Wireless 9-1-1 Deployment and Management Effective Practices Guide

APCO American National Standard 1.103.3-2022

TABLE OF CONTENTS

FOREWORD **4**

EXECUTIVE SUMMARY **6**

INTRODUCTION **8**

POLICY ISSUES **9**

2.1 AGENCY ISSUES 9
2.2 ECC WIRELESS COORDINATOR ISSUES 9

MANAGING PUBLIC EXPECTATIONS **14**

3.1 MANAGING PUBLIC EXPECTATIONS 14
3.2 COLLABORATIVE DEVELOPMENT AND DISTRIBUTION OF MATERIALS 15
3.3 COLLABORATIVE IDENTIFICATION OF LOCATION ACCURACY 16
3.4 PUBLIC AWARENESS AND EDUCATION 16

MANAGING ECC AND RESPONDER EXPECTATIONS **17**

4.1 ECC DEFINE ALI FORMAT 17
4.2 WSP COMPLIANCE WITH ALI FORMAT 17
4.3 VARIABLES AFFECTING ROUTING 18
4.4 FCC RULINGS AND REQUIREMENTS 18
4.5 BASELINE AND CURRENT ASSESSMENTS OF WIRELESS LOCATION ACCURACY 19
4.6 RESOURCES TO VALIDATE LOCATION DATA 19
4.7 ECC AND LOCAL TESTING 20
4.8 PERFORMANCE ANOMALIES TRACKING AND REPORTING 20
4.9 MAINTENANCE TESTING 21

REBID / RE-QUERY **22**

5.1 REBID INTERVAL 22
5.2 REBID - NO LOCATION PROVIDED 25
5.3 REBID - NO LOCATION AVAILABLE 26

CONFIDENCE AND UNCERTAINTY **27**

6.1 CONFIDENCE AND UNCERTAINTY DATA 27
6.2 WSP TO PROVIDE UNCERTAINTY VALUE 28
6.3 DEFINE THRESHOLDS 28

TOWERS **30**

7.1 TOWER LOCATION 30
7.2 SECTOR IDENTIFICATION 30
7.3 ECC(S) ROUTING INSTRUCTIONS 31
7.4 RECONCILIATION OF ROUTING DATA ANOMALIES 32
7.5 REVIEW OF ROUTING DATA 32
7.6 WSP CONTACT INFORMATION 32
7.7 UPDATED INFORMATION 33

CACHE **34**

8.1 CACHE 34

ECC PERFORMANCE TESTING **36**

9.1 PERFORMANCE TESTING 36
9.2 INFORM WSP OF TESTING 37
9.3 TESTING METHODS 37
9.4 SYSTEM OPTIMIZATION 37
9.5 TRAINING PROGRAM 39

WIRELESS SERVICE PROVIDER – ECC AREA TESTING **40**

10.1 TESTING COORDINATION 40
10.2 TESTING GUIDELINES 40
10.3 TESTING CONSISTENCY 41
10.4 TESTING SCHEDULE 41
10.5 TESTING PROCESS 41
10.6 TESTING CALL-THROUGH PERFORMANCE 42
10.7 TEST RESULTS COLLECTION AND REVIEW 42
10.8 TESTING CONTACT INFORMATION 43
10.9 NETWORK CHANGE CONTROL 43

GLOSSARY **44**

ACKNOWLEDGMENTS **48**

APPENDIX A **49**

NOTES **55**

Copyright ©2022 APCO International | All Rights Reserved

FOREWORD

The Association of Public-Safety Communications Officials (APCO) International is the world's largest organization of public safety communications professionals. It serves the needs of public safety communications practitioners worldwide - and the welfare of the general public as a whole - by providing complete expertise, professional development, technical assistance, advocacy, and outreach.

The 2022-2023 APCO International Board of Directors:

Angela R. Batey, RPL, CPE, President
Becky Neugent, First Vice President
Stephen Martini, RPL, CPE Second Vice President
Jason E. Kern, RPL, CPE, Immediate Past President
Derek K. Poarch, Ex-Officio

APCO International standards are developed by APCO committees, projects, task forces, work-groups, and collaborative efforts with other organizations coordinated through the APCO International Standards Development Committee (SDC). Members of the committees are not necessarily members of APCO. Members of the SDC are not required to be APCO members. All members of APCO's committees, projects, and task forces are subject matter experts who volunteer and are not compensated by APCO. APCO Standards activities are supported by the Communications Center & 9-1-1 Services Department of APCO International.

For more information regarding APCO International and APCO standards please visit:
www.apcointl.org
www.apcostandards.org

APCO American National Standards (ANS) are voluntary consensus standards. The use of any APCO standard is voluntary. All standards are subject to change. APCO ANS must be reviewed at least once every five years. The designation of an APCO standard should be reviewed to ensure you have the latest edition of an APCO standard, for example:

APCO ANS **3**.101.1-2007 = 1- Operations, 2- Technical, 3-Training
APCO ANS 3.**101**.1-2007 = Unique number identifying the standard
APCO ANS 3.101.**1**-2007 = The edition of the standard, which will increase after each revision
APCO ANS 3.101.1-**2007** = The year the standard was approved and published, which may change after each revision.

The latest edition of an APCO standard cancels and replaces older versions of the APCO standard. Comments regarding APCO standards are accepted at any time and can be submitted to apcostandards@apcointl.org; if the comment includes a recommended change, it is requested to submit supporting material along with the recommended change. If you have a question regarding standards, including interpretation, APCO will respond to your request following its policies and procedures. ANSI does not interpret APCO standards. ANSI will forward the request to APCO.

APCO International adheres to ANSI's Patent Policy. Neither APCO nor ANSI handle identifying patents that may require an American National Standard (ANS) license or for conducting inquiries into the legal validity or scope of any patents brought to their attention.

No position is taken with respect to the existence or validity of any patent rights within this standard. APCO is the sole entity that may authorize the use of trademarks, certification marks, or other designations to show compliance with this standard.

Permission must be obtained to reproduce any part of this standard and can be obtained by contacting APCO International's Communications Center & 9-1-1 Services Department. Requests for information, interpretations, and/or comments on any APCO standards should be submitted in writing addressed to:

APCO Standards Program Manager, Communications Center & 9-1-1 Services
APCO International
351 N. Williamson Blvd
Daytona Beach, FL 32114 USA
apcostandards@apcointl.orgF

ISBN: 978-1-943877-48-5
Copyright © 2022

EXECUTIVE SUMMARY

The original publication of the Wireless 9-1-1 Deployment and Management Effective Practices Guide was the result of the efforts completed during the long standing APCO Project LOCATE (Locate Our Citizens at Times of Emergency) Committee (2000-2008). The level of cooperation and collaboration that led to that version remains valuable today as this revised edition is prepared for release through the APCO Standards Development Committee (SDC), per American National Standards (ANS) principles and practices.

This edition of the effective practices guide seeks to reinforce and, as necessary, redefine basic elemental deployment efforts. In addition, the same concerns surrounding delivering the best location data possible to the Emergency Communications Center (ECC) remain critical to a prompt, effective dispatch of all classes of emergency services. The original standards were prepared during a time when wireless 9-1-1 calls were between 35 and 50 % of the total 9-1-1 call volume and hard-wired telephone connectivity had not yet begun to erode as the primary mechanism for access to emergency services via 9-1-1. In 2019 an Federal Communications Commission (FCC) Notice of Proposed Rulemaking citing "Consumers make 240 million calls to 911 each year, and in many areas 80% or more of these calls are from wireless phones."[1] In addition, it is also reported that in 2018 the number of Americans with smartphones rose to 77%, up from just 35% in Pew Research Center's first survey of smartphone ownership conducted in 2011.[2] The actual consumer-use pattern and impact on total 9-1-1 call volume is however not uniform across the nation, with local variances reported in both wireless call volume and wireless reliance.

The goal of these effective practices remains primarily informational. It is important to maintain a balanced recognition of the roles of the multiple partners that contribute to the successful transfer and delivery of both voice and location data to the ECC. This revision is intended to support every reasonable effort by current ECC Managers to proactively manage public and responder expectations at the local level; support a positive working relationship with the wireless service providers founded on a fundamental understanding of the operational parameters of all wireless E9-1-1 service; along with influencing public policy, including regulatory and legislative action. The ECC Manager should also define, develop, and promulgate performance focused ECC training, maintain active quality assurance efforts, and understand the relationship between these actions and field responder efficiency and safety. The evolution of wireless devices as a primary means to reach emergency services, in both active and passive modes, requires the ECC staff to understand the wireless network, operation, technical assets and liabilities, as well as the direct impact such dynamics may have on a particular call within any ECC service area.

[1] 9-1-1 Statistics, National Emergency Number Assoc., https://www.nena.org/page/911Statistics, (last visited July 19, 2022).
[2] Pew Research Center, Internet and Technology, Mobile Device Report (Feb. 5, 2018), http://www.pewinternet.org/fact-sheet/mobile/.

These Effective Practices are not produced in a vacuum; the ECC and the agencies/citizens it serves must acknowledge that every deployed subset operates individually. Despite thousands of wireless E9-1-1 calls successfully processed and managed daily anomalies do occur within every system. The ECC staff should have knowledge of how wireless 9-1-1 within their service area works; what infrastructure supports normal calls for service loads and what variables can influence the performance of the system.

The revision of this standard does not seek to define the still evolving accuracy requirements that are being considered by the FCC across the Nation. Amendments and modifications to such requirements are in discussion; however, an overreliance on such language is not as valuable to individual ECCs as actual local performance testing of the deployed system within a specific service area.

The expansion of wireless devices in place of hard-wired telephone instruments does raise legitimate issues regarding location data from calls made within various structures. The reduction of hard-wired phones and the increase in the percentage of 9-1-1 calls that arise from wireless devices support consideration of industry-wide accuracy-testing efforts to support a reasonable, predictable expectation of service in compliance with the evolving revised accuracy parameters. The public safety communications stakeholders and their wireless industry partners continue to seek resolution of the issues involved in this area.

The ECC Manager should understand that effective, wireless E9-1-1 deployment is of itself a process with a measurable and defined outcome. However, deployment is only the initial threshold of accomplishment, and continuous participative management is required to fully understand all the current practical and evolving potential of such services. The revision of this standard seeks to support this ongoing and expanding area of service delivery within every ECC.

Chapter One

Introduction

SCOPE

This revision is intended to support every reasonable effort by current ECC Managers to proactively manage public and responder expectations at the local level; support a positive working relationship with the wireless service providers founded on a fundamental understanding of the operational parameters of all wireless E9-1-1 service; along with influencing public policy, including regulatory and legislative action. The ECC Manager should also define, develop, and promulgate performance focused ECC training, maintain active quality assurance efforts, and understand the relationship between these actions and field responder efficiency and safety.

The revision of this standard does not seek to define the still evolving accuracy requirements that are being considered by the FCC across the Nation. Amendments and modifications to such requirements are in discussion; however, an overreliance on such language is not as valuable to individual ECCs as actual local performance testing of the deployed system within a specific service area.

The ECC Manager should understand that effective, wireless E9-1-1 deployment is of itself a process with a measurable and defined outcome. However, deployment is only the initial threshold of accomplishment, and continuous participative management is required to fully understand all the current practical and evolving potential of such services. The revision of this standard seeks to support this ongoing and expanding area of service delivery within every ECC.

