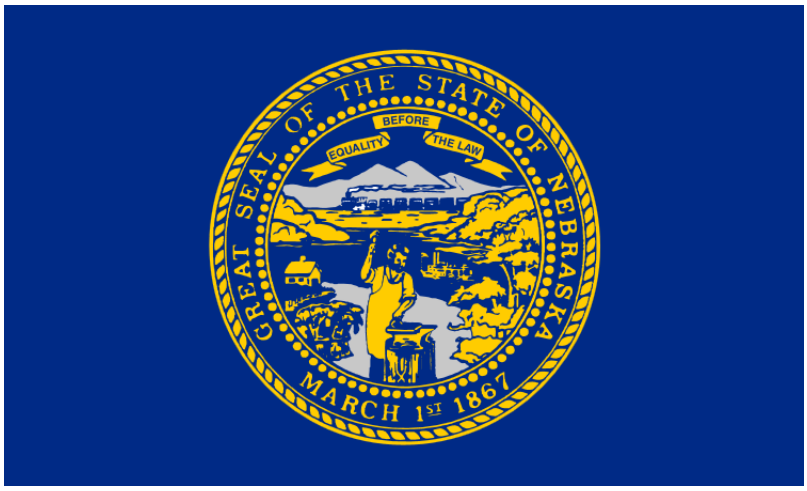

9-1-1 ASSESSMENT AND ACTION PLAN REPORT

FINAL REPORT

SUBMITTED JULY 12, 2016 TO:
STATE OF NEBRASKA PUBLIC SERVICE COMMISSION

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EXECUTIVE SUMMARY

The tragic events of February 12, 2016, which resulted in three lives lost, illustrate for the 9-1-1 community—and all those involved in its mission—the importance of operational awareness, technical comprehension, due diligence, training, and quality assurance. Every 9-1-1 call, each and every day, is an opportunity to improve service to the public calling for help.

With the passage of Legislative Bill 938, the State of Nebraska Legislature recognized the significance of statewide coordination, training standards development, uniform technical training, and quality assurance (QA) for 9-1-1 service throughout the state, and has identified the Nebraska Public Service Commission (PSC) as the central point for these functions. While the call receipt and dispatch of emergency personnel and services likely always will be a local responsibility, the oversight and standardization of services that can be accomplished by the PSC will further the mission of 9-1-1, which is to effectively link the public in need with the public safety response services that are best equipped to handle their situation.

The incident cited above is an example of how the PSC can assist 9-1-1 centers across the state to develop the operational improvements, guidelines, standards and training needed to elevate the quality of 9-1-1 service in Nebraska. The PSC asked Mission Critical Partners, Inc. (MCP) to assist with the technical and operational review of the February incident, and tasked MCP to focus on standards and best practices in order to provide the PSC with actionable recommendations.

The findings and recommendations in this report leverage lessons learned from the February incident and are applicable to public safety answering point (PSAP) operations in general. The recommendations are the result of cooperation with the Douglas County (County) PSAP management and staff who provided the background information related to the 9-1-1 call in question. They also assisted MCP with gathering information on the processes and technology used in the PSAP, as well as a comprehensive review of existing standards and best practices applicable to 9-1-1 functions and operations.

Reviews of this nature are difficult. One never truly can recreate the 9-1-1 call under exactly the same circumstances and emotions that occurred as the situation was happening. It is very easy to make assumptions about how an incident unfolded, or how and why people made the decisions they made, in a retrospective view when the outcome is known.

It is this path forward, for the PSC and the 9-1-1 community in general, which this assessment provides. The PSC, as the custodian of 9-1-1 service quality in Nebraska, has a recommended direction, the authority and, most importantly, the responsibility to make significant and meaningful changes to improve 9-1-1 service in Nebraska.

SCOPE

MCP was retained by the PSC to review the technical implications and operational procedures related to a 9-1-1 call that occurred on the morning of February 12, 2016, in an effort to consider effective practices and recommendations for all PSAPs in the state of Nebraska. The tragic events associated with that call resulted in the loss of three lives. The primary goal of this assessment is to determine whether any technical or operational improvements can be recommended to enhance the quality of 9-1-1 service in Nebraska and improve outcomes of future 9-1-1 calls.

BACKGROUND

At 10:12:20 on the morning of February 12, 2016, a 9-1-1 call was received at the Douglas County Emergency Communications (DCEC) Department from a Sprint wireless device. There was no discernable voice communication on the call despite query from the call-taker. The call-taker attempted to query the caller using a teletypewriter (TTY) device, which is normal practice and in keeping with Americans with Disabilities Act (ADA) recommendations. After receiving no response from the caller, the call-taker disconnected the call and attempted to call the party back. No answer was received on the callback and no further action was taken by the call-taker. This process is normal for a non-responsive wireless 9-1-1 call.

At 10:21:31, a DCEC call-taker received and answered a 9-1-1 call from a male calling from a Sprint device. Upon the normal answering query from the County call-taker, the calling party stated that he had a medical emergency and that he had been shot. The call-taker then initiated a transfer to the Fire/Rescue position. The Fire/Rescue dispatcher answered with the standard DCEC query. The caller was not audible. Several more queries of the caller were made by the Fire/Rescue dispatcher. The caller still was not audible.

The dispatcher then asked the call-taker if the caller had said anything. It is at this point that the call-taker offered that the caller said he had been shot. The call-taker and dispatcher shared information about the location of the call displayed and the confidence factor provided with the call (400 meters). It was determined that a Law Enforcement response should be initiated to the tower location displayed on the automatic location identification (ALI) record. The Fire/Rescue dispatcher disconnects the caller having received no further response from several queries.

At 10:24:21 the Fire/Rescue dispatcher calls the wireless handset back. A male answered and stated that he had been shot. When the Fire/Rescue dispatcher asked him where he was, the caller stated that he did not know the address. He made it known, however, that there was a man at that location with a gun. The callback to the victim's phone disconnected at 10:25:19. The reason for the disconnect is unknown.

The Fire/Rescue dispatcher enters a dispatch to the Phase 1 location displayed, which was 15002 Blondo Street. According to DCEC records, additional attempts to call the wireless handset were made by the Fire/Rescue dispatcher, in an attempt to obtain more information on the location of the caller and the situation. There were several disconnects and subsequent callbacks to the wireless device. Communication was established between the dispatcher and the original caller on all of those attempts. It is unknown what caused the communication between the wireless handset and the 9-1-1 Center to be terminated on the subsequent calls. The final disconnect was noted at 10:35:16.

There are numerous factors regarding this particular 9-1-1 call that will be thoroughly explored in the sections below. The focus of this report is to assess the procedural and operational actions, as well as the technical performance and activities, as they relate to standards of operation and best practices that normally would be experienced in a PSAP for a call of this nature.

The goal is to provide the PSC with sufficient information to establish effective practices related to wireless 9-1-1 calls and to enhance 9-1-1 services across the state.

TECHNICAL FINDINGS AND RECOMMENDATIONS

FINDING #1: WIRELESS ROUTING DOCUMENTATION

The initial wireless 9-1-1 call, using a Sprint handset, was routed to the DCEC via a Sprint tower. The second call to 9-1-1 from the same handset was routed to the PSAP using a Verizon Wireless tower.

