river or lake.

In addition, man-made environmental features such as high tension transmission lines, commercial radio or television towers etc. can be listed separately or included in the Test Point specific identification data and remain part of the regular Performance Testing Report. Cell telephone number.

#### **2.4.2 Dynamic**

- Test data elements may include, test call date and local time clearly noted ex: 11:15am or 1115 hours, Central Standard Time. Test call device ID number and telephone number (TN). Atmospheric conditions as observed ex: clear, cloudy, rain, snow, fog.
- Foliage coverage level as applicable.
- Test data as successfully delivered to the appropriate PSAP staff and console position data and trunk number if appropriate.
- Test Calls that are misrouted should be noted for further review and inquiry.
- Time of Rebid and results for analysis.
- Test data as recorded within any event/incident number as assigned at the PSAP for record retrieval purposes.
- The presentation of the overall data for all testing should be in a consistent format for every call and each performance testing episode.

# WIRELESS E9-1-1 SYSTEM PERFORMANCE AT THE PSAP

## **PERFORMANCE DATA REVIEW and ANALYSIS**

### **2.5 Performance Data Review and Analysis**

The value of all performance testing is greatest for the PSAP Staff. A thorough review and analysis affords the PSAP Manager the opportunity to determine the relationship of multiple variables and actions which can influence the ultimate usefulness of the delivered location data associated with wireless E9-1-1 calls.

A regular review of the relationship between Uncertainty and both the initial presentation of location data and the post Rebid has significant influence on operational decision making and dispatch of appropriate services. The potential exists for the Uncertainty value to become the best indication of the usefulness of the location data at the PSAP. Consistent testing processes, appropriate timing of Rebid as well as subsequent calls per carrier must however be observed during each testing occurrence.

- Review of the Test Call data as compared to the location data actually delivered to the PSAP, based upon the event/incident record, created at the time of the successful test call should be completed in a timely manner.
- The Confidence value, which may or may not be shown at the PSAP, and the Uncertainty value assigned to the location data per call by the WSP should also be included in the data array. It will be important to verify if these values are included and how they appear in the ALI display.
- Specific notation of the Rebid time and the result should also be in the PSAP event record and added to the assembled data summary.
- The Data Review documentation should include specific reference to whether or not a synchronized timing protocol or equipment is in place at the PSAP.
- The Test Call data should be presented fully and then the actual performance data as delivered and documented. This allows a clear comparison of the known location data and the delivered location estimate by the WSP.
- The PSAP may elect to create an additional, abbreviated version of the Test Call report with an analysis of performance gap per test call.
- As data is collected over time the potential exists for performance trends to be identified; these generalizations may be helpful but each must be tempered with a clear explanation of the variables influencing the apparent trend. For example, heavy foliage during the summer versus light foliage during winter testing.
- The PSAP should consider adding a column to the testing analysis spreadsheet which offers one of three choices as to the value for dispatch purposes of the final location data provided to the PSAP with each Test Call based upon the degree of error. Simply the words helpful, fairly helpful, not helpful are recommended. The PSAP should have a value defined for each such notation to facilitate consistent characterization over time, ex: helpful is +/- X meters.

Sample test data and a review analysis can be found within the Appendices.



# Project LOCATE

## **3. PERFORMANCE TESTING APPROACHES**

The PSAP/AHJ that decides to conduct Performance Testing may be of any size and need only be the primary PSAP serving the designated PSAP Test Area for wireless E9-1-1 calls. The benefits from the valuable lessons learned from assessing actual performance of the deployed wireless E9-1-1 systems and its impact on dispatch, staff training and the understanding of wireless E9-1-1 are truly applicable to every PSAP.

Every PSAP/AHJ should be able to conduct some level of performance testing. The testing effort, when properly conducted will provide the PSAP/AHJ useful information regarding the location data delivered to the calltaker/dispatcher is for emergency response purposes, when compared to the actual location data.

PSAP/AHJ level performance testing is not intended to be used to evaluate the level of WSP compliance with existing (FCC) rules. At present, there is no requirement upon any WSP to meet the current FCC location parameters at the PSAP/AHJ level.

Wireless Performance Testing is not required at the PSAP level and the cost of such testing may or may not be recoverable by either the PSAP or the WSP which is clearly based on state specific legislation. The value of performance testing is primarily to the PSAP, local first responders and the certainly the public. Performance testing provides all these groups the opportunity to learn about how wireless service is actually working within their community.

It is reported that wireless E9-1-1 calls account for at least half of the 200 million 9-1-1 calls made annually. While many callers can offer an adequate description of their location, the callers that do not know their location in an emergency, create a significant challenge for any PSAP. Therefore, knowing the actual capability of the deployed E9-1-1 systems within any PSAP Service Area becomes extremely important as it is directly related to providing a more effective response.