Chapter Two

Policy Issues

SCOPE

This effective practice seeks to encourage an agency to formally designate an ECC Wireless Coordinator per ECC service area. This effective practice supports the ECC in its efforts to inform all agency managers and executives of the actual performance of wireless systems within the service area.

2.1 Agency Issues

2.1.1 The agency should designate an ECC wireless 9-1-1 coordinator per ECC service area.

2.1.2 Questions may arise that can best be answered by the official point of contact for the agency, as the individual who actively controls the dispersal of any cost recovery funds. However, the agency will be better served if its ECC Wireless Coordinator actively maintains awareness and understanding of the current local, state, and federal regulations.

2.2 ECC Wireless Coordinator Issues

2.2.1 The ECC Wireless Coordinator should be expected to have the requisite level of specific knowledge and the skill set to work in a cooperative manner with the stakeholders, including the wireless service providers or their third party contractor(s), the local 9-1-1 service provider, the ECC customer premise equipment provider, the ECC Computer Aided Dispatch (CAD) service provider, and the provider(s) of base map development and services (including the addressing responsibility within the service area).

2.2.2 The ECC Wireless Coordinator also should serve as the single point of contact within the ECC Service Area for resolution of issues related to standard Automatic Location Identification (ALI) display formats, tower site/sector call routing, default call routing decisions, the liaison for local testing, maintenance, and call management issues, as well as providing documentation of all interactions and any local performance testing conducted by the ECC.

2.2.3 In addition, the ECC Wireless Coordinator should be responsible for assuring wireless call processing training materials contain actual performance data of the Wireless Service Provider (WSP), including usefulness of location data within the service area. WSP providers are required, upon request by the ECC, to collect and make available live 9-1-1 call data. The monitoring of such services should be evaluated based on the most recent FCC Order and Actions; the status of which should always be included in local training and informational programs.

2.2.4 The ECC Wireless Coordinator should conduct an ongoing, comprehensive effort to fully inform ECC service area decision makers of the nature and dynamics of Wireless 9-1-1 call management practices of the WSPs and the impact upon delivery of consistent and usable dispatch information to the ECC.

2.2.5 This effective practice supports the ECC in its efforts to inform all agency managers and executives of the actual performance of wireless systems within the service area. The failure to invest in a better understanding of the nature and dynamics of wireless E9-1-1 calls exposes the ECCs and their leadership to the risk associated with their staff being unable to provide adequate service to wireless 9-1-1 callers. It is important to properly and fully inform such managers and executives of the challenges that are common to wireless E9-1-1 deployment, along with the recommended means for resolution, relevant costs, and the impact on ECC operations. Furthermore, there is a need to regularly assess the continuing issues related to location data delivered to the ECC, including what the ECC can do to assist wireless service provider's efforts toward improvements, appropriate regulatory changes and consumer and responder experiences.

2.2.6 The expansion of per-call data received at the ECC is important to the continued development of wireless testing as well as changing consumer use and expectations. Specifically, locally attained information concerning percentages of wireless 9-1-1 calls made from indoor versus outdoor locations and the reported location data associated with the call may lead to improvements in testing efforts and identification of further enhancements for in-building services.

2.2.7 The WSPs and the ECC Wireless Coordinator within each ECC service area should develop and maintain a documentation process which defines the roles and responsibilities of each (i.e., a simple checklist). As appropriate, the timeline of all testing activity should be provided, including end-to-end assessments and processes to resolve issues related to deployment, implementation, and call management.

2.2.8 Becoming an active partner in the deployment preparations, testing and post deployment implementation and initial call management is only the first level of the essential partnership between ECCs and WSPs. Every ECC should understand that wireless call management is an ongoing activity which requires regular efforts to review system and staff performance to maintain adequate awareness of the regulatory, technological, and operational environment.

2.2.9 For the ECCs that remain without wireless E9-1-1 service today, it is recognized that constraints like the lack of time, understanding and perceived authority still exist. Agencies may not have taken a sufficiently active and responsible role in either the initial or follow-up deployment efforts made by the wireless service provider(s).

2.2.10 When first informed of any request by a wireless carrier, contractors, or other service providers (9-1-1 system, Customer Premise Equipment (CPE), CAD, Mapping) who are instrumental in delivering the wireless location data to the ECC, the ECC Wireless Coordinator should actively engage in the process. This will allow the ECC to better understand and influence the final product delivered to the ECC. It is recommended the agency recognize the role of the ECC as the end user of the wireless E-9-1-1 location data and seek to maximize its value to the Public Safety Telecommunicator (PST).

2.2.11 Being part of the wireless call management effort involves understanding the ECC's responsibilities and accepting the tasks that are best performed by the ECC. Coordinating the timely and effective participation by others, properly documenting and reporting both these activities and their results is a critical role of the ECC. When testing is planned, it is particularly important to replicate, as much as possible, actual end-to-end performance testing through to the ECC. The ECC should use this early opportunity to provide feedback on the actual performance of the deployed system, focusing on the usefulness of the location data for dispatch purposes at present.

2.2.12 Once wireless implementation is completed, the emphasis of ECC activity should be directed at managing the actual call processes and identifying tactics to improve service locally. Appropriate regard should be given to the general limitations and requirements of the regulatory, technological, and operational environment.

2.2.13 Each WSP and the ECC Wireless Coordinator responsible for the ECC's operations within any service area should define and develop, in writing, the process to resolve issues related to wireless call management and related testing efforts.

2.2.14 As the primary user of location data, the ECC should promptly establish, in writing, the process by which issues can be resolved among the participants, when such data is needed to effectively dispatch appropriate resources to a reported emergency. The process should include directions for identifying and reporting trouble or anomalies by the PST. The ECC should develop procedures for documenting how the problem was discovered, including management responsibilities, directions on contacting the WSP, follow up requirements, and ultimate issue resolution and closure.

2.2.15 Testing of systems should be of interest to the ECC, and a clearly defined set of expectations and responsibilities is the most effective means to monitor activity and results within current technical and regulatory parameters.

2.2.16 Since all wireless implementations involve multiple participant entities, it is easy to let confusion about which entity has responsibility for separate elements impede the effort to seek resolution. In most cases, the wireless service provider is the legitimate first point of contact for questions and issues regarding wireless E9-1-1 location data, tower or sector routing and overall system services.

2.2.17 The ECC should consider regular and consistent processing of required information post-implementation, to include appropriate maintenance and any amendments to the Memorandum(s) of Understanding (MOUs) between all WSPs within the jurisdiction of the ECC which are needed to reflect current technologies, performance requirements, results, and objectives.

2.2.18 A written memorandum of understanding regarding the roles, responsibilities, and processes for interaction between the ECC and the WSP is an appropriate way to record the nature of this important relationship. The advantage of a written document includes the opportunity to discuss, in advance, critical issues and expectations of the parties regarding maintenance and performance. This also offers the opportunity to discuss planned WSP or ECC technology changes necessary to meet/exceed required performance objectives.

Specific Reference Materials: APCO Project 38 Locate: An Assessment of the Value of Location Data Delivered to ECCs with Enhanced Wireless 9-1-1 Calls. https://www.apcointl.org/download/locate-final-report/?wpdmdl=6274

2.2.19 The ECC should remain aware of all current cost recovery parameters, restrictions, and requirements in their state regarding wireless services, which are likely to impact the ECC.

2.2.20 Wireless service providers and their contractors work in numerous states and are aware of multiple cost recovery opportunities as well as related regulatory restrictions and requirements. The ECC should be aware of the local and state funding definitions, restrictions, and allowances. The ECC should actively monitor the use of all funds and, when necessary, be ready to support changes which are consistent with the needs and goals of public safety. The cost recovery issues should not erode the working relationship between the ECC and the WSPs within the ECC service area, because the maintenance of a positive partnership affords the best opportunity to make improvements in service to the wireless E9-1-1 caller.

Chapter Three

Managing Public Expectations

SCOPE

This effective practice seeks to encourage the ECC to manage public expectations of location accuracy. This effective practice supports the ECC in its effort to work together with the WSP to develop and distribute informational materials.

3.1 Managing Public Expectations

3.1.1 The ECC should document and provide (such as on the ECC website or informational brochures) the assessment of wireless E9-1-1 service performance within the ECC service area, which might include service description by topologies. As actual performance post-implementation may change over time, the assessment effort should therefore be continually reviewed and updated to identify relevant modifications in system performance.

3.1.2 The ECC is urged to invest in helping wireless E9-1-1 callers better understand the nature of wireless calls in general, specifically highlighting the differences in terms of location data reporting capability throughout every ECC service area. Public awareness and education are critical to the ECC and the caller, as wireless 9-1-1 calls continue to shift toward the primary method for accessing emergency services. However, the consumer is responsible for their choice of equipment and service provider. The ECC can only objectively report the actual observed performance across a variety of conditions such as location, indoor, outdoor, and the effect of weather conditions per WSP.

3.1.3 The expectations of the public consumer may be based on the record of achievement that has been found with outdoor testing as well as reported actual calls; however, the reliability of such data is subject to change. In addition, the ECC may find assistance and support for such public information from the wireless service providers within their service areas.

3.1.4 Generally, the consumer is not able to effectively understand the value of location data they have provided to the ECC in times of emergency. The ECC, therefore, has a valuable opportunity to aggressively engage in candid, well developed, and professionally managed public education efforts aimed at alerting consumers to their role in giving effective responses to the appropriate emergency services.

Specific Reference Materials: For more Consumer Wireless E9-1-1 information, visit: https://www.fcc.gov/consumers/guides/911-wireless-services.

3.1.5 CTIA - The Cellular Telecommunications Industry Association, is an International nonprofit membership organization that has represented the wireless communications industry since 1984. Membership in the association includes wireless carriers and their suppliers, as well as providers and manufacturers of wireless data services and products. The association advocates on behalf of its members at all levels of government. CTIA also coordinates the industry's voluntary efforts to provide consumers with a variety of choices and information regarding their wireless products and services. This includes the voluntary industry guidelines, programs that promote mobile device recycling and reusing, and wireless accessibility for individuals with disabilities. https://www.ctia.org

3.2 Collaborative development and distribution of materials

3.2.1 The ECC, in a continuing partnership with the wireless service providers (WSPs) within any ECC service area, should seek information and support for public education efforts. The WSPs are equally invested in having informed subscribers operating the system in times of emergency. It is fair to report that every current location determination technology has some limitations, as does the call receipt and display technology used in the ECC. For example, the ability to transmit voice does not always assure the transmission of location information that can be used to effectively dispatch emergency resources.

3.2.2 Public awareness and education should document that practical system performance, as implemented in many locations, simply does not provide the call-taker with adequate location information. The variance in location data accuracy also applies to wireless calls made within structures, an increasingly expanding subset of wireless E9-1-1 calls presented to public safety agencies. The wireless E9-1-1 caller needs to be informed of the conditions which could produce imprecise location information, creating obstacles for responders and potentially leading to a delayed response or even no response from emergency personnel.

3.3 Collaborative identification of location accuracy

3.3.1 ECC websites, informational brochures, public service announcements and other methods/forums can be used to inform consumers of the performance variances within the service area. The value of location information can be influenced by an array of factors, with differences observed between indoor and outdoor calls, calls made from both moving and stationary vehicles, older handsets that do not have E911 capability, and areas where wireless service providers determine the ability to provide location accuracy is limited or technically impossible. In any environment which may impede the wireless service providers ability to provide meaningful location information, some risk occurs which could negatively impact the ability of the ECC and/or Responders to find the caller or deliver assistance to the caller quickly. Wireless Service Providers are required to file a list of counties or portions of counties they have excluded from the FCC location accuracy requirements.