The PSC received a response from Sprint explaining many of the nuances involved in routing a 9-1-1 call to the appropriate PSAP, and why some calls are delivered by another carrier's network. The calls originated from an indoor location that is not currently covered under Federal Communications Commission (FCC) wireless accuracy rules.

It is critical that the PSC, DCEC specifically, and indeed any PSAP, understands the many use cases involved with the delivery of wireless 9-1-1 calls. PSAPs are required to complete a wireless routing spreadsheet for each carrier's towers and cell sectors at the time of tower activation, and may be requested to validate routing when other significant changes occur in the tower coverage footprint. The spreadsheet contains the baseline information that is key to determining which PSAP will receive a wireless 9-1-1 call and how the associated tower information will be displayed in the ALI record. At the time of MCP's visit to the DCEC, we were verbally advised that the DCEC participates in wireless testing when a carrier notifies it regarding a new or modified tower that requires validation. MCP did not review individual wireless routing spreadsheets.

Recommendation

The most effective method for understanding wireless routing use cases for the Nebraska PSAPs is for the PSC to undertake wireless integrity testing for the state and its bordering jurisdictions. Priority

should be given to assessing wireless performance in Douglas County and its nearby regions. The Association of Public-Safety Communications Officials (APCO) recommends that every Authority Having Jurisdiction (AHJ) evaluates the performance of current systems in their service areas. While carriers are required to perform accuracy testing within their networks, the tests performed by jurisdictions provides insight into the actual user experience. The PSC should assure that PSAPs and AHJs validate all wireless routing information and identify routing gaps/overlaps in their jurisdictions. PSAPs should be further required to document their processes and methodology for validating wireless routing information.

MCP also recommends that the PSC consider a public education campaign centered on wireless 9-1-1, the importance of knowing one's location, the limitations of indoor wireless service and the differences in various technologies (wireline vs. wireless). The public's understanding of how 9-1-1 works—particularly wireless 9-1-1—could be greatly enhanced by such a campaign and would help to improve service delivery.

Standards and best practices consulted include the following:

- *National Emergency Number Association (NENA) 57-002, NENA E9-1-1 Wireless Maintenance Call Routing & Testing Validation Standard, June 5, 2007*
- *FCC Network Reliability and Interoperability Council (NRIC) Best Practices*
- *APCO/NENA ANS 1.102.2-2010, APCO-NENA Public Safety Answering Point (PSAP) Service Capability Criteria Rating Scale, July 28, 2010*
- *APCO ANS 3.103.2-2013, Wireless 9-1-1 Deployment and Management Effective Practices Guide*

Unless otherwise noted, the remaining findings and recommendations relate to the second wireless 9-1-1 call routed by Verizon's Blondo Street tower.

FINDING #2: MEDIA REPORTS

Initial and subsequent reports provided by the DCEC to the media and to the PSC indicated that the PSAP only received Phase 1 location data for the call in question. Subsequent research, however, verify that Phase 2 location data was transmitted and was available to the call-taker and the Fire/Rescue dispatcher.

A comprehensive chronology of events is an essential component of any investigation. PSAP leadership must thoroughly review and validate all incident-related information before it is released to the media and the PSC.

High-profile and volatile events often result in a flurry of requests for incident details and other information. A comprehensive and detailed chronology had not been completed before information was released and therefore resulted in confusion.

Subsequent reports from the DCEC and research by MCP provide additional technical considerations that are discussed in detail in the findings below.

Recommendation

Media reports of incidents, especially high-profile and volatile events, need to be technically accurate and sound. Information should be based on what is known and not what is anecdotal or not fully verified. Public information officers (PIOs) should be consulted, if available, for any interaction with the media. Training for PSAP leadership on media relations is essential, even if a PIO is used. Premature release of information before it is fully investigated is not in the best interest of any agency.

The PSC should establish a media relations training requirement and work with the Nebraska PSAP leadership to assure that all agencies are aware of best practices for managing external release of information related to incidents within their jurisdictions. Moving forward if discussion is required regarding the veracity of information provided by a PSAP, it is best pursued independently of technical and operational considerations.

Standards and best practices consulted include the following:

- *Federal Emergency Management Agency (FEMA) 517, National Incident Management System (NIMS), Basic Guidance for Public Information Officers (PIOs), November 2007*
- *FEMA IS-29, Public Information Officer Awareness*
- *FEMA IS-702.A, NIMS Public Information Systems, September 2011*
- *NIMS Intelligence/investigations Function Guidance and Field Operations Guide, October 2013*

FINDING #3: WIRELESS CALL PROCESSING/REBIDS

APCO's *Wireless 9-1-1 Deployment and Management Effective Practices Guide #380743* recommends that "the Agency 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 [wireless Phase 2] Class of Service." Further, APCO ANS 3.103.2-2013, *Wireless 9-1-1 Deployment and Management Effective Practices Guide,* recommends that the PSAP not rebid (automatically or manually) less than 30 seconds after the call is first presented to a call-taker. Subsequent rebids should be at no less than 30-second intervals.

Reports provided to MCP at the time of our visit to the DCEC indicated that the call-taker at position 6 initiated multiple rebids of ALI location in rapid succession, some with only a few seconds in between each rebid request. Repeated rebids with too short of an interval may prevent the PSAP from obtaining the best location information, and may have had a negative effect on the data received for this call.

The Fire/Rescue dispatcher received a Phase 2 ALI screen and did not rebid for updated location. Regardless of the class of service reported for the initial call, an appropriately timed rebid effort may provide the public safety telecommunicator with access to updated location data. It is our assessment that the initial call taker rebid too rapidly and the dispatcher should have rebid as per agency policy.

A PSAP's customer premises equipment (CPE) can be configured for either manual or automatic rebid of wireless ALI information. The choice of electing the manual or automatic rebid process is left to the AHJ. Training of PSAP personnel on the appropriateness of a rebid, the timing of a rebid, what they can expect to learn from a rebid request, and the nuances of each carrier's system is necessary for any PSAP to fully understand the wireless technology implications.

Recommendation

Rebid standards and practices should be part of a PSAP's initial training program and annual refresher training should be provided for all call-taking and dispatch personnel.

PSAPs should consider the appropriateness of enabling a single automatic rebid 30 seconds after receipt of a wireless 9-1-1 call. Relying on telecommunicators to "watch the clock" for the initial 30-second timeframe may be difficult, especially at a busy PSAP (such as the DCEC) with frequent in-progress calls. Technical issues that appear to be a result of rebidding should be pursued as a formal trouble ticket with the local exchange carrier (LEC) and CPE provider to identify the root cause. The PSC should consider establishing a best practices recommendation for PSAPs in Nebraska regarding rebid of Phase 1 and Phase 2 data.