This regularly monitored performance information should become part of PSAP staff initial pre-service and in-service training. The same information can assist first responders better understand why the reported location of any event may differ from the actual location, and such deviation may change across the PSAP Service Area. Executive decision makers will benefit as well, as they begin to understand the fundamental difference in the capability of wireline versus wireless E9-1-1 services. Finally, when properly managed, the performance of wireless E9-1-1 can improve the ability of the public to better understand how wireless E9-1-1 actually works, as well as the reasons that it does not match the location standards of wireline E9-1-1. Creating public awareness of the need to take a more proactive role in reporting the location of the emergency has additional value to the PSAP/AHJ as other technologies emerge that may also provide access to 9-1-1.

# WIRELESS E9-1-1 SYSTEM PERFORMANCE AT THE PSAP

## 3.1 PSAP Performance Testing Levels

While performance testing is not required, if the PSAP chooses to conduct such testing for the plethora of benefits already mentioned, it is the responsibility of the PSAP to conduct testing in a fair and consistent manner.

This will require a commitment of financial, personnel and technological resources. However, Project LOCATE believes the defined, differential levels of performance testing can provide benefits to every PSAP taking wireless E9-1-1 calls. The proposed Levels of Performance Testing seek to respect the fact that every PSAP has resource availability problems.

Accordingly, Project LOCATE offers three levels of PSAP Performance Testing processes which may be described as Level 1, Level 2 and Level 3. In determining the appropriate Level of Testing at a particular PSAP, consideration must be made for the relationship between the 9-1-1 Service Provider, Local Exchange Carrier(s) and the Wireless Service Providers within the PSAP Service Area. These three entities all share in the determination of how location data will appear to the PSAP. Understanding the role of each party facilitates resolution of issues raised that may be related to the other parties.

Performance Testing Levels differ in the number of Test Points used in the regular testing effort based upon availability. The basic principles remain the same regardless of the Level of performance testing utilized. In the event of apparent recurring anomalies or degraded results, additional test points may be warranted throughout the service area.

## 3.2 Level 1 Performance Testing

Every PSAP should be able to accomplish and benefit from Level 1 PSAP Performance Testing. The goal of such testing remains the same for this and all levels, to allow a comparison of known data (Test Point dataset) to delivered data (ALI data display) at the PSAP for determining what, if any, degree of error exists between the two data sets based upon a specific wireless E9-1-1 call. Essentially, the PSAP will be able to assess what is being delivered to the calltaker as opposed to what is recorded as the actual location data associated with a specific Test Point, per WSP, on the date of the Test Call.

The difference between Level 1 and other Levels is the availability and quantity of known Test Points within the specific PSAP/AHJ Service Area. The benefits of performance testing should not be denied to a PSAP/AHJ which has Phase 2 Wireless Service capability but may not have a robust base map, adequate staff to conduct such testing or the funds to contract with a third party to conduct such testing.



# Project LOCATE

## Level 1 Performance Testing

### TEST POINTS

At Level 1, the PSAP may elect to use existing survey points within the PSAP Service Area as the Test Points (as defined within Performance Testing Basic Elements for All Levels, Section 2). The Test Points may be survey points, with a documented latitude/longitude accurate within 10 meters, created for another reason by the highway department, USGS, USDA, county airport authority, tower site installations and other such applications. The number of such points may be limited. However, the value of even a limited number of Test Points to assess baseline performance over time by different WSPs is not necessarily diminished by a smaller sample or Test Points. At least 12-15 Test Points within the PSAP/AHJ Service Area should be established.

### TESTING FREQUENCY

The Level 1 process allows the PSAP to regularly, at least monthly, assess the deployed system performance of each WSP and with the appropriate documentation of Test Calls (as defined within Performance Testing Basic Elements for All Levels, Section 2) a set of historical data can be developed. The attention given to both static and dynamic elements can also serve to indicate potential trends, anomalies, recurring performance variances, as well as value for dispatch purposes of the delivered per call location data.

### TESTING DOCUMENTATION

The maintenance of consistent Test Call data, as well as Data Analysis and Review processes (as defined within Performance Testing Basic Elements for All Levels, Section 2) will benefit the PSAP regardless of size, as well as the first responders, the public and the WSP.

### COMMUNICATION WITH CARRIERS

Project LOCATE encourages the PSAP to make contact with all the WSPs offering Phase 2 wireless E9-1-1 capability within the PSAP Service Area to report any substantial degradation of service noted, since despite the best efforts of these providers, elements of the specific deployed system can fail, be subject to damage or misalignment which may be unknown to the WSP.