3.3.2 The ECC, through well developed and documented performance testing from such diverse sites and circumstances, can begin to develop valuable information. It is important that performance testing be conducted regularly, and that the information is shared with the public in a timely manner.

3.3.3 The ECC, as part of the positive partnership with wireless service providers, may be able to provide information from the documented performance testing identifying differences or inconsistencies in the location information delivered to the ECC.

3.4 Public Awareness and Education

3.4.1 The WSPs should collaborate with ECCs, especially in similar service areas, to develop and regularly update information available for public outreach to encourage better management of their expectations and the variables which can reduce the value of location data, such as non-initialized wireless telephones or the donation of used wireless telephones. Effective, broad reaching public awareness and education efforts regarding the expansion of wireless technology and its everyday use requires regular review and refreshment of public statements. All entities shall work together and base regular revisions on performance testing

3.4.2 Jointly developed information should be posted on APCO, NENA (National Emergency Number Association) and other websites as designated, as well as the WSP websites for access by public policymakers and public safety professionals.

Chapter Four

Managing ECC and Responder Expectations

SCOPE

This effective practice seeks to encourage the ECC to manage ECC and Responder expectations of location accuracy. This effective practice supports the ECC in its effort to work together with the WSP to evaluate and document location accuracy information.

4.1 ECC define ALI format

4.1.1 The ECC should embrace its role in the partnership with stakeholders to improve wireless location data as delivered to the ECC. To provide public safety telecommunicators with a consistent presentation of wireless E9-1-1 location data, the ECC should actively participate in defining how data will appear in the automatic location information (ALI) display. The expansion of potential location-related information based on alternate data sources, as described within the Next Generation 9-1-1 marketing materials, should also be anticipated, and defined with the active participation of the ECC.

4.1.2 The ECC should be in regular contact with the 9-1-1 System Service Provider, local exchange carrier, third party representatives of the wireless service providers, and the local CPE and CAD providers to ensure close coordination and clear expectations concerning this important implementation element.

4.2 WSP compliance with ALI format

4.2.1 The consumer of wireless E9-1-1 service is best served when the ECC and wireless service providers have cooperated in reaching agreement with the 9-1-1 System Service Provider and local exchange carrier to deliver location data in an agreed manner.

4.2.2 The ECC may find it helpful to discuss with other ECC representatives who have similar CPE, CAD, and service providers to learn more about the benefits of this management process.

4.3 Variables affecting routing

4.3.1 The ECC should educate Public Safety Telecommunicators and responders of the variables that affect routing, such as class of service (COS) and specific wireless E9-1-1 call location data presented to the ECC.

4.3.2 Utilizing relevant, accurate and timely training and information, the ECC can provide an adequate level of understanding of how wireless location data differs from wireline location information. These differences and the variables which create such potential differences in the value of such data will be significant for all call processing practices and response efforts.

4.3.3 Particular attention should be given to the interpretation of wireless location data as delivered to the ECC by wireless service providers and specific areas within the ECC service area. Such variables may include topography, inside and outside building issues, status of carrier infrastructure, system capability within service area, terrain features like heavy forestation, weather, and other conditions. This level of understanding will allow call-takers to better manage the impact of the information on dispatch decision making. Responders must also better understand the variances of wireless location data to maximize their effective response.

4.3.4 In addition, the ECC should monitor, define, and provide appropriate explanation of the COS differences often displayed with wireless calls within the ECC Service Area along with the specific information obtained in collaboration with the WSP from call testing under such conditions.

4.4 FCC rulings and requirements

4.4.1 The ECC should educate Public Safety Telecommunicators and responders regarding the current FCC rulings and requirements for ECC Service Area measurement and reporting of accuracy compliance.

4.4.2 This reinforces the need to better understand the current system performance in terms of usefulness and consistency of location data delivered to the ECC as necessary for effective dispatch of emergency services and locating the wireless caller.

4.4.3 The ECC should continue to emphasize the value of understanding and adjusting for variances in the value of wireless location data by ECC staff and responders. Training should include a summary of the most recent action by the FCC regarding compliance reporting within the current accuracy parameters requirements.

4.4.4 ECC Communications Training Officer (CTO) trainers should provide access to the most recent FCC Orders and related summary information for use by the ECC. The consistency and correctness of such information within any training or education effort is critical. The ECC is encouraged to ensure that the responsibility to monitor the activity and decision making in this area is clearly assigned to a designated individual.

Specific Reference Materials: FCC Report and Order, FCC 07-114, Released 10.29.19, https://docs.fcc.gov/public/attachments/DOC-360516A1.pdf

4.5 Baseline and current assessments of wireless location accuracy

4.5.1 It is recommended that every ECC develop a baseline assessment and conduct current assessments of wireless location accuracy as delivered to the PSAP (Public Safety Answering Point). The purpose of the assessment is to determine actual performance of each WSP providing services within the service area of the ECC.

4.5.2 The assessments provide a comparison of delivered location data versus the actual known ground truth of a fixed location reference point, providing empirical data regarding the value of the delivered location data from such areas under like conditions, for dispatch and responder purposes.

4.5.3 This documentation, based upon consistent performance testing processes, can provide the ECC with sufficient reference data to quickly detect any degradation of current system capability and performance. The results of such performance testing should be regularly reviewed, revised, and updated prior to publication for ECC staff and responders. The same data and results will also be beneficial as informational reference to the consumer, reinforcing the need to know the location of the emergency being reported.

Specific Reference Materials: See also, EP 380781-785 for more information on ECC Level Performance Testing.

4.6 Resources to validate location data

4.6.1 The location of the emergency is a critical informational element of any E9-1-1 call. The ECC should educate staff and responders regarding the availability and use of resources to validate location data presented by the WSP.

4.6.2 In addition, the ECC should reinforce and encourage staff and responders to use all available resources to verify the actual location of the emergency, including but not limited to, local mapping resources, multiple local databases, known reference points and their own experience within the ECC and associated service area boundaries.

4.6.3 Understanding the variables that may influence the value of wireless E9-1-1 location data, as well as documenting the current actual performance of deployed services within the ECC, are critical elements for making effective dispatch decisions daily.

4.6.4 For best use of Z-axis data, the ECC staff and responders should have access to resources such as floor plans and other building specific data for use in validation of specific address information.

4.6.5 Since Z-axis data is referenced to the WGS-84 datum, any floor level or other representations must be done locally by the ECC. Conversion from the height above ellipsoid (WGS-84) to the height above ground, above mean sea level, floor level, or etc., may not be exact due to baseline reference variability.

4.6.6 If Z-axis data is available, the ECC will receive this information without formal request to the FCC or carries. However, the ECC must verify the ALI equipment can both receive and display the Z-axis data.

4.7 ECC and Local Testing

4.7.1 The ECC should incorporate the results of its local testing program into its training program. The training program should provide the 9-1-1 call takers with an enhanced understanding of the strengths and weaknesses of the Phase II wireless E9-1-1 systems throughout the ECC service areas and the operational impact on responders.

4.7.2 Informational materials, including the results of local baseline performance assessments, should be provided to both first responders and the public, in addition to inclusion in the basic training of all staff in every ECC. The inclusion of this information supports the effective use of the location data delivered to the ECC on all wireless calls and facilitates a shared understanding of expectations and understanding by responders.

4.7.3 The percentage of wireless E9-1-1 calls arriving at ECCs across the country may vary per location, however some anecdotal reports suggest the volume may be as great as 70%, with the estimated CTIA numbers indicating a minimum of 50% nationwide. The need for improved training is especially relevant to performance within the ECC and is essential to successful call processing and effective dispatching of emergency services.

4.8 Performance Anomalies Tracking and Reporting

4.8.1 The ECC should have a formal internal process in place for timely reporting, tracking and resolution of any wireless performance anomalies.

4.8.2 Conducting the assessment of actual performance can identify degradation of wireless E9-1-1 capability within the ECC service area and document anomalies that create concern by the public safety entities. The ECC should use its documented performance testing processes to provide the basis of inquiry to the wireless service provider regarding how the systems work under the defined set of static and dynamic variables.

4.8.3 It is recommended that in addition to ensuring that changes in system performance resulting in a more significant deviation in location data value for dispatch purposes be routinely shared with ECC staff and all response agencies. The same information should be provided to and discussed with the identified wireless service provider, who may not be aware of the problem and has an interest in resolving performance issues.

4.8.4 The ECC is strongly encouraged to work in a cooperative manner with the wireless service providers on a regular basis to improve understanding of the services currently provided, particularly the defined requirements, and to develop reasonable expectations.

4.8.5 The Z-axis data, while required where available, may not always be accessible due to technology limitations.

4.9 Maintenance Testing

4.9.1 The ECC should be aware of ATIS 05000010 (Maintenance Testing) troubleshooting parameters and make them part of the ECC's formal internal process.

4.9.2 The Emergency Services Interconnection Forum (ESIF) is a committee of the Alliance for Telecommunication Industry Solutions (ATIS). ATIS is a United States based body that is committed to rapidly developing and promoting technical and operational standards for the communications and related information technologies industry worldwide, using a pragmatic, flexible and open approach. ESIF is comprised of wireless and wireline network service providers, manufacturers and providers of support services that facilitate the identification and resolution of technical issues related to the interconnection of telephony and emergency services networks.

4.9.3 ESIF members are predominately wireless and wireline industry individuals. However, public safety is represented by several agencies, ECC practitioners, and both APCO and NENA staff. The Maintenance Testing document cited above in its ATIS standard format was created by a subcommittee of ESIF. The document provides information regarding potential system problems which can affect service in general, but especially regarding location data delivery to the ECC.

Recommended Reference Material: ATIS 05-000010 Maintenance Testing at (fees apply) https://www.atis.org/docstore/default.aspx

Chapter Five

Rebid / Re-Query

SCOPE

This effective practice seeks to encourage the ECC to understand the Rebid-Re-query process. This effective practice supports the ECC in developing Standard Operating Procedures (SOP) for the Rebid-Re-Query process.

5.1 Rebid Interval

5.1.1 Re-bid refers to the process of obtaining updated location information on a wireless 9-1-1 call. This may be completed by an automatic or manual process. In an automatic process, the 9-1-1 CPE will automatically re-bid for updated location information at a time interval set by the ECC and/or vendor. A manual re-bid requires the PST to manually request updated location information, which may be accomplished by pressing a button or another method, depending on the ECC's CPE. The PST should follow existing ECC specific re-bid policies.

5.1.2 Wireless Dispatchable Location 1 (WDL1) represents a higher quality of location information. The sub-address elements of information that WDL1 provides, including floor (plus or minus one floor), and building zone or quadrant (e.g., NW, SW, NE, or SE) of the caller. Additional sub-address elements may appear in what ECCs commonly call the "location" field. It may be possible to receive a WDL1 Class of Service for a single-family residence without sub-address elements. The WDL1 Class of Service will be displayed under these conditions.