Standards and best practices consulted include the following:

- *APCO ANS 3.103.2-2013, Wireless 9-1-1 Deployment and Management Effective Practices Guide*
- *FCC NRIC Best Practices*
- *APCO/NENA ANS 1.102.2-2010, APCO-NENA Public Safety Answering Point (PSAP) Service Capability Criteria Rating Scale, July 28, 2010*

FINDING #4: WIRELESS CALL PROCESSING-SUPPORT SYSTEMS

MCP reviewed information from CenturyLink, Verizon and the West Corporation (formerly Intrado) VIPER® CPE Power Management Information System (MIS) for the calls related to the wireless 9-1-1 incident in question. MIS reports typically provide information related to call detail records (CDR) such as Automatic Number Identification (ANI)/ALI information, call start and end time, call duration, call transfers, ALI rebids and call destination. Each PSAP's call-handling system is unique to its specific environment. The amount, type and layout of CDR information available within MIS reports typically is configured by vendors in collaboration with the PSAP during system implementation. While MIS reports provide considerable insight, there is risk of misinterpretation if the PSAP and the target audience is not familiar with all facets of the specific system configuration. When reviewing a complex wireless incident that includes technical data from multiple internal and external sources, it is especially important to assure that each data point is assessed within the appropriate context so as not to confuse or compromise the review. MCP found several data points within the DCEC MIS reports that are difficult to interpret without detailed technical call flow diagrams to qualitatively explain their meaning.

Recommendation

The PSC should work collaboratively with PSAPs in the state to ensure that each agency possesses a detailed understanding of how its call-handling system is configured. Call-flow diagrams should be created as part of initial system implementation testing and amended as necessary when modifications to the system are made. Call flows should be created for each class of service (CoS) enabled by the jurisdiction. The diagrams and accompanying documentation should include examples of MIS reports (e.g., call details, call events, and ALI history) for each CoS value. PSAPs should also be encouraged to implement a formal change management process and policy that mandates documentation of any and all changes to mission critical technologies. Adhering to a formal process will enable PSAPs to maintain up-to date and accurate information that should be part of ongoing system and operational training.

The PSC also should encourage PSAPs to educate themselves as to the effect of technical call control when initiating a transfer or conference. Typically, only one PSAP position has technical call control at a given moment in time. Call-control scenarios differ between technology solutions and selective routers. It is important for each PSAP to understand the many 9-1-1 and ten-digit use cases associated with transfers and conferences, so that they can adjust their procedures appropriately, especially when deciding which position takes the lead for wireless rebids.

Standards and best practices consulted include the following:

- *APCO ANS 3.103.2-2015, Minimum Training Standards for Public Safety Telecommunicators*
- *NENA 56-005, Call Answering Standard/Model Recommendation*
- *NENA 54-001, Communications Center/PSAP Daily Personnel Model Recommendation, November 18, 2004*
- *NENA 56-001, NENA Guidelines for Minimum Response to Wireless 9-1-1 Calls, November 18, 2004, revised*

FINDING #5: WIRELESS CALL-PROCESSING DATA INTEGRITY

MCP requested additional information from Verizon and Comtech Telecommunication Systems (TCS) as to whether any updates to Phase 2 location were unable to be transmitted to the PSAP. The response to the inquiry reads as follows (note: all times within the quoted response reflect Pacific Standard Time):

“The TCS Mobile Positioning Center (MPC) received a Call Termination Report at 08:22:09, shortly after the second rebid, indicating that the call had been terminated. For this reason, no further location requests were sent to Verizon’s location platform. Accordingly: the first rebid @08:21:50 received updated location; the second rebid just 15 seconds later (08:22:05) received the last known location; and the remaining 5 rebids after call termination at 08:22:09 did not receive updated location.”

The details in this response are especially troubling as they indicate that TCS received a call termination at 10:22:09 Central Standard Time (CST). The voice call is known to have remained active until 10:24:07 CST, one minute and 58 seconds after TCS indicated that it received the termination report. The first rebid noted by Verizon at 10:21:50 coincides with trunk seizure and answer of the call at Fire/Rescue dispatch position 10. The original call-taker at position 6 remained on the conference with the Fire/Recue dispatcher for the duration of the call, and performed a rebid at 10:22:05. The VIPER® ALI history and Power MIS call-event reports show the initial call taker at position 6 performing another rebid at 10:22:09, the same time that TCS alleges it received a call-termination report. The five subsequent rebids from position 6 are acknowledged as having occurred, but no updates to location were provided, as TCS showed the call as being terminated.

The Power MIS call-event reports show additional indication of rebids that are not substantiated in the Verizon response. Absent further investigation involving the wireless carrier and its support vendors, it is not possible for MCP to provide further clarity on these disparities.

Recommendation

The confusion surrounding the chronology of these particular call events speaks to the larger issue of the necessity to involve the wireless carriers and the 9-1-1 service provider in fully understanding the chronology of events that occurred. The PSC should work with the DCEC to submit a trouble ticket for this event. All PSAPs should be fully knowledgeable regarding their equipment and how the wireless technology interacts with CPE, computer-aided dispatch (CAD) equipment, MIS used by the PSAP, Geographic Information Systems (GIS), and any other technology employed by the PSAP to aid in call processing. The PSC should standardize the variety of solution configurations across the state. Until such time as consistency can be realized, PSAPs must be encouraged to consult with their technical subject-matter experts (SMEs) to “fill in the gaps.”

Regarding the 9-1-1 call in question at the DCEC, CenturyLink, West, Verizon and TCS need to assist with providing answers to the following:

- *Why does the CPE or selective router see the call transfer as a rebid event, and how is this information being passed to the wireless carrier’s MPC?*
- *Are call terminations sent to the MPC by the selective router? If not, from where did this signal come?*
- *Why do the Power MIS call-event reports and VIPER ALI history show a rebid at 10:22:09 CST by position 6 when TCS is indicating it received a call-termination report at the same time?*
- *What did the CPE and selective router do with the subsequent rebids performed by position 6 after 10:22:09?*
- *When a call transfer is transferred from the call-taker position to the Fire/Rescue dispatch position, do both positions have equal technological control over the established conference bridge? Are there any technological limitations or implications of which either position should be aware? If so, what are they?*

- *Is it possible that the Power MIS call-event reports are not accurately reflecting the series of events?*

Some of these questions must be asked by the DCEC of its vendors, while some are the responsibility of the PSC to investigate. The PSC and the DCEC should work collaboratively and remain engaged in the ongoing research into the above questions, as they in all likelihood are reflective of similar questions that should be asked by other PSAPs in the state. The call events in question can be reproduced as part of a targeted test scenario to ascertain further insight into the performance of all the involved systems. The PSC should publish best practices for rebidding that include guidance on any impacts that may result when a multi-position conference is involved.
Standards and best practices consulted include the following:

- *NENA 56-006, Emergency Call Processing Protocol Standard, June 7, 2008*
- *NENA 56-005, Call Answering Standard/Model Recommendation, June 10, 2006*
- *NENA 56-001, Guidelines for Minimum Response to Wireless 9-1-1 Calls, November 18, 2004, revised*

FINDING #6: ALI SYSTEMS

The DCEC interfaces the VIPER® ALI feed into its Motorola CAD system, which automatically displays the initial ALI information in the CAD incident entry screen. Initial wireless location information is automatically transferred to the CAD incident address field. For Phase 2 calls, the location is preceded by the word “approximate” to notify the telecommunicator that the civic address displayed is an approximation of the geographic coordinates sent by the calling device.