## 3.3 Level 2 Performance Testing

Level 2 of PSAP Performance Testing also relies upon the guidelines within this manual that reinforce the need for consistent, well-defined testing procedures and documentation. At this level, the PSAP should have additional resources to commit to the performance testing effort including a well developed and maintained base map, access to competent geographic information systems (GIS) staff support as well as a mapped ALI system or computer aided dispatch (CAD) system.

# WIRELESS E9-1-1 SYSTEM PERFORMANCE AT THE PSAP

## Level 2 Performance Testing

### TEST POINTS

At Level 2, the PSAP has the ability to establish Test Points, create the accompanying dataset and use the CAD event record of the Test Call to provide the ALI Display data and document the Rebid process and secondary results. At this level, the total number of Test Points may be greater than that at Level 1. It is also likely that such PSAP Service Areas will have multiple environments from which to make Test Calls as part of the regular, at least monthly, performance testing regimen.

A minimum of 25 Test Points from a potential array of 50 or more should be used at Level 2. To maximize the benefit of monitoring deployed system performance per WSP over time, alternate Test Points from within the same general environment may be used, but only when any additional variables not heretofore defined or explained can be controlled. Each Test Point is a unique location, specifically defined as a source of Test Calls. Failure to maintain consistency of the Test Points used may reduce the value of the Performance Testing conducted at the PSAP level, especially if performance trends are being evaluated.

### TESTING FREQUENCY

The Level 2, as with Level 1 process, suggests the PSAP at least monthly or as often as resources allow, assess the deployed system performance of each WSP and with the appropriate documentation of Test Calls (as defined within Performance Testing Basic Elements for All Levels, Section 2) a set of historical data can be developed. The attention given to both static and dynamic elements can also serve to indicate potential trends, anomalies, recurring performance variances, as well as value for dispatch purposes of the delivered per call location data.

### TESTING DOCUMENTATION

The documentation of Test Calls while consistent with that of the Level 1 may also be enhanced if GIS staff actually participates in the testing process. Graphic representation of the known versus delivered data can be helpful in training and public information sessions.

### COMMUNICATION WITH CARRIERS

As with all the performance testing levels offered here, the PSAP wireless E9-1-1 coordinator should make contact with the appropriate WSPs to report that performance testing is being conducted, distinguishing it from compliance testing and report findings that strongly indicate any anomaly within the deployed system per test episode or over time. The PSAP should anticipate that the WSP and/or their Third Party partner will have questions.



# Project LOCATE

## Level 3 Performance Testing

### 3.4 Level 3 Performance Testing

Project LOCATE included in its Final Report of April, 2007 entitled: An Assessment of the Value of Location Data Delivered to PSAPs with Enhanced Wireless 9-1-1 Calls, found at [www.APCOProjectLOCATE.org](http://www.APCOProjectLOCATE.org), a description of PSAP Level 3 Performance Testing being conducted by the Bexar Metro 9-1-1 District.

This level of testing meets the definition offered here of Level 3 Performance Testing. The summary purpose of this level of testing is to ensure the successful end-to-end delivery of a E9-1-1 call and location delivery capabilities originating from all wireless networks serving the area. The program seeks to provide a means to evaluate the overall operational ability of each wireless 9-1-1 network on a continuing basis.

This level of testing expands the elements under review and assessment to include functionality beyond the actual location data delivered within the PSAP/AHJ. Test Call data is evaluated for correctness of routing and location data, cross checked against a well maintained Master Street Address Guide (MSAG), GIS address interpolation, aerial photography and field verification.

In this level of performance testing, the primary objective is to verify the operational capability of each WSP's network through a series of test calls placed from each cell sector. In addition to location data usefulness, network issues adversely impacting E9-1-1 services and call quality are documented. Conditions that are noted per Test Call include blanking, busy signals, voice/transmission degradation and service outages.

The level of resource commitment by this entity is significant and is not expected to be emulated by all PSAP/AHJs across the country. However, the power of the information derived from this type of process affords such agencies exceptional understanding of how the deployed systems operate within their large service area. Agencies that have this level of resources are encouraged to participate in PSAP Performance Testing at this level.

### TEST POINTS

In this sample of Level 3 Performance Testing, the entity relies upon their access to over 200 survey grade monuments within the agency multiple PSAP Service Areas. At least one such monument is included in every testing episode.

In addition, the entity can create its own Test Points, establishing a reference ground truth by using a Trimble AG-114 Differential GPS (D-GPS) or equivalent receiver certified as accurate within 3.28 feet 90% of the time. The receiver is pre-set to prevent the field technician from logging a control point if the Position Dilution of Precision (PDOP) exceeds 4 or fewer than 5 satellites are in view.