5.1.3 Wireless Dispatchable Location 2 (WDL2) represents the highest-level quality of location information among the three classes of service listed, which is estimated to meet the FCC's definition of a Dispatchable Location. Some of the elements of WDL2 are comparable to WDL1. WDL2 may include sub-address elements such as the actual floor, and additional room information for multiunit buildings (e.g.., room, suite, or unit). Additional sub-address elements may appear in what most ECCs call the "location" field. It may be possible to receive a WDL2 Class of Service for a single-family residence without sub-address elements. The WDL2 Class of Service will be displayed under these conditions.

5.1.4 Wireless E9-1-1 Civic Address (WCVC) represents the civic address of the caller. The WCVC Class of Service will be displayed under these conditions. WCVC is the estimated address of the caller that does not rise to the level of WDL1 or WDL2.

5.1.5 Sub-Address Elements

In some cases, additional sub-address elements, such as a room or suite number, will also be displayed to the PST, and will appear in what ECCs commonly identify as the location field. See Tables 1 and 2 below for a complete list of sub-address elements and place type codes. Because ANI/ALI displays are customizable, ECCs have used various names for the "location" field. Attention must be paid to ensure that these modifications will not interfere with the delivery of these new elements. Some ECCs have utilized the location field for miscellaneous information. In many cases, this field is limited to twenty characters, so it is important to reserve the capacity to enable the receipt of future enhanced location information. See Table 1 for a description of sub address elements.

TABLE 1 – ATIS SUB-ADDRESS ELEMENTS

CODE	DESCRIPTION	EXAMPLES
RSS	Residential Single Story Single Family	A one-story private home, no matter how large in square footage. (Note it may be attached to another dwelling, but they are independent living units).
RMS	Residential Multi-Story Single Family	A multi-story private home, no matter how large in square footage. (Note it may be attached to another dwelling, but they are independent living units).
MTS	Multi-Tenant Residential – Single Story	One building, subdivided into apartments, condominiums, suites, hotel rooms, or other living spaces on one floor.
MTM	Multi-Tenant Residential – Multi-Story	One building, subdivided into apartments, condominiums, suites, hotel rooms, or other living spaces on two or more floors.
CMS	Commercial – Single Story	A Single-story building with no residential use. Includes government buildings, churches, libraries, stores, malls, museums, aquariums, factories, stadiums, warehouses, shipping terminals, public transportation buildings, or other similar facilities.
CMM	Commercial – Multi-Story	A multi-story building with no residential use. Includes government buildings, churches, libraries, stores, malls, museums, aquariums,

		parking structures, factories, stadiums, warehouses, shipping terminals, public transportation buildings, or other similar facilities.
MUM	Multi-Use – Multi-story (building with both commercial & residential occupants)	A multi-story, multi-use building featuring residential and commercial uses.
MUS	Multi-Use – Single story (building with both commercial & residential occupants)	A Single-story, multi-use building featuring residential and commercial uses.
OBS	Office Building – Single Story	A Single-story office building with no residential use.
OBM	Office Building – Multi Story	A Multi-story office building with no residential use.
SCH	School Campus (Admin, Dorm, Classroom)	A single or multi-story, multi-use building featuring education uses to include on campus housing, classrooms, administrative facilities, plus commercial and office buildings on campus.

5.1.6 Z-Axis

Wireless carriers are required to provide uncompensated barometric pressure (UBP) to ECCs from any handset that has the capability of delivering barometric sensor data. The ECCs should consider how UBP could be used to assist the ECC in locating a caller, and then confirm that their CPE can display UBP.

In addition to UBP, some calls may include an altitude estimate for the caller's device. This estimated z-axis information may be provided in the form of meters above the World Geodetic System 1984 (WGS84) datum. It is important to note that receipt of this data may require a proprietary solution and, in some cases, may involve a software update or replacement of existing CPE.

5.1.7 The ECC dispatcher should wait 20 seconds (automatically or manually) after the call is first presented to re-bid. Subsequent rebids should be at 30 second intervals for all classes of service. If automatic rebid is used, only the first rebid should be automatic.

5.1.8 The term to describe the action by a call-taker seeking an updated location data estimate may vary. Rebid, Re-Query, Re-Inquiry, and other are terms used to describe the CPE's ability to solicit updated location data for the call.

5.1.9 ECCs have not diminished the critical need for prompt delivery of the best location data available on every wireless E9-1-1 call. All the parties recognize that the wireless E9-1-1 caller may often be able to describe the location or use a locally known reference point to assist the PST to determine the approximate location of the emergency.

5.1.10 The frequency of actual response decisions being made based on the location data provided may be low. However, the criticality of an event in which the caller cannot describe their location during an emergency is extremely high.

5.1.11 For a variety of reasons, such as separate timing parameters for voice and location data delivery, the best location data may not arrive with the initial wireless E9-1-1 call. Therefore, the revised routine practice for call takers should include a Mid-Call Location Update through the Rebid or Re-query function, after an appropriate interval. The optimum interval between the arrival of the first location data and a rebid for updated location data, regardless of the COS or Class of Service reported, should not be less than 30 seconds.

***Specific Reference Materials**:* See also, Appendix A of this Report, Mid-Call Location Update (aka: re-bid)

5.2 Rebid - No Location Provided

5.2.1 The ECC 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 call-taker as a WPH2 COS

5.2.2 The ECC should establish a standard operating procedure (SOP) requiring every Wireless E9-1-1 call received during which the caller cannot provide adequate location data, to perform a rebid even if the original class of service reported indicates it is a WPH2 call (Phase II Wireless Call).

5.2.3 Regardless of the reported class of service on the initial call, the simple rebid effort at the appropriate time interval, may provide access to updated location data by the Public Safety Telecommunicator.

5.2.4 The first primary use case of rebids is to provide more precise latitude/longitude information.

5.2.5 The second primary use case of rebids is to provide updated latitude/longitude information based on near real time changes of the caller's device.

5.3 Rebid - No Location Available

5.3.1 The ECC should be aware that the exact same latitude and longitude presented after multiple rebids indicates that improved location is not available for a reported stationary emergency scene at which the caller has stopped. The caller that continues and does not stop at the scene may call again, at which point it is reasonable to expect a change of location data. The call-taker should check the COS, and if it is WPH2 and the latitude/longitude information does not update, a note should be made of the information and referred to the WSP.

5.3.2 During basic training of all public safety telecommunicators, every ECC should include information and appropriate guidance through an ECC SOP to instruct telecommunicators to effectively manage wireless E9-1-1 calls for which no improved location data is available, despite rebid efforts. The way various WSPs configure their internal systems can impact the outcome at the ECC.

5.3.3 The ECC should ensure that all public safety telecommunicators have the most updated and complete information regarding wireless E9-1-1 call delivery from each wireless carrier providing services within the service area boundaries of the ECC

Chapter Six

Confidence and Uncertainty

SCOPE

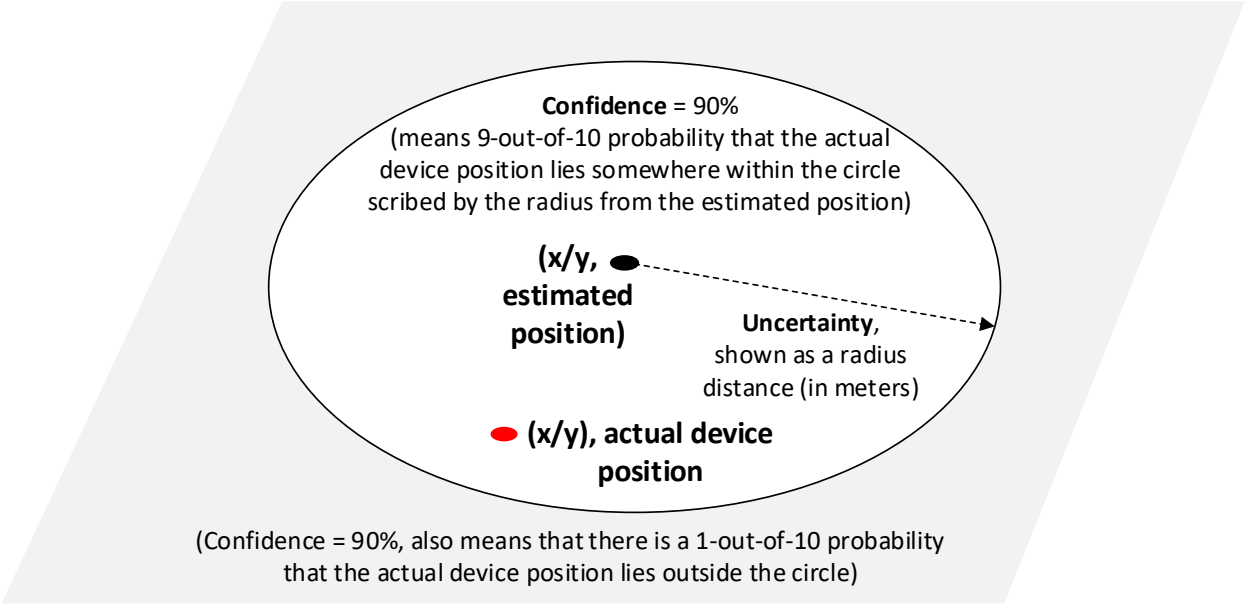
This effective practice seeks to encourage the ECC understand the confidence and uncertainty data. This effective practice supports the ECC in its effort to work together with the WSP to provide uncertainty data and define thresholds.

6.1 Confidence and Uncertainty Data

6.1.1 The 2015 FCC Fourth Report and Order requires the wireless carriers to standardize Confidence levels for uncertainty estimates at 90%. This standardization of 90% Confidence makes Uncertainty estimates consistent among wireless carriers and therefore, easier to understand and more useful in determining the latitude and longitude of a wireless 9-1-1 caller. Uncertainty is the estimated error that describes the area in which the device being located is likely to be found. Confidence defines how likely the device will be found within the uncertainty circle.

6.1.2 For example, 90% Confidence means that nine out of ten times, an ECC can expect to locate a wireless caller within the Uncertainty estimate from the reported x/y coordinates. For example, if a Phase II wireless call (WPH2) has an Uncertainty estimate of thirty meters, then 90% of the time the actual location of the caller can be expected to be within thirty meters of the reported x/y coordinates. Due to the nature of wireless service, each call may have a different Uncertainty value. See Figure 1.

Figure 1 – Confidence and Uncertainty Graphic



6.1.3 Recent requirements by the FCC require that confidence and uncertainty data for all wireless 9-1-1 calls, whether placed from indoors or outdoors, be delivered at the request of ECC on a per-call basis.

6.1.4 The data shall specify the caller's location with a uniform confidence level of 90 percent. With uniform confidence levels, call-takers will more easily identify when a location fix is less trustworthy due to larger uncertainties. The impact of the Uncertainty Value should be verified by performance testing on a regular basis.

6.1.5 The E911 service provider responsible for transporting confidence and uncertainty between the WSP and the ECC must enable the transmission of confidence and uncertainty data provided by the WSP to the requesting ECC. The ECC Wireless E9-1-1 Coordinator should recognize that the ANI/ALI data fields are controlled by the local E9-1-1 service provider, who should also be consulted on desired changes of the data array.

6.1.6 The 2020 FCC Sixth Report and Order requires the Z-axis data to fall within +/- 3 meters for vertical uncertainty for 80% of wireless enhanced 9-1-1 calls.

6.2 WSP to Provide Uncertainty Value

6.2.1 The ECC is encouraged to work with the appropriate WSPs to have an uncertainty value included in the data associated with each Phase 2 call delivered to the ECC. The variance in location data associated with specific wireless service providers should also be cited in the development and distribution of public information, ECC training and responder awareness materials.