Telecommunicators may choose to remove the word “approximate” and validate this location for use as an incident address, or choose to overwrite it based upon details relayed by the caller. The call-taker manually must initiate ALI rebids on the VIPER system to obtain updated wireless location information. Rebids do not automatically transfer to the CAD system. The DCEC reports that telecommunicators also may use a traditional CPE display to view ANI/ALI information. While the CAD system display is more heavily relied upon, both tools are available to the DCEC call-taker and are consulted in the call-handling process.

Agencies that use both the CPE ALI system and the CAD system to process wireless location must be vigilant in understanding how the CAD system interface works, and what, if any, modifications to the data are occurring when the information is being transferred.

MCP requested additional information about the CAD system interface. The DCEC response dated April 15, 2016, indicates that the CAD system removes certain information on Phase 1 wireless calls, such as the carrier field and the cardinal coordinates (north, south, east and west) of the address. The correspondence further indicates that the removal of the cardinal coordinates contributed to the confusion surrounding the missing sector numeric value (“3”) associated with the Blondo Street tower.

The response indicates that the CAD system removed the “E” from the end of the record. MCP was surprised to learn that the CAD system alters the ALI display in any way, and questions the soundness of this practice.

The DCEC reported that it is working with Motorola to ascertain whether its internal CAD system database retains any record of the original Phase 2 “approximate location” after a call-taker or dispatcher has modified it. At the time of this report, MCP was advised that it does not.

Maintaining the integrity of ALI information is of paramount importance to the processing of an emergency call. The Power MIS provides an audit trail of ALI information that was presented to the Motorola CAD system, but it does not reflect the incident address information that initially was viewed by the telecommunicator. Relying solely on the Power MIS reports to audit the data flow of wireless 9-1-1 calls therefore may be misleading. Screen capture or other data from the CAD incident may not provide the reviewer with a comprehensive chronology of the data flow for a selected call. Some CAD and logging system vendors provide users with database capabilities that retain all system transactions, regardless of whether validation has occurred.

Recommendation

The PSC should emphasize the importance of ALI data integrity as part of the effort to provide standardized training to its PSAPs. PSAPS that use CAD either in lieu of, or in addition to a CPE-based ALI display should avoid manipulation of the ALI spill. MCP understands that there may be circumstances that require certain fields in the CAD record to be handled in accordance with unique local needs. In these cases, as is seen at DCEC, the CAD system should allow unaltered transfer of the raw ALI spill into a separate section of the incident entry mask. If a system is not configured to log an unaltered record of the approximate location displayed in the incident address field, the PSAP should consult their vendor and seek to modify their system if possible.

The PSC should stress the importance of implementing the appropriate level of transaction logging, especially when multiple system interfaces are involved in the processing of an emergency call. PSAPs should be required to annually compare data from disparate MIS systems to assure that each system is performing as expected. The PSC will need to provide training and specific use cases as examples of how these comparison studies should be implemented.

Standards and best practices consulted include the following:

- *APCO/NENA ANS 1.102.2-2010, APCO-NENA Public Safety Answering Point (PSAP) Service Capability Criteria Rating Scale, July 28, 2010*
- *FCC NRIC Best Practices*

FINDING #7: GEOGRAPHIC INFORMATION SYSTEMS

As referenced above, the DCEC reported and was observed to use its CAD system to display incoming 9-1-1 calls on the telecommunicator map. This practice also is used by other regions. The DCEC

advised MCP that Phase 2 coordinate data (latitude/longitude) from the ALI spill is reverse geocoded[1] to the nearest civic address available in its GIS data. When the ALI record displays in the CAD system, the reverse-geocoded civic address is displayed with “approximate location” inserted into the location field. As mentioned earlier in the document, the term “approximate location” is used to notify the telecommunicator that the civic address displayed is an approximation of the geographic coordinates sent by the calling device. As an example, if the coordinate data reverse geocodes to 123 Main St., the CAD system will display it as “approximate location 123 Main St.” in the incident entry mask and on the map.

Reverse geocoding is a prevalent topic in recent NENA working groups on public safety GIS. If reverse geocoding is used, many SMEs recommend specific steps be taken to avoid misrepresentation of the latitude and longitude. Reverse geocoding uses “as the crow flies” methodology to associate coordinates to the nearest civic location. This methodology can result in selection of a geographic location that may impede access to the caller, but in some cases can be useful in initiating a response to a general area when specific location of the caller cannot be obtained.

All involved in public safety response will agree that the accuracy of GIS data is an important factor, especially when a PSAP relies on the map display or reverse geocoding to locate a caller. Alignment between public safety GIS, ALI and Master Street Address Guide (MSAG) databases is a critical step in assuring that calls are routed correctly and displayed accurately on the telecommunicator’s map display. This is an essential practice and should be encouraged with other PSAPs throughout the state. The DCEC currently receives its data from the Douglas Omaha GIS (DOGIS) department. Updates to the CAD system map database are provided every one to two weeks, depending on the number of changes that have occurred.

Recommendation

As the PSC moves forward in developing a strategy for implementation of Next Generation 9-1-1 (NG9-1-1), it must assure that all PSAP GIS datasets meet the 98-percent match rate with the ALI and MSAG databases, as recommended by NENA. The use of reverse-geocoded Phase 2 coordinates in conjunction with the flag for “approximate location” is a reasonable approach **if** GIS data has been evaluated for accuracy. Telecommunicator training for all PSAPs must include detailed guidance on how to use a reverse-geocoded address when a caller cannot provide their location.

Upcoming anticipated revisions to NENA standards and the planned GIS Data Model for NG9-1-1 likely will recommend that GIS and CAD system map database updates occur on a weekly basis, at a minimum. The PSC should plan to mandate adherence to these standards once they are finalized. In

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[1] ESRI Glossary: “the process of finding a street address from a point on a map.” See “geocoding.”
Ref: NENA 08-003

addition, the Nebraska PSAPs should continue to work with their GIS departments to confirm that the data they receive has been evaluated for accuracy against the relevant MSAG and ALI databases.

The DCEC reports it has initiated refresher training for its personnel regarding what they should expect to see for Phase 2 locations in their CAD systems. They further reported that this topic is part of planned refresher training to assure that each telecommunicator understands how to use this information during an emergency.

Standards and best practices consulted include the following:

- *NENA 02-010, Standard Data Formats for 911 Data Exchange and GIS Mapping, December 16, 2010*
- *NENA 02-014, Standard GIS Data collection and Maintenance Standards, July 17, 2007*

FINDING #8: ALI HISTORY AND CALL-EVENT RECORDS

The ALI history and call-event records from Power MIS show very minor updates only to the X coordinate of the caller for the rebids that occurred after 10:22:09. Verizon has advised that no updates were sent and has asked for copies of call logs or screen captures to be reviewed.

Recommendation
The PSC should work with Douglas County to obtain the necessary nondisclosure and confidentiality documents, and release the applicable portion of the Power MIS report to Verizon for further research.

OPERATIONAL FINDINGS AND RECOMMENDATIONS

When performing an operational review of a major incident, it is important to remain objective and avoid the tendency to allow the knowledge of the outcome to color the evaluation of the action taken by the PSAP. During meetings with the PSAP, MCP made the following operational observations regarding the second wireless call routed to the PSAP via Verizon's Blondo Street tower.