# WIRELESS E9-1-1 SYSTEM PERFORMANCE AT THE PSAP

## Level 3 Performance Testing

### TESTING FREQUENCY

Level 3 testing should be completed no less than monthly; more frequent subset testing may be more appropriate based on resources needed.

### TESTING DOCUMENTATION

Basic Testing Data should be reported as cited in other Levels of Testing. In Level 3 testing, additional data fields and analysis is required based upon additional call routing, cross checking of X,Y as displayed against MSAG and GIS Files and current wireless facility data.

### COMMUNICATION WITH CARRIERS

As with all the performance testing levels offered here, the PSAP wireless E9-1-1 coordinator should make contact with the appropriate WSPs to report that performance testing is being conducted, distinguishing it from compliance testing and report findings that strongly indicate any anomaly within the deployed system per test episode or over time.

### 3.5 Contacting the Wireless Service Provider (WSP)

The PSAP/AHJ conducting Performance Testing as described in this document can achieve the status of full partner in the effective management of wireless E9-1-1 within the PSAP Service Area. Using well defined data derived from a consistent and competent testing processes, the PSAP/AHJ will find the WSP willing to participate in an effort to make improvements, within current regulatory and technical boundaries.

The PSAP Manager should expect the WSP to ask some basic entry level questions about the performance as noted by the PSAP. Generally, the WSP will make inquiry concerning:

1. What is the issue?
2. What is the nearest mile marker of cross street which you are identifying the area in question?
3. What is the normal experience at this location?
4. When did you first notice the change?
5. Have you made any changes to your tools (network, CPE, testing equipment or interface or to the selective router since you last experienced the area performing as normally expected?

The PSAP which has developed credible historical data of actual performance will be in the best position to answer these questions as well as assist in determining what improvements may be possible within the PSAP Service Area.



# Project LOCATE

## PERFORMANCE TESTING AND MANAGEMENT

### **4. PSAP SERVICE AREA PERFORMANCE TESTING AND MANAGEMENT**

#### **4.1 Management of Wireless E9-1-1 by the PSAP**

The PSAP or the AHJ should accept the continuing responsibility to manage wireless 9-1-1 in the following manner:

- Designate a Wireless 9-1-1 Coordinator as recommended in the APCO Project LOCATE, Effective Practices;
- Review the existing Alliance for Telecommunication Industry Solutions (ATIS) and Emergency Services Interconnection Forum (ESIF) documentation at [www.atis/esif](http://www.atis/esif) for the numerous wireless related issues and standards that exist today;
- Take steps to effectively manage the expectations of PSAP staff, first responders and the public as related to their assumed parity between wireline and wireless E9-1-1 capability;
- Actively participate in the monitoring of the actual performance of deployed systems, continuing to inform the public and responders of actual performance;
- Contact the appropriate WSP when issues, questions and concerns arise regarding service and maintain a relationship with the providers.

# WIRELESS E9-1-1 SYSTEM PERFORMANCE AT THE PSAP

## REFERENCES

### APPENDICES/REFERENCES/BIBLIOGRAPY

The Appendices include appropriate reference material for additional information as well as examples of selected documents. In addition, future information is available on the Project LOCATE website: [www.locatemodelcities.org](http://www.locatemodelcities.org)

- A. Regulatory Review and Summary – Wireless E9-1-1
- B. Wireless Accuracy Testing Information
- C. Summary and citation for ATIS 0500010 Maintenance Testing
- D. Level 1 Testing example – Central EMS, Fayetteville, AR.
- E. Level 2 Testing example – Jasper County ESB, Carthage, MO.
- F. Level 3 Testing example – Bexar Metro, San Antonio, TX.
- G. Rebid Statement from EP Guide
- H. PSAP Testing EPs from Guide
- I. Sample Test Point and Test Call data spreadsheet



# Project LOCATE

## APPENDIX A: REGULATORY REVIEW AND SUMMARY

### Current Compliance Testing Requirements and Issues:

The Federal Communications Commission (FCC) has established accuracy requirements for network and handset based location solutions for Enhanced 9-1-1 emergency call services. These requirements are cited here and can be found in more detail within the Commission's Third Report and Order, adopted September 15, 1999.<sup>1</sup>

Phase II location accuracy and reliability:

- (1) For network-based technologies: 100 meters for 67 percent of calls, 300 meters for 95 percent of calls;
- (2) For handset-based technologies: 50 meters for 67 percent of calls, 150 meters for 95 percent of calls;
- (3) For the remaining 5 percent of calls, location attempts must be made and a location estimate must be provided to the appropriate PSAP.