6.2.2 The uncertainty value assigned to each call is determined by assessing the reported data versus the actual, known location data. The ECC does not always have a known ground truth point available for every reported location within the service area. The performance testing completed by the ECC does offer an opportunity to participate in determining a range of uncertainty values that demonstrate a predictable level of reliability.

6.3 Define Thresholds

6.3.1 APCO and the WSPs should seek to define uncertainty value threshold trends to provide ECCs with guidelines for additional rebids.

6.3.2 The ECC should continue to review and evaluate the usefulness of the uncertainty data associated with wireless E9-1-1 calls. Some WSPs have maintained that it is the uncertainty value that offers the call-taker the best tool to assess the validity of the location estimate per wireless call.

6.3.3 The ECC should engage the appropriate WSPs in identifying as many tools as possible to enhance the value of all location data delivered to the ECC. All tools should offer consistency and predictability that is observable and measurable.

Chapter Seven

Towers

SCOPE

This effective practice seeks to encourage the ECC to collect and review routing information. This effective practice supports the ECC in its effort to work together with the WSP to ensure optimal service implementation and operations.

7.1 Tower Location

7.1.1 An effective partnership between the WSP and the ECC, on behalf of the consumer of wireless E9-1-1 services, is required to ensure optimal service implementation and operation. All WSPs shall ensure that every tower location has a MSAG (Master Street Address Guide) valid address. The assignment of WSP unique identifiers for specific towers should also be provided to the ECC and reviewed for currency and accuracy at least annually. The assigned latitude/longitude of the tower location may also be used as an additional source of identification and should be agreed upon among the parties. Upon request, the ECC should act promptly to verify the address and reply to the WSP or their representative.

7.1.2 ECCs should include information regarding the assignment of MSAG valid addresses to tower locations and antennae faces, if a wireless 9-1-1 call does not produce a Class of Service (COS) of WPH2 or Wireless Phase Two.

7.1.3 The ECC Wireless E9-1-1 Coordinator should also share this information with neighboring ECCs, if the calls managed by these tower locations are delivered to another ECC. The task of managing the relationship between ECCs that may be sharing towers or have a designated rule as the default/alternate point of delivery for calls from these towers remains an active and ongoing responsibility of the coordinator.

7.2 Sector Identification

7.2.1 The WSP should provide the ECC with sector identification on the towers (such as East, West, North, South, Southeast, etc.). Omni-directional towers should be so identified.

7.2.2 The ECC should work with the WSP to ensure sector identification values are assigned to each sector, enhancing the value to the ECC during location data value assessment on Phase 1 wireless calls. This information may also be used with 9-1-1 systems and/or Computer Aided Dispatch (CAD) GIS mapping to present an image of the estimated area where the caller is likely to be at the time of the transmission of the data.

7.2.3 All omni-directional antenna tower sites should also be identified and reported to the ECC. Having accurate tower site location data, from the WSP, allows the ECC to effectively utilize these reference points to assist callers during times of emergency.

7.2.4 The ECC Wireless E9-1-1 Coordinator will find it advantageous to seek an annual "audit" from the WSPs. The audit should reference any tower modifications, which may include antenna direction and configuration, range, new antennae, new towers, decommissioned tower sites, temporary tower deployments, etc.

7.3 ECC(s) Routing Instructions

7.3.1 It is understood and accepted that wireless tower service coverage does not normally follow the political subdivisions of agencies, counties or even states. The ECC should utilize their working relationship with all the WSPs to provide the most accurate and accepted set of routing information per tower site and/or sector face.

7.3.2 The ECC should actively accept their partnership responsibilities, including the need to report the accepted default routing plan promptly and fully for each tower face and/or site which impacts the delivery of service within the ECC territory to the WSP. The ECC should obtain confirmation that the preferred routing information has been received and accepted by the WSP.

7.3.3 Any delay by the ECC to effectively share the necessary information regarding a new tower and interim routing while additional upgrades are in progress with the WSP, or their third-party contractor, could lead to wireless E9-1-1 calls being routed in a manner inconsistent with the needs of the callers or current requirements of the effected ECC(s).

Specific Reference Materials:

- *Visit the ATIS/ESIF website, review specifically, Issue 35: Post Deployment Cell Site Additions*
- *Visit the ATIS/ESIF website, review specifically, Issue 36: Deployment Cell Site Additions – Provisional Routing*

7.4 Reconciliation of Routing Data Anomalies

7.4.1 Early in the relationship with the WSPs, the ECC should clearly define the process for the resolution of routing issues. The process should include well-defined responsibility for notice of problems with specific action items as well as reasonable timelines for remedy. Post-deployment adjustments and processes should be expected, as the experience of wireless call volume, consistency and value of location data are continually assessed by the ECC.

7.4.2 The expanding role of wireless technology use throughout many service areas reinforces the need to designate a local ECC wireless E9-1-1 coordinator on behalf of the ECC.

7.5 Review of Routing Data

7.5.1 The ECC should request cell and routing data contained in the Mobile Positioning Center (MPC) or Gateway Mobile Location Center (GMLC) for the service area and perform annual reviews. Upon completion, results should be furnished to the WSP for review and response if appropriate

7.5.2 It is recommended the ECC review the cell and routing data maintained at the MPC or the GMLC (or current equivalent) within the deployed system of each WSP on a regularly scheduled basis. The review should be considered by all parties as a legitimate/responsible inquiry and effective practice by the ECC to maintain service quality. The review can prevent service issues by identifying pre-event data and existing rules that may be subject to change within these systems.

7.5.3 The ECC and WSP should also have a well-defined process developed for resolving any issues that arise from such reviews. These actions are an integral part of any meaningful partnership which should exist between the ECC and WSPs.

7.6 WSP Contact information

7.6.1 This Effective Practice continues to encourage meaningful partnerships between the ECC and WSP for effective wireless E9-1-1 service. The WSP should make direct contact with the ECC through their contractors and provide appropriate contact information to facilitate the effective practices cited in this Guide. The ECC should likewise seek to provide the WSP with corresponding contact information and maintain a positive working relationship during the development, construction, and modification of any tower site. It will also be important to determine actual ownership of the tower and any other potential WSP users, if not totally dedicated to a particular wireless service provider.

7.7 Updated Information

7.7.1 The ECC should take responsibility for developing an effective relationship with all WSPs, their contractors and agents that have impact on the operational and technical capability of deployed systems within the overall service area. The discussions must be broad enough to cover not only the coordination of implementation or redesign requests, but also tower development, system maintenance, baseline performance and providing access to contact information to resolve issues related to services in general and emergency events. The ECC must recognize that unlike the legacy PSTN connectivity, a wireless tower, tower face or other service element can be discontinued or interrupted without notice to the ECCs that may be affected by temporary changes in

7.7.2 The WSP and the ECC should maintain regular communication and collaborative efforts with associated, neighboring ECCs regarding data and routing maintenance processes, and commit to continual review with associated follow-up

7.7.3 The most effective means of preventing the routing of urgent wireless calls to unintended destinations is to actively participate in continuing management discussions and decision making for call routing plans. In addition, post-deployment adjustments and establishing processes to develop and implement valid changes should be defined prior to the first instance of a problem resulting a delay in response to a wireless E9-1-1 caller.

7.7.4 The responsibility to provide the most effective service is shared between the ECC, the WSP and their contractors. This obligation continues long after the initial deployment and becomes part of the expected quality of service management function of the ECC, on behalf of the consumers and responder groups.

Specific Reference Materials: Review also ATIS 05000010 (Maintenance Testing) at https://www.techstreet.com/atis/standards/atis-0500010?product_id=1627496

Chapter 8

Cache

SCOPE

This effective practice seeks to encourage the ECC to understand the impact of cashing. This effective practice supports the ECC in its effort to work together with the WSP to understand and correct issues.

8.1 Cache

8.1.1 Caching was initially deployed on the mobile network's edge to compensate for congestion created by traffic and limited bandwidth communication circuits. Unfortunately, this created potential location information validity issues. Today the wireless networks employ a full mesh caching arrangement that refreshes more often via high bandwidth communications links, eliminating the possibility of invalid network derived location data. Emerging device-based location determination technologies, which provide enhanced location information that is not affected by the network caching, will soon render network-based location determination systems obsolete.

8.1.2 There are some variances between WSPs regarding the length of time initial call location data is associated with the call and upon what activity that data is updated by the caller and/or the call-taker.

8.1.3 The ECC should first understand the potential impact this system element can have on wireless E9-1-1 call processing and dispatch of appropriate resources. In the worst-case scenario, the location data from the last call may be presented as the ALI with a later, and perhaps unassociated, call. The influence of cache timing parameters within the deployed system should be recognized and understood as part of the total wireless call management responsibility of the ECC. The Rebid action reportedly forces a new data retrieval process.

8.1.4 The potential influence on call processing (specifically the interpretation of location data delivered to the ECC) should be included in all wireless call-taker/dispatcher training materials. In addition, the ECC should seek to identify a means to detect instances in which potential cache issues have created a problem during call processing. This data may subsequently be used by the ECC in discussion with the WSP to seek further clarification, better understanding and potential corrective actions related to Cache within the system as implemented.

8.1.5 The extent to which the ECC may experience cache-related location data issues with calls may be minimal; however, as part of effective call management, understanding the nature of the issue from the WSP perspective will provide opportunities to assist call-takers identify and deal with the peculiar circumstances of this issue.

Chapter 9

ECC Performance Testing

SCOPE

This effective practice seeks to encourage the ECC to develop and conduct a well-defined performance testing process. This effective practice supports the ECC in its effort to work together with the WSP to develop specific testing methods and expectations for each location technology.

9.1 Performance Testing

9.1.1 The ECC should develop and engage in a regular and consistent testing process to evaluate the continued performance of wireless systems as deployed within their service area. Establishing baseline performance of the implemented systems across the topologies of the service area can provide the ECC with useful information. Evaluating the consistency and accuracy of location data delivered to the call-taker with wireless E9-1-1 calls enhances the PST's ability to make accurate location decisions. The ECC is responsible for funding performance testing,

9.1.2 It is unnecessary for all baseline performance testing to meet the rigorous practices, as defined within OET 71 or ATIS 0500001. The requirement to determine actual compliance with current FCC location accuracy and frequency parameters is the responsibility of the WSP, not the ECC. The ECC should expect that such compliance level testing per ECC area is a usual and customary cost of the WSP associated with offering such services.

9.1.3 The ECC should focus on conducting well defined and consistent empirical testing that uses known reference points to assess the value of the WPH2 location data delivered to the call taker. When conducted in a regular and consistent manner, this level of practical field performance assessment can provide information that has operational implications for training, dispatching and overall system status. Complete and thorough documentation of conditions and processes used during such testing can also assist the ECC in discussions with the WSP(s) concerning performance and potential system improvements.

9.2 Inform WSP of Testing

9.2.1 The ECC should communicate and inform the WSP of planned testing, to foster an effective partnership with each WSP during all performance testing efforts and clearly distinguish them from any FCC compliance testing efforts. It is reasonable to share with each WSP the performance testing methodology being used, and the ECC's understanding of the specifics of the deployed system in the ECC's service area.

9.2.2 This recommended approach reinforces the level of commitment and desire to understand the systems as deployed by the ECC and provides characteristic results for consideration of outdoor and indoor performance. The observed data results may be used in training, operational functionality, response decisions and for managing consumer awareness.