FINDING #9: INITIAL CALL INTAKE

Upon answering a 9-1-1 call, the DCEC standard query of the caller is "9-1-1, do you need police, fire or medical?" On February 12, 2016, the caller responded to the call-taker by advising that he "had been shot." The call-taker immediately transferred the caller to the on-duty Fire/Rescue dispatcher for emergency medical dispatch (EMD) intervention. The call-taker did not verify the caller's name, location or callback number before transferring the call. MCP was advised that this is the current directed procedure at the PSAP when a medical call is received. When the caller did not respond to the Fire/Rescue dispatcher's questions, he asked the call-taker if there was any other information. The call-taker advised the dispatcher that the caller reported he had been shot.

NENA 56-005, *Call Answering Standard/Model Recommendation, Section 3.6*[2] states, "The telecommunicator will obtain the basic information from the caller. At a minimum, this information should include: the address or exact location of the incident, call back number, type of emergency, time of occurrence, hazards, identity of those involved and their location. Comment: For those calls that are transferred to another telecommunicator for dispatch of emergency services, it is important to obtain certain minimum information in the event the call is lost during transfer. 'Hazards' includes any potential hazards at the scene, including the presence of weapons; it may also be appropriate to determine the relationship between the caller and those involved (1st, 2nd or 3rd party)."

Each 9-1-1 call has unique attributes that require PSAPs to use judgement when determining the most appropriate course of action. While many standards and best practices are available to guide the telecommunicators' actions, split-second decision-making can be complex. There are two issues with which PSAPs commonly struggle, and they should assess them for alignment with best practices and national standards. These issues are as follows:

- *First, should a call-taker validate, at minimum, the callback number and location of a medical call before transferring it for EMD? This approach takes longer but the information allows the PSAP to still take action should the call be lost or the caller be unable to relay additional information. In a situation where an injured caller is unsure of their location, finding them is the most important aspect of the call. Complicating the interrogation of a shooting with a transfer may add unnecessary risk. Call-handling systems such as those used by the DCEC that use two separate 9-1-1 trunks for EMD transfers are thought to have a reduced risk of the PSAP dropping or disconnecting a caller. However, the PSAP's technical systems do not resolve the issue of a call dropping or disconnecting for other reasons, such as signal strength fade on a wireless call.*
- *The second issue involves how a PSAP should classify an incident when the initial report involves a medical issue. While a gunshot wound obviously requires medical attention, consideration also must be given to other key law enforcement-related circumstances that impact the safety of citizens and responders. Many PSAPs, such as the DCEC, immediately transfer in an attempt to reduce the number of duplicate questions involved when calls must be transferred for fire/EMS or law-enforcement dispatch. Duplicate questions can lengthen call-processing times unnecessarily or, in some cases, slightly delay the dispatch of units. However, the risk of wasting time must be balanced carefully with the need to quickly ascertain the circumstances of a shooting.*

Recommendation

Incident critique is an important part of assuring that agencies are handling difficult calls in the most appropriate way possible. The PSC should encourage all of its PSAPs to engage in critiques whenever

[2] https://c.ymcdn.com/sites/www.nena.org/resource/resmgr/Standards/NENA_56-005.1_Call_Answering.pdf

a serious and/or prolonged incident has occurred. In situations such as the incident that occurred on February 12, 2016, PSAPs may choose to have the initial call-taker further question the caller prior to initiating a conference with a dispatcher. If only one location-validation process is to be accomplished, it should be conducted by the initial call-taker.

In some cases, callers only may be able to provide minimal information within the first few moments of contact with the PSAP. Active shooter training and numerous articles from APCO, NENA and the Department of Homeland Security (DHS) place heavy emphasis on the safety of the scene, safety of first responders, and safety of the public. It is therefore advisable to focus initial call-handling on the incident location, description, circumstances of the shooting, and, if appropriate, the whereabouts of the shooter, Formal incident critiques assist in identifying PSAP and responding agency procedures that may benefit from modification.

In this situation, it may have been more appropriate for the initial call-taker to have maintained control of the call and prioritized the minimum call information as referenced in the NENA and APCO standards. The PSC should encourage PSAPs to revisit their standard operating procedure (SOPs) and align their procedures for active-shooter events with national standards and best practices. The PSC should consider establishing NENA and APCO standards as the call-handling standards acceptable in the state. Training and protocols for active-shooter events should be included. MCP understands that "active shooter" typically implies an incident in a public venue; however, the core call-handling and response principles are the same. All PSAPs will benefit from training that emphasizes techniques to assure scene and responder safety.

Standards and best practices consulted include the following:

- *NENA 56-005, Call Answering Standard/Model Recommendation*
- *APCO ANS 3.103.2-2015, Minimum Training Standards for Public Safety Telecommunicators*
- *NENA 56-001, Guidelines for Minimum Response to Wireless 9-1-1 Calls, November 18, 2004, revised*
- *NENA 56-006, Emergency Call Processing Protocol Standard, June 7, 2008*

FINDING #10: CUSTOMER SERVICE CONSIDERATIONS

Call-takers and dispatchers who must repeatedly try to ascertain the location of an injured caller may not be fully cognizant of their tone of voice and demeanor. Call-takers and dispatchers often need to be assertive when attempting to quickly obtain information from a caller. However, it is vitally important that they project empathy and guard against being perceived as insensitive when questioning a caller. Moreover, PSAP personnel infrequently encounter emergency calls where it is difficult to obtain the incident location. In such cases, they may succumb to the pressure of the moment and question callers in a disorganized manner. Sometimes, PSAP personnel, in an attempt to keep their composure during such high-stress events, inadvertently project an air of casualness. Both approaches frustrate some emergency callers and should be avoided. The goal is to project the appropriate level of concern and

understanding while securing the information needed to execute an effective response to the emergency.

Recommendation
NENA standards require the following professional conduct: “Telecommunicators will be courteous, kind, patient, and respectful in dealing with the public, field users and peers.” They further require that “employees shall conduct themselves in a professional manner.”

Many PSAPs, including the DCEC, have a QA process in place. The PSC should encourage all PSAPs to adopt a formal QA process that aligns with national standards. Annual appraisals should be conducted and include emphasis on customer service and interpersonal communications. Allowing telecommunicators to listen to calls they have handled is beneficial.

The PSC should consider recommending interpersonal communication skills and customer-service training for all Nebraska PSAP personnel.

Standards and best practices consulted include the following:

- *APCO ANS 3.103.2-2015, Minimum Training Standards for Public Safety Telecommunicators*
- *NENA 54-001, Communications Center/PSAP Daily Personnel Model Recommendation, November 18, 2004*
- *NENA 56-006, Emergency Call Processing Protocol Standard, June 7, 2008*
- *APCO/NENA ANS 1.107.1-2015, Standard for the Establishment of a Quality Assurance and Quality Improvement Program for Public Safety Answering Points*
- *APCO Professional Communications Human Resources Committee Report*

FINDING #11: CALL PROCESSING/OBTAINING DISPATCHABLE LOCATION INFORMATION

Both the Fire/Rescue dispatcher and original call-taker received Phase 2 location information while the 9-1-1 call was active. The dispatcher and original call-taker (who remained on the line) conversed, and the call-taker advised that they had a Phase 2 uncertainty of 400 meters on the ALI screen. The Fire/Rescue dispatcher chose to not rely on that information in lieu of disconnecting the call and attempting a callback. Subsequent successful callbacks eventually led to identifying that a hostage situation was in progress, but definitive verbal location information could not be obtained.