Public safety should recognize that current compliance testing requirements may be legitimately fulfilled by the wireless service provider (WSP) across a wide area, to include its national footprint. Such compliance practices may also include the weighting and averaging of results. This practice should be fully understood by all PSAP managers, since while meeting the present parameters for compliance with the existing FCC rules for accuracy testing, the location data actually delivered for Phase 2 wireless calls to each appropriate Public Safety Answering Point (PSAP) may not be consistently within these estimated ranges.

It is important for every PSAP or Authority Having Jurisdiction (AHJ) to assess the actual performance of the deployed system by each WSP within the local PSAP Service Area. This data can be critical to the effective dispatch of emergency services. Further, since the accuracy compliance test data is not made available to the corresponding PSAPs within the testing footprint defined by the WSP, the specific performance of the system related directly to callers and the PSAP which receives the call is unknown to the PSAP/AHJ.

On September 20, 2007, the FCC again revised its rules and ordered a phased plan to have compliance testing conducted based upon the boundaries of the PSAP/AHJ requesting Phase 2 service. The benchmarks of this most recent Order are provided here and can be fully reviewed within the Order at [www.fcc.gov](http://www.fcc.gov). See specifically: Wireless E9-1-1 Location Accuracy Requirements (PS Docket No. 07-114); In the Matter of Revision of the Commission's Rules to Ensure Compatibility with Enhanced 9-1-1 Emergency Calling Systems (CC Docket No. 94-102); Association of Public-Safety Communications Officials-International, Inc. Request for Declaratory Ruling; 9-1-1 Requirements for IP-Enabled Service Providers (WC Docket No. 05-196), Report and Order.

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<sup>1</sup> Revision of the Commission's Rules to Ensure Compatibility with Enhanced 9-1-1 Emergency Calling Systems, CC Docket No. 94-102, Third Report and Order, 14 FCC Rcd 17388, 17417-23 ¶ 66-77 (1999) (adopting the current version of Section 20.18(h)).

# WIRELESS E9-1-1 SYSTEM PERFORMANCE AT THE PSAP

These benchmarks consist of the following:

- By September 11, 2008 – one year from the date of adoption of this Order – each carrier subject to the rule must satisfy the location accuracy requirements of Section 20.18(h) within each Economic Area (EA) in which that carrier operates.
- By September 11, 2009 – each carrier subject to the rule must file with the Commission a report describing the status of its ongoing efforts to comply with Section 20.18(h) of the Order.
- By September 11, 2010 – three years from the date of adoption of this Order – each carrier subject to the rule must (1) satisfy the location accuracy requirements of Section 20.18(h) within each Metropolitan Statistical Area (MSA) and Rural Service Area (RSA) in which that carrier operates; (2) demonstrate PSAP-level compliance with Section 20.18(h) within at least 75% of the PSAPs the carrier serves; and (3) demonstrate accuracy in all PSAP service areas within at least 50% of the applicable location accuracy standard. In other words, a carrier subject to the accuracy standard for handset-based technologies in Section 20.18(h)(2), which is 50 meters for 67 percent of calls, must achieve location accuracy of 75 meters for 67 percent of calls in all PSAPs in order to comply with this requirement.
- By September 11, 2011 – four years from the date of adoption of this Order – each carrier subject to the rule must file with the Commission a report describing the status of its ongoing efforts to comply with Section 20.18(h).
- By September 11, 2012 – five years from the date of adoption of this Order – each carrier subject to the rule must be in full compliance with Section 20.18(h) at the PSAP service area level.

**United States Court of Appeals for the District of Columbia, N. 08-1069, dated March 25, 2008.**

- Motion for Stay of execution of the FCC Orders cited above is issued. The Motion to Stay the Execution of the FCC Order was based on both substantive and procedural issues. The U.S. District Court issued a single page statement. The text of the statement is cited below.

*Movants seek a stay of the FCC's Order imposing E911 requirements for wireless carriers. Movants raise both substantive and procedural objections to the FCC's Order. We need not address the substantive issue, however, because the movants have demonstrated a likelihood of success based on the Order's procedural irregularities - in particular, the serious problems with the notice. Because the other requirements for a stay are also satisfied, the motions for stay are granted.*