9.2.3 Empiric data arising from performance testing alone may not be adequate to fully assess the overall performance of the system as implemented. The regularity and consistency of the performance achieved can, however, provide an adequate basis for further discussion and anticipated action by the parties toward improvement of service capability.

9.3 Testing Methods

9.3.1 The ECC 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.). It is recommended that the ECC discuss the performance testing efforts to be conducted within the jurisdiction with each WSP. These efforts are not conducted to assess accuracy compliance issues; therefore, the number and location of test call origination shall represent actual use patterns of wireless E9-1-1 callers in the service area. It is also appropriate to test within areas that have high frequency of use, as determined by ECC records, and those areas from which wireless E9-1-1 calls are often the dominant source of emergency event information.

9.4 System Optimization

9.4.1 The ECC represents all the public safety disciplines and the general public. It is best served by a cooperative effort with the WSP(s) to recognize, interpret and respond to system performance as demonstrated by all testing results. The goal of such efforts, supported by complete and competent documentation of conditions and processes used during such testing, is intended to improve understanding of the deployed systems. This level of understanding by public safety supports shared efforts to improve the operational response capability of emergency services.

9.4.2 As it is the ECC's responsibility to manage the wireless call process, it is recommended that the ECC support staff in developing a reasonable understanding of how wireless systems work. As with the traditional landline telephone service providers, recognizing the role of wireless service providers, third party contractors, wireless industry representative groups and standard development organizations is helpful. In addition, the ECC should seek to develop an on-going and positive relationship with the WSP that fosters discussion of any identified issues which have an adverse impact on the operational capability of the ECC to provide service to persons amidst crises.

9.4.3 Performance testing is intended to develop awareness of and foster confidence in the estimated location data associated with each wireless E9-1-1 call. When properly understood and managed, the testing program offers the best opportunity to define the predictability and consistency of wireless service performance across the shared service area. Such efforts facilitate the efforts of the ECC in reaching the highest level of performance from the implemented system.

9.4.4 When conducted in a regular and consistent manner, this level of practical field performance assessment will provide the ECC with information that has implications for training, operational functionality, dispatching and overall system status at the time of the testing. Further, it is through such testing that initial assessments of the Uncertainty value can also be accomplished for a variety of potential call scenarios. The potential influence of the derived and presented uncertainty to the call-taker for decision making regarding call processing is an important benefit of such testing.

9.4.5 Performance Testing should always be regarded as an opportunity to gain experience on how the system operates amidst a wide range of static and dynamic variables. It is clearly not intended to supplant wireless accuracy compliance testing, which is a function and responsibility of the WSP, per FCC regulatory processes. Note that indoor performance testing does present some challenges that should be understood by the ECC Public Safety Telecommunicators.

9.4.6 Based on such post-performance testing discussions with the WSPs, the ECC may determine that re-testing is appropriate, such as when it will allow the full assessment of data elements that are more completely defined as well as system specific variables. At that time, it will be essential to document any modified actions which are different from the original testing effort to assist in defining the variables for which controls were provided as well as the opportunity to review comparative results of such actions.

9.5 Training Program

9.5.1 The effort, cost, and commitment to conduct a well-defined performance testing process, to share the results with each WSP, and to candidly discuss both, has value only if all parties well understand the outcomes. The ECC should seek to develop the best level of understanding possible for the systems in use at the time of the testing within the service area. The testing results may influence public policy and education, call management, staff training, field responder training, and identify the call locations and situations which offer the greatest challenges to existing technology.

9.5.2 This level of knowledge must transfer to ECC staff who are directly providing the service. Documentable experience and functional examples of wireless call handling should be incorporated into the ECC training program for both initial and on-going training. The ECC should seek to develop training methods that duplicate, or mirror actual service experienced in the service area. Performance observations and evaluations should include wireless call handling as a regular part of the supervisory process. Using a percentage of wireless calls received in the ECC as part of the training and performance evaluation may be appropriate.

9.5.3 The implications of wireless testing must be translated into performance measures that can be assessed at the call-taker and dispatcher level, supporting further trustworthiness of the estimated location data. The impact upon wireless E9-1-1 call processing and the dispatch of emergency services must be evaluated fairly and uniformly to best determine the value of these efforts. This level of improved direct service delivery requires relevant, complete, and effective training materials for all staff engaged in the ECC.

Chapter 10

Wireless Service Provider – ECC Area Testing

SCOPE

This effective practice seeks to encourage the ECC to develop and conduct ECC area testing to validate routing and delivery of format and content of ALI display at the ECC. This effective practice supports the ECC in its effort to work together with the WSP to coordinate and document this testing.

10.1 Testing Coordination

10.1.1 The WSP and the ECC, as partners in the delivery of effective wireless E9-1-1 service and response, should coordinate any testing being planned by the WSP that seeks to deliver calls directly to the ECC.

10.1.2 The ECC should understand the range of testing options the WSP may use, some of which do not include actual delivery of voice and location. The WSP often seeks to limit impacting the ECC with its testing efforts. However, whenever possible and with coordination, the full inclusion of the ECC can have additional benefits to both parties.

10.1.3 The benefits of including ECC, whenever possible, with adequate notice and coordination supports call-through testing and improves understanding of how each deployed system functions, under routine and unusual circumstances, how call information will be presented at the ECC, as well as the opportunity to capture the per-call data for subsequent review and analysis. Whenever possible, the ECC should seek to support call-through testing by assigning adequate staff for the identified testing period necessary to complete the designated test calls.

10.2 Testing Guidelines

10.2.1 Agencies are encouraged to use guidelines set forth in OET-71 or ATIS 0500001 (Accuracy Testing) for best results.

10.2.2 It is recommended for the ECC to take responsibility for reviewing and developing an understanding of the current Memorandum and Orders of the Federal Communications Commission (FCC) regarding accuracy parameters, timeline, and responsibilities upon both the ECC and the WSP. The ECC should include an explanation of such orders in PST training materials to better manage expectations of staff and responders and, additionally, educate responders and the public.

10.3 Testing Consistency

10.3.1 The ECC has a responsibility to complete performance testing and monitor any end-to-end testing, or its functional equivalent, to assess the consistency between the pANI sent and the information displayed at the ECC. This effort provides the opportunity to assess the impact of several processes, including cache and re-bid value as well as the coordination of system elements in support of overall system performance.

10.4 Testing Schedule

10.4.1 The WSP and the ECC should mutually agree to an end-to-end field-testing schedule to minimize the impact of and disruption to the ECC operations. The ECC should understand the importance of all WSP testing and accept that some impact upon the ECC staff is likely to occur. Every reasonable accommodation should be made to facilitate the opportunity for the WSP to conduct testing, to include calls delivered to the call-taker. The ECC, based upon actual call data, should provide optimum times of the day for such testing to occur. It is critical for all parties to understand that even with effective coordination, the dynamic nature of actual emergency events may cause the participation of the ECC staff to be postponed, interrupted, or terminated by the ECC.

10.5 Testing Process

10.5.1 The effectiveness and overall importance of testing within the ECC service area may be defined by the value it has to the specific ECC and potential consumers within the service area. It is recommended that the ECC specifically request that all towers and all sectors be tested. The ECC should also seek to determine what wireless devices are being used to make the test calls, if they are not being computer generated. In cases where a certain handset has been found to be common within the ECC service area and concerns have been noted with the WSP previously, testing by the WSP or the ECC should include calls from that specific handset device.

10.5.2 If test calls are not computer generated, testing should include conditions such as low batteries, weak RF signal, and urban environment challenges (e.g., concrete buildings, etc.)

10.6 Testing Call-through Performance

10.6.1 Call-through performance testing to the ECC should be designed in such a way as to validate routing and delivery of format and content of ALI display at the ECC, as defined by the ECC. The ECC should continue coordinate with the WSP to conduct testing to assess both routing and location data format presentation to the ECC. It is noted that the wireless network coverage areas and positioning systems currently deployed may not completely align with ECC jurisdictional areas. The "Routing ECC," as it referred to in the ATIS Standard, is the ECC to which a call from a given location is routed based on wireless system coverage factors and position determination capabilities used by the WSP and may or may not be the same coverage area as the political authority of the ECC.

10.6.2 The resolution of ALI display format issues may also involve the ECC 9-1-1 system service provider (911 SSP), which should be part of the coordination effort during the testing process. It is highly recommended that the ALI display for every WSP be consistent, to minimize the need for a variable interpretation per WSP.

10.7 Test Results Collection and Review

10.7.1 The WSP and the ECC should independently document and record the results of testing. Following the completion of the testing, the WSP and the ECC should meet to review and discuss testing results and agree to the methodology for potential retests. Based upon the post-implementation testing evaluation of its wireless E9-1-1 call testing data, as well as discussions with the WSP(s), there is an opportunity to review the results and discuss their implication for effective wireless E9-1-1 call processing at the ECC level.

10.7.2 The power of understanding how the systems operate and perform across the service area is critical to successful wireless call management and ECC operational effectiveness. The sharing of test data and a candid discussion of the test results and processes should be a fundamental element in any testing plan.

10.8 Testing Contact Information

10.8.1 The ECC as a partner in the delivery of effective wireless E9-1-1 service and response, should establish and maintain accurate contact information for each WSP and their contractors. The level of cooperation and coordination is enhanced by the ability of both parties to make direct contact with the appropriate individuals to discuss the issues, answer questions and prepare for testing of any type. The ability to reach appropriate persons on a 24/7 basis also provides the ECC or the WSP the opportunity to alert each other of potential testing schedule changes. The ECC should also ensure that the WSP has the appropriate contact information for the ECC and any changes or modifications to personnel or contact information should be communicated to the WSP in the serving area.

10.9 Network Change Control

10.9.1 It is recommended that the partnership between the ECC and the WSP(s) include a well-defined process which allows the ECC to be alerted to any network dynamics or equipment modifications that are taking place, or have occurred, that may impact the system for a period of time. Examples of such activity may include but are not limited to adding sites, rehoming, major antennae reconfiguration (call routing impact) as well as discontinued use of tower sites and antenna locations. The relationship developed over time through on going cooperative, collaborative efforts has positive benefits for the wireless consumer, ECC, and Wireless Service Providers.

10.9.2 All the parties' benefit from such notice so they understand the impact on the delivery of service to the wireless E9-1-1 caller and the first responders.

Specific Reference Recommendations:

- ATIS-0500009 High Level Requirements for End-to-End Functional Testing (fees apply) https://webstore.ansi.org/Standards/ATIS/ATIS0500009
- ATIS-05000010, Maintenance Testing: 3.4 Accuracy Maintenance Test Trigger Mechanisms (fees apply) https://webstore.ansi.org/Standards/ATIS/ATIS0500010
- ATIS Define Topologies & Data Collection Methodology (ATIS-0500011) (fees apply) https://webstore.ansi.org/Search/Find?in=1&st=ATIS-0500011
- ATIS 0500013 Wireless Indoor Testing (fees apply) https://webstore.ansi.org/Search/Find?in=1&st=ATIS-0500013
- OET-71 (FCC website) https://transition.fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oet71/oet71.pdf

GLOSSARY

ALI **Automatic Location Identification** is the automatic display at the PSAP of the address/location of the device that called 9-1-1.

ANI **Automatic Number Identification i**s the automatic display at the PSAP of the telephone number associated with the line that called 9-1-1.