While each 9-1-1 call is unique and requires telecommunicator judgement, the choice to disconnect is questionable, especially when the circumstances of a shooting have not been ascertained.

Recommendation
The PSC should work with its PSAPs to carefully critique use cases for wireless 9-1-1 calls and determine what, if any, circumstances validate the choice to disconnect a caller during an in-progress incident. Disconnecting from a call can be risky and may prevent the PSAP from further attempts to

rebid for better Phase 2 coordinate data. However, MCP does note that in the aforementioned incident, the dispatcher consulted other databases and was able to determine a dispatchable address when such information could not be readily and accurately confirmed by the caller.

Standards and best practices consulted include the following:

- *APCO 3.103.2-2013, Wireless 9-1-1 Deployment and Management Effective Practices Guide*
- *APCO/NENA ANS 1.102.2-2010, APCO-NENA Public Safety Answering Point (PSAP) Service Capability Criteria Rating Scale, July 28, 2010*
- *APCO ANS 3.103.2-2015, Minimum Training Standards for Public Safety Telecommunicators*

FINDING #12: WIRELESS CALL PROCESSING/INTERPRETATION OF PHASE 2 COORDINATE INFORMATION

The DCEC indicated that the Fire/Rescue dispatcher and original call-taker questioned the validity of the Phase 2 coordinate location on their ALI screens for three reasons:

1. The ALI uncertainty displayed was 400 meters; this is a high value that may indicate inaccurate location.
2. The civic address of Verizon's Blondo Street tower was missing the numerical value of the sector (showed "E" instead of the expected "3E"). The missing numeric caused the dispatcher to question whether the civic address did in fact represent a tower, as they expect to see a numeric associated with a cell sector.
3. The caller mentions being near "Blondo" in response to the dispatcher's coaching and query for location.

Per the email sent by the PSC to MCP on April 27, 2016, Verizon Wireless indicated that "the system is currently provisioned to transmit 'E' in tower directional, without any requirement to include the sector number. TCS received a request on March 24, 2016 (as a result of a request from the County) to include the sector number in responses going forward. This change is currently going through TCS's change control process and is expected to be implemented by April 11, 2016."

MCP was advised that the PSAP expects to see numeric values on all cell sector civic locations, and a trouble report has been initiated by the DCEC to have Verizon Wireless correct the location display for the Blondo Street tower. Verizon's email indicates that its towers were not required to display in this manner until a March 24, 2016, request initiated by the DCEC. The information received from the DCEC and that provided from Verizon appear to be in conflict. Previous routing spreadsheets, approved by the PSAP, should be consulted to determine when the "E" disappeared from the routing tables and if this was approved by the PSAP. If it was not an approved change, Verizon Wireless should be asked for an explanation of the discrepancy.

MCP does not dispute that there appears to have been legitimate concern with the ALI uncertainty. Coupled with the fact that the caller mentions being near "Blondo," there was reasonable cause to enter an incident at the location of the Blondo Street tower and attempt a search. However, despite the

potential confusion with the ALI display, there remains a question as to whether the Phase 2 information should have been used to create an additional simultaneous search effort in the vicinity of the Phase 2 geodetic coordinates.

It is noted that the Fire/Rescue dispatcher's use of related databases to track previous calls from the cell phone in question resulted in finding the location of the incident, and their resourcefulness is commendable.

Recommendation

All PSAPs, in conjunction with the PSC, should validate all of the civic locations on their wireless routing spreadsheets annually and determine whether there is consistent application of expected information across all wireless providers. Further conversation is warranted to ascertain why there is a disparity between the information provided by the DCEC and that provided by Verizon Wireless regarding how towers are configured to display. A trouble ticket should be opened with Verizon Wireless to begin the investigation if that has not been done already.

It is MCP's experience, in observing at many PSAPs across the nation, that telecommunicators do not often receive volatile, in-progress calls that rely on the use of data alone to locate a caller. In many cases, the caller can tell them their location. Moving forward, the PSC should request that PSAPs revisit their procedures and training programs to assure that their personnel are offered annual refresher training for all wireless 9-1-1 calls, and especially those that require seldom-used skills.

MCP makes no assertion that a secondary simultaneous search effort would have altered the eventual outcome of the incident. It subsequently was determined that the Phase 2 location coordinates were not in close proximity to the incident location. The PSC should encourage PSAPs encountering similar circumstances to use all tools available to them to identify an incident location.

Standards and best practices consulted include the following:

- *APCO ANS 3.103.2.2013, Wireless 9-1-1 Deployment and Management Effective Practices Guide*
- *APCO/NENA ANS 1.102.2-2010, APCO-NENA Public Safety Answering Point (PSAP) Service Capability Criteria Rating Scale, July 28, 2010*
- *NENA 56-001, Guidelines for Minimum Response to Wireless 9-1-1 Calls, November 18, 2004, revised*
- *APCO ANS 3.103.2-2015, Minimum Training Standards for Public Safety Telecommunicators*

CONCLUSION

Serious incidents such as the one handled by the DCEC on February 12, 2016, often result in a high level of internal and external scrutiny. Research and in-depth investigation into the technical and operational details of the incident have resulted in numerous recommendations for DCEC, the PSC and all Nebraska PSAPs to consider. Leveraging lessons learned from this incident enables the PSC to prioritize training and best practices that are likely to improve efficiencies and service levels for all PSAPs across the state.

As the PSC moves forward, assuming its role in coordinating 9-1-1 efforts, it is essential that several key issues be prioritized:

- *The PSC, PSAPs and the emergency communications vendors must work collaboratively to assure that agencies understand how their call-handling systems are configured, how they are expected to perform, the interactions of various technologies, and the data flow of all 9-1-1 calls, but especially wireless 9-1-1 calls.*
- *Understanding wireless call flow and performance is best achieved through testing in a real-world environment that provides an objective assessment of both the caller and PSAP experience. While the County offers a unique geographic opportunity given its proximity to the Iowa state border, the PSC should undertake comprehensive wireless location accuracy testing in all of its PSAP regions across the state.*
- *The PSC must assure that the basic principles of national call-handling standards are incorporated consistently into the SOPs for all of its PSAPs.*
- *The PSC should consider supporting or providing training programs that address the needs of the PSAP community.*

MCP appreciates the opportunity to assist the PSC in this recent effort to improve emergency communications for its constituents.