# Project LOCATE

## APPENDIX B

## Wireless Accuracy Testing Information

- **General Guidance for Wireless Compliance Testing**  
The general guidelines for compliance testing of deployed systems may be found within the FCC Office of Engineering and Technology Bulletin, 71.  
See: [www.fcc.gov](http://www.fcc.gov)
- **ATIS 05 000001 Accuracy Testing Standard**  
In response to the FCC established accuracy requirements for network and handset based location solutions for Enhanced 9-1-1 emergency call services (found in the Commission's Third Report and Order, adopted September 15, 1999). The Alliance for Telecommunication Solutions thru the Emergency Services Interconnection Forum (ESIF) has published the above standards as the industry accepted requirements for testing accuracy performance of Wireless E9-1-1 Phase 2 systems. This document provides a common frame of reference that individual stakeholders can use to validate the accuracy methodology of 9-1-1 location technologies.  
See: [www.atis.org/esif](http://www.atis.org/esif)
- **APCO Project LOCATE Final Report – An Assessment of the Value of Location Data Delivered to PSAPs with Enhanced Wireless 9-1-1 Calls**  
This Report provides a complete description and summary of results obtained during the performance testing efforts of Project LOCATE at selected PSAPs across the country in 2005 and 2006. Additional references are contained in the Report.  
See: [www.APCOProjectLOCATE.org](http://www.APCOProjectLOCATE.org)
- **APCO Project LOCATE Wireless 9-1-1 Deployment and Management Effective Practices Guide**  
This Report includes specific "Effective Practices" for PSAP Level Performance Testing as well on going management of deployed wireless systems.  
See: [www.locatemodelcities.org](http://www.locatemodelcities.org)

# WIRELESS E9-1-1 SYSTEM PERFORMANCE AT THE PSAP

## APPENDIX C

### ATIS 0500010 Maintenance Testing

Through the ESIF process, a standard entitled Maintenance Testing was adopted. The purpose of defining the requirements and testing regimens necessary when conducting any testing to verify current issues regarding wireless accuracy as well as end to end testing, post implementation of Phase 1 or Phase 2 wireless service.

As used within the context of this standard, end to end testing consists of monitoring the delivery of the location data from the WSP through to the PSAP. This testing activity seeks to verify and validate that there is appropriate interoperability between the WSP and the Emergency Service Network.

The Maintenance Testing Standard is provided by citation and is recommended reading since the standard offers multiple examples of maintenance triggers which would likely require Maintenance Testing as defined.

See: <http://www.atis.org/esif>



# Project LOCATE

## APPENDIX D EXAMPLES OF TESTING LEVELS - LEVEL 1

### LEVEL 1 Testing Site

Central EMS  
 645 S School Ave  
 Fayetteville, AR 72701  
 LOCATE Contact Person: Steve Harrison and Samantha Paul

Washington County is one of 75 counties in Arkansas. The county had an estimated population in 2007 of 194,292 living within a total area of 952 square miles which includes the City of Fayetteville as the seat. Central EMS receives 9-1-1 calls from Primary PSAP, creates an event, and processes the call for service. In calendar year 2007, Central EMS reported that 68% of the calls they handle are from wireless phones. Wireless Phase II Service is provided by Sprint/Nextel, AT&T, Alltel and Verizon.

They had not conducted any performance testing prior to being contacted by Project LOCATE in May, 2008. A sample of the results of their initial performance testing effort, following the LEVEL 1 Test Site parameters appears here.

All Test Calls made from same location, outdoors with sunny skies noted in record.

TP	WSP	Call	Date	Time	COS	UNC	CNF	LAT	LONG	ERROR	COMMENT
5	100	I-1	5/22/08	1705	1	1709	100	36.17092	94.239178	6533.5	WPH 1 first
5	100	R-1	5/22/08	1706	2	36	95	36.11463	94.260635	16.5	Value of Rebid
5	200	I-1	5/22/08	1708	2	443	95	36.11396	94.259906	96.1	WPH2
5	200	R-1	5/22/08	1709	NRF					N/A	Rebid NRF
5	300	I-1	5/22/08	1712	1					N/A	Hwy 16 Tower NE
5	300	R-1	5/22/08	1713	2	164	90	36.11464	94.260656	17.8	Value of Rebid

NOTE: WSP 400 had no successful calls from this location. A second and third call to each of the other three providers, with intervals of 10 and 15 minutes respectively did not produce like results. In some cases the results were better while other results were worse than the first call.

# WIRELESS E9-1-1 SYSTEM PERFORMANCE AT THE PSAP

## APPENDIX E

## EXAMPLES OF TESTING LEVELS - LEVEL 2

### LEVEL 2 Testing Site

Jasper County Emergency Services Board  
 13870 Dispatch Lane  
 Carthage, MO. 64836  
 LOCATE Contact Person: Rich Nordell and Mike Runnebaum

Jasper County is located in Southwest Missouri, shares a common border with Kansas, Oklahoma is just minutes away and Arkansas is less than an hour. The County is crossed by Interstate Highway 44 (E/W) and US 71 (N/S). The resident population of 110,624 swells to over 350,000 as a daily service population.

Jasper County was one of the PSAP test areas for Project LOCATE's assessment of the value of Location Data delivered to the PSAP with Enhanced Wireless 911 Calls in 2005 and 2006. At that time 70% of all 9-1-1 calls processed at the County 9-1-1 Center were wireless.