ANS **American National Standard** is a standard that has been sponsored by an ANSI-accredited SDO and met ANSI's Essential Requirements.

ANSI **American National Standards Institute** is a private, not-for-profit organization that oversees the creation, promulgation, and use of thousands of norms and guidelines that directly impact businesses in almost every sector. ANSI facilitates the development of American National Standards by accrediting the procedures of SDOs. These groups work cooperatively to develop voluntary national consensus standards.

APCO **Association of Public-Safety Communications Officials International** is the world's oldest and largest organization of public safety communications professionals. It serves the needs of public safety communications practitioners worldwide - and the welfare of the general public as a whole - by providing complete expertise, professional development, technical assistance, advocacy, and outreach.

ATIS **Alliance for Telecommunications Industry Solutions** is a forum where information and communications technology companies convene to find solutions to their most pressing shared challenges. ATIS is accredited by ANSI and is the North American Organizational Partner for 3GPP.

CAD **Computer Aided Dispatch** is a computer-based system that assists PSTs with activities such as call input, dispatching, call status maintenance, event notes, field unit status and tracking, and call resolution and disposition.

CLEC **Competitive Local Exchange Carrier** is a company that provides an alternative service to the Local Exchange Carrier (LEC) within its territory.

CMRS **Commercial Mobile Radio Service** is a regulatory classification for mobile phone service created by the U.S. Federal Communications Commission as part of the Omnibus Budget Reconciliation Act of 1993.

CoS **Class of Service** is a designation of the type of wireless location service. (MOBL, W911, WRLS, WPH1, WPH2, WCVC).

CPE **Customer Premise Equipment** enables the delivery of a voice-generated request for assistance from a 9-1-1 caller to a PST.

CTIA **The Cellular Telecommunications Industry Association,** is an International nonprofit membership organization that has represented the wireless communications industry since 1984. https://www.ctia.org

CTO	**Public Safety Communications Training Officer** is a telecommunicator who consistently demonstrates superior skills, knowledge, and professionalism on the job. One who is responsible for implementing training program(s) in accordance with local, state, federal, tribal, and departmental mandates.
E9-1-1	**Enhanced 9-1-1** is a system that enables the delivery of a caller's phone number and location information to the PSAP receiving the call.
ECC	**Emergency Communications Center is** a facility with capabilities that include intelligence collection and monitoring, 9-1-1 multimedia traffic processing, full scale dispatch, and incident command capabilities.
ESIF	The Emergency Services Interconnection Forum is a committee of ATIS. ESIF is comprised of wireless and wireline network service providers, manufacturers and providers of support services that facilitate the identification and resolution of technical issues related to the interconnection of telephony and emergency services networks.
FCC	**Federal Communications Commission** regulates interstate and international communications by radio, television, wire, satellite, and cable in all fifty states, the District of Columbia, and U.S. territories. An independent U.S. government agency overseen by Congress, the Commission is the federal agency responsible for implementing and enforcing America's communications laws and regulations.
GMLC	**Gateway Mobile Location Center** is a computer processing device that can receive and process requests from a location service client (such as a location mapping software application) which are forwarded to the serving mobile location center. The GMLC is used to discover and communicate with a location server that determines the position of the mobile device.
LEC	**Local Exchange Carrier** is a company that provides local telephone service to the public in a specific geographic area.
LOCATE	**Locate Our Citizens at Times of Emergency was** a project created by APCO to find ways to hasten the deployment of wireless 9-1-1 Phase II.
MOU	**Memorandum of Understanding** is a formal agreement between two or more parties. Companies, organizations, and governmental entities can use MOUs to establish official partnerships.
MPC	**Mobile Positioning Center** is a functional entity that provides an interface between the wireless originating network and the emergency services network. The MPC retrieves, forwards, stores, and controls position data within the location services network.
MSAG	**Master Street Address Guide** is a database of street names and house number ranges within their associated communities defining Emergency Service Zones and their associated ESNs to enable proper routing of 9-1-1 calls.

NEAD **National Emergency Address Database** was established to help 9-1-1 professionals and other emergency responders locate wireless 9-1-1 callers indoors by supporting the delivery of dispatchable location information (street address plus apartment, office number or other information needed to find a caller).

NENA **National Emergency Number Association** is an organization whose mission is to work with 9-1-1 professionals nationwide, public policy leaders, emergency services and telecommunications industry partners, like-minded public safety associations, and other stakeholder groups to develop and carry out critical programs and initiatives, to facilitate the creation of an IP-based Next Generation 9-1-1 system, and to establish industry leading standards, training, and certifications.

OET **Office of Engineering and Technology Office** is part of the FCC and their mission is to manage the spectrum and provide leadership to create new opportunities for competitive technologies and services for the American public.

pANI **Pseudo-Automatic Number Identification** is a feature by which automatic number identification is provided to a public safety answering point of the ten-digit telephone number of the specific cell site or cell site sector from which a wireless call originated.

PSAP **Public Safety Answering Point** is a facility equipped and staffed to receive emergency and non-emergency public safety calls for service via telephone and other communication devices. Emergency calls for service are answered, assessed, classified, and prioritized.

PST **Public Safety Telecommunicator** is an individual employed by a public safety agency as the first of the first responders whose primary responsibility is to receive, process, transmit, and/or dispatch emergency and non-emergency calls for service for law enforcement, fire, emergency medical, and other public safety services via telephone, radio, and other communication devices.

SDC **Standards Development Committee** is a standing Committee that provides the means, methods, and actions necessary for the development and maintenance of standards.

SOP **Standard Operating Procedure** is a written procedure prescribed for repetitive use as a practice, in accordance with agreed upon specifications aimed at obtaining a desired outcome.

SSP **System Service Provider** provides systems and support necessary to enable 9-1-1 calling for one or more PSAPs in a specific geographic area. It is typically, but not always, an Incumbent Local Exchange Carrier.

UBP Uncompensated Barometric Pressure

WDL1 **Wireless Dispatchable Location 1** provides civic oriented data (address and building zone where appropriate). Includes traditional WPH2 geodetic data, the X, Y, and uncertainty data associated with the caller's location (where available).

WDL2 **Wireless Dispatchable Location 2** provides civic oriented data (address and sub-address location where appropriate). Includes traditional Wireless Phase II (WPH2) geodetic data, the X, Y, and uncertainty associated with the caller's location (where available).

WCVC **Wireless E9-1-1 Civic Address** provides civic oriented data (address). Includes traditional WPH2 geodetic data, the X, Y, and uncertainty data associated with the caller's location (where available).

WPH2 **Wireless Phase II Call** must be implemented in an area by local 9-1-1 systems and wireless carriers. Phase II allows call takers to receive both the caller's wireless phone number and their estimated location information.

WSP **Wireless Service Provider** is an organization that provides wireless services to its customers, including cellular services, satellite services, and internet services.

ACKNOWLEDGMENTS

APCO recognizes the working group members who provided their expertise in updating this document to successfully create this standard.

Judith Weshinskey-Price - Chair
Pinellas County Safety and Emergency Services
Largo, FL

Darrell True, Vice Chair
Metacomet Emergency Communications Center
Norfolk, VA

Karen Allen
Security System Analyst
Phoenix, AZ

Lenny BeckRoda
Citizen APP
New York, NY

Cheryl Giggetts
CTA Consultants
Lynchburg, VA

Jeanna Green
T-Mobile
Overland Park, KS

Ryan Jensen
T-Mobile
Bellevue, WA

Roger Marshall
Comtech Safety & Security Technologies
Seattle, WA

Susan Petrimoulx
Essential Management Solutions, LLC
Pottsville, PA

Susan Sherwood
Verizon Wireless
Roswell, GA

Taryn Sofie
Cencom E9-1-1 Public Safety Communications Center
Round Lake Beach, IL

Ron Whitehurst
LaaSer Critical Communications
Atlanta, GA

Mindy Conner Adams, ENP, RPL, CPE
APCO International
Daytona Beach, FL

Aimee Jarrell
APCO International
Daytona Beach, FL

Appendix A

FCC Wireless Accuracy Modifications
DA 15-433
Wireless E911 Location Accuracy Requirements

Fourth Report and Order
FCC No. 15-9
PS Docket No. 07-114
Released February 3, 2015

This Guide is prepared in accordance with the requirements of Section 212 of the Small Business Regulatory Enforcement Fairness Act of 1996. It is intended to help small entities—small businesses, small organizations (non-profits), and small governmental jurisdictions—comply with the new rules adopted in the above-referenced FCC rulemaking docket(s). This Guide is not intended to replace the rules and, therefore, final authority rests solely with the rules. Although we have attempted to cover all parts of the rules that might be especially important to small entities, the coverage may not be exhaustive. This Guide may not apply in a particular situation based upon the circumstances, and the FCC retains the discretion to adopt approaches on a case-by-case basis that may differ from this Guide, where appropriate. Any decisions regarding a particular small entity will be based on the statute and regulations.

In any civil or administrative action against a small entity for a violation of rules, the content of the Small Entity Compliance Guide may be considered as evidence of the reasonableness or appropriateness of proposed fines, penalties, or damages. Interested parties are free to file comments regarding this Guide and the appropriateness of its application to a particular situation; the FCC will consider whether the recommendations or interpretations in the Guide are appropriate in that situation. The FCC may decide to revise this Guide without public notice to reflect changes in the FCC's approach to implementing a rule, or to clarify or update the text of the Guide. Direct your comments and recommendations, or calls for further assistance, to the FCC's Consumer Center:

1-888-CALL-FCC (1-888-225-5322)
TTY: 1-888-TELL-FCC (1-888-835-5322)
Fax: 1-866-418-0232

Objectives of the Proceeding

In the *Fourth Report and Order*, the Commission adopts measures designed to significantly enhance the ability of Emergency Communications Centers (ECCs) to identify accurately the location of wireless 9-1-1 callers when the caller is located indoors, and to strengthen existing E911 location accuracy rules for outdoor as well as indoor calls. As consumers increasingly replace traditional landline telephony (*i.e.*, wireline) with wireless phones, most wireless calls are now made indoors, and a majority of 9-1-1 calls are from wireless phones. Current location technology is optimized for outdoor calls and may not work as well for indoor wireless calls. A significant objective of the Commission in adopting these measures is to close the gap between the performances of outdoor versus indoors wireless 9-1-1 calls.

The rules allow sufficient time for development of applicable standards, establishment of testing mechanisms, and deployment of new location technology in both handsets and networks. Moreover, the requirements apply only to the extent that the ECC has requested the required services and has a mechanism for recovering its costs associated with them.

The Commission gave significant weight to the "Roadmap for Improving E911 Location Accuracy" that was agreed to in November 2014 (amended January 2015) by the Association of Public Safety Communications Officials, the National Emergency Number Association, and the four national wireless commercial mobile radio service (CMRS) providers ("Amended Roadmap"), as well as the "Parallel Path for Competitive Carriers' Improvement of E911 Location Accuracy Standards" that was submitted by the Competitive Carriers Association to address the considerations faced by the non-nationwide (regional, small, and rural) CMRS providers. At the same time, the rules incorporate "backstop" requirements derived from the Commission's original proposals in the *Third Further Notice.*

The rules are in addition to, not a replacement of, the existing E911 location accuracy rules applicable to outdoor calls, which remain in effect.[3] In establishing these requirements, the Commission's objective is that all Americans using mobile phones – whether they are calling from urban or rural areas, from indoors or outdoors – have technology that is functionally capable of providing accurate location information so that they receive the prompt support they need in times of emergency.