APPENDIX A – STANDARDS AND BEST PRACTICES REFERENCE

NENA Call Answering Standard/Model Recommendation, Document 56-005
https://c.ymcdn.com/sites/www.nena.org/resource/resmgr/Standards/NENA_56-005.1_Call_Answering.pdf

APCO ANS 3.103.2.2015 Minimum Training Standards for Public Safety Telecommunicators
https://www.apcointl.org/doc/911-resources/apco-standards/75-minimum-training-standards-for-public-safety-telecommunicators/file.html

NENA Communications Center/PSAP Daily Personnel Model Recommendation, Document 54-001
November 18, 2004
http://c.ymcdn.com/sites/www.nena.org/resource/resmgr/Standards/NENA_54-001.1_PSAP_Daily_Per.pdf

NENA Guidelines for Minimum Response to Wireless 9-1-1 Calls, Document 56-001
November 18, 2004 Revised (further updates in progress)
http://c.ymcdn.com/sites/www.nena.org/resource/resmgr/Standards/NENA_56-001.1_Min_Response_T.pdf

NENA Call Answering Standard/Model Recommendation, Document 56-005
June 10, 2006
https://c.ymcdn.com/sites/www.nena.org/resource/resmgr/Standards/NENA_56-005.1_Call_Answering.pdf

APCO/NENA Standard ANS 1.107.1—2015 Establishment of a Quality Assurance and Quality Improvement Program for Public Safety Answering Points
https://www.apcointl.org/doc/911-resources/apco-standards/600-11071-2015-quality-assurance/file.html

APCO Standard 3.103.2.2013, Wireless 9-1-1 Deployment and Management Effective Practices Guide
https://www.apcointl.org/doc/911-resources/apco-standards/188-wireless-9-1-1-deployment-and-management-effective-practices-guide/file.html

- *Effective Practices Guide #380741*
- *Effective Practices Guide #380743*
- *Effective Practices Guide #380793*
- *Study Group C Recommendation to ESIF—Contribution G7 (6/16/06) re: Mid-Call Location Update, ESIF Issue 19 April 3, 2003*

APCO Minimum Training for Telecommunicators, Communications Training Officers, Public Safety Communications Instructor, Public Safety Quality Assurance Evaluators, Communications Supervisors, Communications Manager/Director, Communications Technicians, and Training Coordinator
https://www.apcointl.org/standards/apco-standards-for-download.html

APCO Professional Communications Human Resources Committee Report (ProCHRT), 2015
https://www.apcointl.org/doc/conference-documents/resources/619-2015-prochrt-report/file.html

Customer Service/Professionalism Training in General and Treatment of High Priority Callers Specifically, See APCO CDE Course
https://www.apcointl.org/training-and-certification/continuing-dispatch-education/cde-courses/customer-service-in-today-s-public-safety-communications.html

EMD Training
https://www.apcointl.org/training-and-certification/disciplines/emergency-medical-dispatch-emd/emd-overview.html

APCO/NENA ANS 1.102.2-2010, July 28, 2010 - APCO-NENA Public Safety Answering Point (PSAP) Service Capability Criteria Rating Scale
http://c.ymcdn.com/sites/www.nena.org/resource/resmgr/Standards/APCO-NENA-ANS1-102-2-2010.pdf

National Fire Protection Association (NFPA) Standards 1061
http://catalog.nfpa.org/2014-NFPA-1061-Standard-for-Professional-Qualifications-for-Public-Safety-Telecommunications-Personnel-P1402.aspx?icid=B484

APCO ANS 3.109.2.2014 Core Competencies and Minimum Training Standards for Public Safety Communications Manager/Director
https://www.apcointl.org/doc/911-resources/apco-standards/526-core-competencies-and-minimum-training-standards-for-public-safety-communications-manager-director/file.html

NENA E9-1-1 Wireless Maintenance Call Routing & Testing Validation Standard Document 57-002, June 5, 2007
http://c.ymcdn.com/sites/www.nena.org/resource/resmgr/Standards/NENA_57-002.1_Wireless_Maint.pdf

FCC Network Reliability and Interoperability Council (NRIC) Best Practices
https://www.fcc.gov/nors/outage/bestpractice/BestPractice.cfm

- *BP 7-7-3218*
- *BP 7-7-3219*

US Department of Homeland Security, National Incident Management System (NIMS), Basic Guidance for Public Information Officers (PIOs), FEMA 517, November 2007
https://www.fema.gov/media-library-data/20130726-1623-20490-0276/basic_guidance_for_pios_final_draft_12_06_07.pdf

US Department of Homeland Security, National Incident Management System (NIMS), IS-29: Public Information Officer Awareness
https://emilms.fema.gov/IS29/index.htm

US Department of Homeland Security, National Incident Management System (NIMS), Intelligence/investigations Function Guidance and Field Operations Guide, October, 2013
https://www.fema.gov/media-library-data/1382093786350-411d33add2602da9c867a4fbcc7ff20e/NIMS_Intel_Invest_Function_Guidance_FINAL.pdf

US Department of Homeland Security, National Incident Management System (NIMS) Training Program, September, 2011, IS-702.A NIMS Public Information
https://emilms.fema.gov/IS702A/index.htm

NENA Standard Data Formats for 9-1-1 Data Exchange and GIS Mapping, Document 02-010, December 16, 2010
http://c.ymcdn.com/sites/www.nena.org/resource/resmgr/Standards/NENA_02-010_v9_Data_Formats_.pdf

NENA GIS Data Collection and Maintenance Standards, Document 02-014, July 17, 2007
http://c.ymcdn.com/sites/www.nena.org/resource/resmgr/Standards/NENA_02-014.1_GIS_Data_Colle.pdf

ATTACHMENT A – GLOSSARY OF TERMS

TERM	DEFINITION	SOURCE
APCO	Association of Public Safety Communications Officials, International. APCO is the world's oldest and largest not-for-profit professional organization dedicated to the enhancement of public safety communications. 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.	NENA Master Glossary of Terms, NENA ADM-000.18-2014, July 29, 2014. http://www.nena.org/?page=Glossary APCO website: https://www.apcointl.org/about-apco.html
Authority Having Jurisdiction (AHJ)	A State, County, Regional or other governmental entity responsible for 9-1-1 service operations. For example, this could be a county/parish or city government, a special 9-1-1 or Emergency Communications District, a Council of Governments or other similar body.	NENA Master Glossary of Terms, NENA ADM-000.18-2014, July 29, 2014
Automatic Location Identification (ALI)	The automatic display at the PSAP of the caller's telephone number, the address/location of the telephone and supplementary emergency services information of the location from which a call originates.	NENA Master Glossary of Terms, NENA ADM-000.18-2014, July 29, 2014
Call detail records (CDR)	A record stored in a database recording the details of a received or transmitted call.	NENA Master Glossary of Terms, NENA ADM-000.18-2014, July 29, 2014

TERM	DEFINITION	SOURCE
Cardinal coordinates	The four cardinal directions or cardinal points are the directions of north, east, south, and west, commonly denoted by their initials: N, E, S, W. East and west are at right angles to north and south, with east being in the clockwise direction of rotation from north and west being directly opposite east. Intermediate points between the four cardinal directions form the points of the compass.	World Atlas; http://www.worldatlas.com/aatlas/infopage/comprose.htm
Class of Service (CoS)	A designation of the type of telephone service, e.g. residential, business, Centrex, coin, PBX, wireless.	NENA Master Glossary of Terms, NENA ADM-000.18-2014, July 29, 2014
Computer-Aided Dispatch (CAD)	A computer based system, which aids PSAP Telecommunicators by automating selected dispatching and record keeping activities.	NENA Master Glossary of Terms, NENA ADM-000.18-2014, July 29, 2014
Customer Premise Equipment (CPE)	Communications or terminal equipment located in the customer's facilities; call answering equipment (terminal equipment) at a PSAP.	NENA Master Glossary of Terms, NENA ADM-000.18-2014, July 29, 2014