Wireless Phase II Service is provided by Sprint/Nextel, AT&T Mobility, US Cellular, Verizon, and T-Mobile. A sample of the results of their initial performance testing effort, following the LEVEL 2 Test Site parameters appears here.

Loc	WSP	Call	Date	Time	COS	UNC	CNF	LAT	LONG	ERROR	COMMENT
7	100	1-I	4/30/08	1401	2	201	90	37.1977	94.464	115	Arrived as WPH2
7	100	1-R	4/30/08	+:30	2	121	90	37.0776	94.4777	13501	worse than initial call
	200	1-I	4/30/08	1405	1	12709	0	37.2618	94.4321	7554	
7	200	1-R	4/30/08	+:30	2	16	63	37.1985	94.4641	34	Rebid important
7	300	1-I	4/30/08	1408	1	15380	100	37.2002	94.4752	1010	Arrived as WPH1
7	300	1-R	4/30/08	+:30	2	32	95	37.1988	94.4637	21	Rebid important
7	400	1-I	4/30/08	1411	2	28	95	37.1987	94.4641	16	Arrived as WPH2
7	400	1-R	4/30/08	+:30	2	28	95	37.1987	94.4641	16	Remained the same
7	500	1-I	4/30/08	1413	2	0	0	37.1965	94.4686	484	Arrived as WPH2
7	500	1-R	4/30/08	+:30	2	0	0	37.1965	94.4686	484	no change on rebid



# Project LOCATE

## APPENDIX F

## EXAMPLES OF TESTING LEVELS - LEVEL 3

### LEVEL 3 Testing Site

Bexar Metro 9-1-1 Network District  
203 W Nueva, Rm. 309  
San Antonio, TX 78204  
LOCATE Contact Person: Brett Schneider

Bexar County is located in South Central Texas. The county seat of Bexar County and its largest city, is San Antonio. Bexar County has an area of 1,248 square miles and a resident population of 1,493,965 (2005)

Bexar County was one of the PSAP test areas for Project LOCATE's assessment of the value of Location Data delivered to the PSAP with Enhanced Wireless 911 Calls in 2005 and 2006. At that time 55% of all 9-1-1 calls processed were wireless

Wireless Phase II Service is provided by Sprint/Nextel, AT&T Mobility, Verizon, and T-Mobile. A sample of the results of their initial performance testing effort, following the LEVEL 3 Test Site parameters appears here. [See also LOCATE Final Report on Location Data.](#)

# WIRELESS E9-1-1 SYSTEM PERFORMANCE AT THE PSAP

DATE	TEST LOCATION	MAP	WSP	CELL ID	SECTOR	GPS Y	GPS X	ALI LAT	ALI LONG	COS	REBIDS	UNC	CNF	PSAP SERVICE AREA	ACCURACY	PASS/ FAIL
4/7/08	Hillburn / Clegg	648C8	1	53	SE	29.35164	-98.60115	29.35163	-98.60115	WPH2	1	36	95	SAPD	1.21	P
4/7/08	Hillburn / Clegg	648C8	2	1333	SE	29.35164	-98.60115	29.352014	-98.60156	WPH2	1	98	90	SAPD	56.62	P
4/7/08	Hillburn / Clegg	648C8	3	169	SE	29.35164	-98.60115	29.351553	-98.60126	WPH2	1	11	6	SAPD	14.94	P
4/7/08	Hillburn / Clegg	648C8	4	404	S	29.35164	-98.60115	29.351692	-98.60130	WPH2	1	25	9	SAPD	15.41	P
4/7/08	Hillburn / Clegg	648C8	5	2711	W	29.35164	-98.60115	29.351639	-98.60120	WPH2	2	36	0	SAPD	4.41	P
4/7/08	Hillburn / Clegg	648C8	6	50	SE	29.35164	-98.60115	29.351702	-98.60143	WPH2	1	25	95	SAPD	27.72	P
4/7/08	Hillburn / Clegg	648C8	7	83	SE	29.35164	-98.60115	29.351831	-98.60105	WPH2	1	79	90	SAPD	22.69	P
4/7/08	Loop 1604 / Cooper	519A3	1	21	SW	29.60189	-98.38497	29.601792	-98.38488	WPH2	1	21	95	SAPD	13.63	P
4/7/08	Loop 1604 / Cooper	519A3	1	21	SW	29.60189	-98.38497	29.602124	-98.38499	WPH2	1	51	95	SAPD	25.83	P
4/7/08	Loop 1604 / Cooper	519A3	2	1314	SW	29.601897	-98.384974	29.602253	-98.384971	WPH2	1	80	90	SAPD	40.01	P
4/7/08	Loop 1604 / Cooper	519A3	2	1314	SW	29.601897	-98.384974	29.602414	-98.385014	WPH2	1	80	90	SAPD	58.04	P