Finally, we note that many of the rules require covered entities to collect and submit information to the Commission. Notwithstanding the deadlines set forth below, those aspects of the rules do not become effective until the Office of Management and Budget (OMB) issues a control number for that information collection. The Commission will issue a public notice notifying the public of OMB action, and of the date on which the information collection aspects of the rules will become effective assuming OMB approval.

Key Definitions

Dispatchable location: A location delivered to the ECC by the CMRS provider with a 9-1-1 call that consists of the street address of the calling party, plus additional information such as suite, apartment, or similar information necessary to adequately identify the location of the calling party. The street address of the calling party must be validated and, to the extent possible, corroborated against other location information prior to delivery of dispatchable location information by the CMRS provider to the ECC.

Media Access Control (MAC) Address: A location identifier of a Wi-Fi access point.

[3] 47 C.F.R. § 20.18(h).

National Emergency Address Database (NEAD): A database that utilizes MAC address information to identify a dispatchable location for nearby wireless devices within the CMRS provider's coverage footprint.

Nationwide CMRS provider: A CMRS provider whose service extends to a majority of the population and land area of the United States.

Non-nationwide CMRS provider: Any CMRS provider other than a nationwide CMRS provider.

Test Cities: The six cities (San Francisco, Chicago, Atlanta, Denver/Front Range (Colorado), Philadelphia, and Manhattan Borough (New York City)) and surrounding geographic areas that correspond to the six geographic regions specified by the February 7, 2014, ATIS Document,
"Considerations in Selecting Indoor Test Regions,": for testing of indoor location technologies.

Steps a Small Entity Must Take to Comply with The Final Rules

A number of the rules provide less restrictive requirements or extended compliance periods for non-nationwide CMRS providers. This summary extends only to the requirements as they apply to such non-nationwide CMRS providers.

Indoor Location Accuracy Standards

Regarding horizontal location, non-nationwide CMRS providers shall provide (1) dispatchable location or (2) x/y location within fifty meters, for the following percentages of wireless 9-1-1 calls within the following timeframes, measured from the effective date of adoption of this rule:

(1) Within 2 years: 40 percent of all wireless 9-1-1 calls.
(2) Within 3 years: 50 percent of all wireless 9-1-1 calls.
(3) Within 5 years or within six months of deploying a commercially operating Voice over Long-Term Evolution (VoLTE) platform in their network, whichever is later: 70 percent of all wireless 9-1-1 calls.
(4) Within 6 years or within one year of deploying a commercially operating VoLTE platform in their network, whichever is later: 80 percent of all wireless 9-1-1 calls.

Regarding vertical location, non-nationwide CMRS providers shall provide vertical location information with wireless 9-1-1 calls within the following timeframes, measured from the effective date of this rule:

(1) Within 3 years: *all* CMRS providers shall make uncompensated barometric data available to ECCs with respect to any 9-1-1 call placed from any handset that has the capability to deliver barometric sensor information.
(2) Within 7 years: non-nationwide CMRS providers that serve any of the top twenty-five cellular market areas (CMAs) must deploy either (1) dispatchable location, or (2) z-axis technology in compliance with any z-axis accuracy metric that has been approved by the Commission. In those CMAs where dispatchable location is used, non-nationwide CMRS providers must ensure that the NEAD is populated with a sufficient number of total dispatchable location reference points to equal 25 percent of the CMA population. In those CMAs where z-axis technology is used, non-nationwide CMRS providers must deploy z-axis technology to cover 80 percent of the CMA population.

(3) Within 9 years, non-nationwide CMRS providers that serve any of the top 50 CMAs must deploy either (1) dispatchable location or (2) such z-axis technology in compliance with any z-axis accuracy metric that has been approved by the Commission.

Indoor Location Accuracy Testing and Live Call Data Reporting

CMRS providers must establish an indoor location accuracy test bed within 12 months of the rules becoming effective. Subsequently, CMRS providers must validate technologies intended for indoor location (including dispatchable location technologies and technologies that deliver horizontal and/or vertical coordinates) through an independently administered and transparent test bed process, in order for such technologies to be presumed to comply with the location accuracy requirements.

To be considered valid and compliant, the test bed must, at a minimum:

- include testing in representative indoor environments, including dense urban, urban, suburban, and rural morphologies.
- test for performance attributes including location accuracy (ground truth as measured in the test bed), latency (Time to First Fix), and reliability (yield).
- make each test call (or equivalent) independent from prior calls, and base accuracy on the first location delivered after the call is initiated.
- measure yield separately for each individual indoor location morphology (dense urban, urban, suburban, and rural) in the test bed, and based upon the specific type of location technology that the provider intends to deploy in real-world areas represented by that morphology.

    - Providers must base the yield percentage based on the number of test calls that deliver a location in compliance with any applicable indoor location accuracy requirements, compared to the total number of calls that successfully connect to the testing network.
    - Providers may exclude test calls that are dropped or otherwise disconnected in 10 seconds or less from calculation of the yield percentage (both the denominator and numerator).

Any CMRS providers, including non-nationwide providers, providing service in any of the Test Cities or portions thereof must collect and report aggregate data on the location technologies used for live 9-1-1 calls in those areas. Those providers shall identify and collect information regarding the location technology or technologies used for each 9-1-1 call in the reporting area during the calling period, and shall report Test City call location data on a quarterly basis to the Commission, the National Emergency Number Association, the Association of Public Safety Communications Officials, and the National Association of State 9-1-1 Administrators, with the first report due 18 months from the effective date of rules adopted in this proceeding.

For non-nationwide CMRS providers that do not provide service in any of the Test Cities or portions thereof, and thus cannot participate directly in the test bed, the test bed administrator must make the data from the test bed available to such non-nationwide CMRS providers under confidentiality requirements that will later be established by the test bed administrator. Enabling non-nationwide CMRS providers to access test data under the same confidentiality conditions as participating CMRS providers enables smaller CMRS providers to demonstrate compliance at reasonable cost.

Except as noted in the next paragraph, CMRS providers shall also provide quarterly live call data on a more granular basis that allows evaluation of the performance of individual location technologies within different morphologies (*e.g.*, dense urban, urban, suburban, rural). To the extent available, live call data

shall delineate based on a per technology basis accumulated and so identified for: (1) each of the Alliance for Telecommunications Industry Solutions Emergency Services Interconnection Forum (ATIS ESIF) morphologies; (2) on a reasonable community level basis; or (3) by census block.
Non-nationwide CMRS providers that operate in a single Test City need only report live 9-1-1 call data from that city or portion thereof that they cover, while such providers operating in more than one Test City must report live 9-1-1 call data only in half of the regions (as selected by the provider). If a non-nationwide CMRS provider begins coverage in a Test City it previously did not serve, it must update its certification to reflect this change in its network and begin reporting data from the appropriate areas. All non-nationwide CMRS providers must report their Test City live call data every 6 months, beginning 18 months from when the rules become effective.
Non-nationwide CMRS providers *not* providing coverage in any of the Test Cities can satisfy the collection and reporting requirement by collecting and reporting data based on the largest county within their footprints. Further, where a non-nationwide CMRS provider serves more than one of the ATIS ESIF morphologies, it must include a sufficient number of representative counties to cover each morphology.

Submission of Plans and Reports

No later than 24 months from the effective date of these rules, non-nationwide CMRS providers shall report to the Commission on their initial plans for meeting the indoor location accuracy requirements, and further shall file a progress report on implementation of indoor location accuracy requirements; these plans and reports can be submitted in the same filing in PS Docket No. 07-114. At 36 months, *all* CMRS providers shall provide additional progress reports, indicating what progress they have made consistent with their implementation plans.
For any CMRS provider participating in the development of the NEAD database, the 36-month progress report must include detail as to the implementation of the NEAD database. The four nationwide CMRS providers committed to creating and populating the NEAD in the Amended Roadmap agreement. For any CMRS provider that chooses to utilize the NEAD to comply with the Commission's requirements, prior to accessing and using the NEAD, it must certify to the Commission that it will not use the NEAD for any non-9-1-1 purpose, except as otherwise required by law. Additionally, should aspects of a CMRS provider's dispatchable location operation not be covered by the four nationwide providers' privacy and security plan for the NEAD, the provider should file an addendum to ensure that the protections outlined in the NEAD plan will cover the provider's dispatchable location transactions end-to-end.

Confidence and uncertainty data

CMRS providers shall provide for all wireless 9-1-1 calls (indoor and outdoor), x- and y-axis (latitude, longitude) confidence and uncertainty information (C/U data) on a per-call basis upon the request of an ECC. The data shall specify the caller's location with a uniform confidence level of 90 percent, and the radius in meters from the reported position also with a uniform confidence level of 90 percent. All entities responsible for transporting confidence and uncertainty between CMRS providers and ECCs, including LECs, CLECs, owners of E911 networks, and emergency service providers, must enable the transmission of confidence and uncertainty data provided by CMRS providers to the requesting ECC.
Upon meeting the 3-year and 6-year horizontal location benchmarks, CMRS providers shall provide with wireless 9-1-1 calls that have a dispatchable location the C/U data for the x- and y-axis (latitude, longitude) at the uniform 90 percent confidence level. Please note that the 6-year horizontal location benchmark may be extended by later VoLTE deployment by non-nationwide providers (*i.e.*, dispatchable location or x/y location within fifty meters for 80 percent of all wireless 9-1-1 calls).

Latency Requirements for Outdoor 9-1-1 Calls

For outdoor calls only, the rules now require that, to be compliant, a call must provide the specified degree of location accuracy within a maximum latency period of 30 seconds, as measured from the time the user initiates the 9-1-1 call to the time the location fix appears at the location information center. The CMRS provider may elect not to include for purposes of measuring compliance any calls lasting less than 30 seconds.

Recordkeeping Requirements

The rules require that all CMRS providers, including non-nationwide providers, collect and retain for two years 9-1-1 call tracking data for all wireless 9-1-1 calls placed on their networks. Specifically, they must record information on all live 9-1-1 calls, including, but not limited to, the positioning source method used to provide a location fix associated with the call, and record the confidence and uncertainty data that they provide. This information must be made available to ECCs upon request. As noted above, these recordkeeping requirements are subject to OMB approval.

Internet Links

https://apps.fcc.gov/edocs_public/attachmatch/DOC-332342A1_Erratum.docx
https://apps.fcc.gov/edocs_public/attachmatch/FCC-15-9A1.docx
https://apps.fcc.gov/edocs_public/attachmatch/FCC-15-9A2.docx (Wheeler Statement)
https://apps.fcc.gov/edocs_public/attachmatch/FCC-15-9A3.doc (Clyburn Statement)
https://apps.fcc.gov/edocs_public/attachmatch/FCC-15-9A4.docx (Rosenworcel Statement)
https://apps.fcc.gov/edocs_public/attachmatch/FCC-15-9A5.docx (Pai Statement)
https://apps.fcc.gov/edocs_public/attachmatch/FCC-15-9A6.docx (O'Reilly Statement)
https://dps.mn.gov/divisions/ecn/programs/911/Documents/APCO_LOCATE_Effective_Practices.pdf
EP 380781-785 reference

NOTES

APCO International
351 N. Williamson Blvd.
Daytona Beach, FL 32114

www.apcop43.org