# Project LOCATE

## APPENDIX G Informational Statement Regarding Rebid

### Rebid or Mid Call Location Update

The APCO Project LOCATE Wireless 9-1-1 Deployment and Management Effective Practices Guide provides additional guidance regarding the Rebid process and timing. The Effective Practices specifically recommends a Rebid on every WPH2 wireless call, regardless of the Class of Service (COS) initially reported with the call. Project LOCATE has previously urged the AHJ to not utilize automatic rebids, since in some instances, such action resulted in the temporary loss of voice path between the calltaker/dispatcher and the wireless E9-1-1 caller. As a result of these joint public safety and industry discussions, Effective Practice 380741, was created and approved. Across the nation, the term to describe the action by a calltaker to seek a second location data estimate may vary, Rebid, Re-Query, Re-Inquiry, and others are used.

- 380743 The AHJ should rebid all wireless calls when the wireless caller is not able to provide a location, even if the call is initially presented to the calltaker as a WPH2.
- 380741 The AHJ should not rebid (automatically or manually) less than 30 seconds after the call is first presented to the calltaker. Any subsequent rebids should be at 30-second intervals. If automatic rebid is used, only the first rebid should be automatic.
- 380745 The AHJ should be aware that the exact same latitude and longitude presented after multiple rebids indicates improved location is not available. When rebidding, the calltaker would normally expect a change in latitude/longitude. The calltaker should check the COS, if it is WPH2 and it continues to be the same latitude/longitude, a note should be made of the information and then referred to the WSP.

# WIRELESS E9-1-1 SYSTEM PERFORMANCE AT THE PSAP

## APPENDIX H

## Effective Practices Regarding PSAP Testing

### Performance Testing

The APCO Project LOCATE Wireless 9-1-1 Deployment and Management Effective Practices Guide provides additional guidance regarding PSAP Level Performance Testing which has multiple benefits for PSAP Staff, Responders as well as the public.

- **380781** The AHJ should (in an effort to better understand any potential disparity caused by multiple factors throughout its service area) implement a program to test the performance of the WPH2 systems to include routing, usable data presented at the PSAP, and location performance in the various topologies in the PSAP Service area.
- **380782** The AHJ should communicate with the WSP to inform the WSP of testing to be conducted, the methodology to be utilized, and the specifics of the service deployed in the service area.
- **380783** The AHJ and the WSP should discuss specific testing methods and expectations for each location technology (i.e., testing in moving vehicles, indoor testing, rural versus urban, etc.).
- **380784** Both the AHJ and the WSP should work together to interpret the testing results and agree on a plan to address identified deficiencies to ensure that the system is performing as optimally as possible in the service area. Correction plans should include retesting to allow assessment of improvements in system optimization.
- **380785** The AHJ should incorporate the results of its local testing program into its PSAP training program



# Project LOCATE

## APPENDIX I

### Sample Testing and Call Data Reports

Project LOCATE defined three levels of PSAP Level Performance Testing, all of which can provide significant information to the PSAP/AHJ regarding the actual performance of wireless E9-1-1 systems, as deployed to provide service within any PSAP jurisdiction. There are costs associated with any level of PSAP Performance Testing, however Project LOCATE believes these are a legitimate investment in better understanding wireless E9-1-1 and serving the caller in crisis, when they cannot adequately describe the location of the emergency.

The reports of the consistent methodology used to conduct all test calls will provide benefits to staff, responders and the public. The use of the report data should assist in training staff to better understand how wireless E9-1-1 actually works with the PSAP Service Area. The reports will also assist responders in adjusting their expectation about the routine value of the location data as delivered to the PSAP for dispatch purposes as well as form a valid basis to properly inform the public consumer about how wireless E9-1-1 works in various portions of the PSAP Service Area.

In addition to the per call dynamics as reported by the three PSAPs within this Manual, the PSAP/AHJ may consider additional data elements to be collected and reviewed as part of the performance testing process. Additional elements may include:

Did the call route to the appropriate PSAP, based on tower/section agreements in place?
Is the Test Call data is presented in a consistent format on every call
Is the Test Call data the same as data displayed at PSAP position?
Is "Confidence" displayed in the data array?
Is "Uncertainty" displayed in the data array? Can any assumptive value of the location data be gained based on the consistency of the assigned Uncertainty Value v. the ground truth?
Does Test Call synchronize with PSAP timing protocol?
Is Rebid conducted at appropriate interval?

# WIRELESS E9-1-1 SYSTEM PERFORMANCE AT THE PSAP

**Notes:**



# Locate

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