TERM	DEFINITION	SOURCE
Emergency Medical Dispatch (EMD)	The Emergency Medical Dispatcher (EMD) has been recognized as an essential component of effective EMS systems. Proper and timely training as well as a sound Medical Protocol are part of EMD and helps the trained telecommunicator deliver appropriate medical care to the calling public with emergency medical needs. The IAED is a non-profit standard-setting organization promoting safe and effective emergency dispatch services world-wide. Comprised of three allied Academies for medical, fire and police dispatching, the IAED supports first-responder related research, unified protocol application, legislation for emergency call center regulation, and strengthening the emergency medical dispatch community through education, certification, and accreditation.	IAED, Internatioal Academies of Emergency Dispatch; http://www.emergencydispatch.org/Terms
Geographic Information Systems (GIS)	A system for capturing, storing, displaying, analyzing and managing data and associated attributes which are spatially referenced.	NENA Master Glossary of Terms, NENA ADM-000.18-2014, July 29, 2014
Local Exchange Carrier (LEC)	A Telecommunications Carrier (TC) under the state/local Public Utilities Act that provide local exchange telecommunications services.	NENA Master Glossary of Terms, NENA ADM-000.18-2014, July 29, 2014

TERM	DEFINITION	SOURCE
Master Street Address Guide (MSAG)	Address recognized by Public Safety for the dispatch of emergency first responders. It is an absolute and unique address in that variants for directions, street spelling, street suffixes, and community names are not allowed. It is preferred that MSAG Addresses be in Civic Address format. The community name associated with this address format is assigned by the Addressing Authority in cooperation with the 9-1-1 Administrator and may or may not be the same as the community name assigned by the USPS. MSAG addresses are used to route 9-1-1 calls and for ALI display. *NOTE: MSAG Address data format is not standardized throughout the country. This is generally attributed to legacy system limitations that have been continued as operational practices on the part of 9-1-1 administrative entities. This fact gives rise to the need for two subtending MSAG definitions. (See Standard MSAG and Local Operational MSAG.)*	NENA Master Glossary of Terms, NENA ADM-000.18-2014, July 29, 2014

TERM	DEFINITION	SOURCE
Mobile Positioning Center (MPC)	The MPC serves as the point of interface to the ANSI wireless network for the Emergency Services Network. The MPC serves as the entity which retrieves, forwards, stores and controls position data within the location network. It can select the PDE(s) to use in position determination and forwards the position to the requesting entity or stores it for subsequent retrieval. In the case of a PDE with autonomous determination capability, the MPC receives and stores the position estimation for subsequent retrieval. The MPC may restrict access to position information (e.g., require that the MS be engaged in an emergency service call or only release position information to authorized nodes.)	NENA Master Glossary of Terms, NENA ADM-000.18-2014, July 29, 2014
Mobile Switching Center (MSC)	The wireless equivalent of a Central Office, which provides switching functions from wireless calls.	NENA Master Glossary of Terms, NENA ADM-000.18-2014, July 29, 2014
National Emergency Number Association (NENA)	The National Emergency Number Association is a not-for-profit corporation established in 1982 to further the goal of “One Nation-One Number.” NENA is a networking source and promotes research, planning and training. NENA strives to educate, set standards and provide certification programs, legislative representation and technical assistance for implementing and managing 9-1-1 systems.	NENA Master Glossary of Terms, NENA ADM-000.18-2014, July 29, 2014

TERM	DEFINITION	SOURCE
National Incident Management System (NIMS)	The National Incident Management System (NIMS) is a systematic, proactive approach to guide departments and agencies at all levels of government, nongovernmental organizations, and the private sector to work together seamlessly and manage incidents involving all threats and hazards—regardless of cause, size, location, or complexity—in order to reduce loss of life, property and harm to the environment. The NIMS is the essential foundation to the National Preparedness System (NPS) and provides the template for the management of incidents and operations in support of all five National Planning Frameworks.	FEMA, http://www.fema.gov/national-incident-management-system
Network Reliability and Interoperability Council (NRIC)	FCC initiated work groups whose mission is to partner with the FCC, the communications industry and public safety to facilitate enhancement of emergency communications networks, homeland security, and best practices across the burgeoning telecommunications industry.	FCC; https://www.fcc.gov/about-fcc/advisory-committees/communications-security-reliability-and-interoperability-3
PDE	The PDE determines the precise position or geographic location of a wireless terminal when the MS starts a call or while the MS is engaged in a call. Each PDE supports one or more position determining technologies. Multiple PDEs may service the coverage area of an MPC and multiple PDEs may serve the same coverage area of an MPC utilizing different positioning determining	NENA Master Glossary of Terms, NENA ADM-000.18-2014, July 29, 2014

TERM	DEFINITION	SOURCE
	technologies. (PDE is synonymous with Location Determination Technology (LDT)	
Phase I Wireless	For E9-1-1 Phase I, the FCC requires the wireless carriers to deliver to the appropriate PSAP the telephone number of the handset originating the 9-1-1 call (callback number) and the location of the cell site/sector receiving the 9-1-1 call.	NENA Master Glossary of Terms, NENA ADM-000.18-2014, July 29, 2014
Phase II Wireless	For E9-1-1 Phase II, the FCC requires the wireless carriers deliver to the appropriate PSAP the telephone number of the handset originating the 9-1-1 call and the latitude and longitude of the call. The accuracy requirement imposed on the wireless carriers by the FCC varies depending on the location technology used by the wireless carrier.	NENA Wireless Phase I and II Features and Functions Operational Information Document, NENA 57-501 Final 01/20/04
Public Safety Answering Point (PSAP)	An entity responsible for receiving 9-1-1 calls and processing those calls according to a specific operational policy.	NENA Master Glossary of Terms, NENA ADM-000.18-2014, July 29, 2014

TERM	DEFINITION	SOURCE
Rebid	Once queried by the MPC, the PDE is allowed up to 30 seconds to provide a valid Phase II location. In most cases, with current technology, the PDE will not have responded with final Phase II location information to the MPC by the time the call is answered by the PSAP and initial ALI query to the MPC is performed. This makes it necessary for the PSAP to be able to re-bid or re-request their ALI to receive the caller's location information or to receive updated location information. This is currently necessary, because 9-1-1 calls are generally routed in 5 seconds or less and once the call is routed, it usually takes no more than 1 second for the initial ALI bid to be made. If an accurate latitude and longitude cannot be calculated in the 6 or less seconds it takes to route the call and make the initial ALI bid, then the wireless carrier will deliver Phase I type location data. In those cases, the PSAP will then need to re-bid or re-request the ALI approximately 15 to 30 seconds after they receive the initial ALI bid to obtain the 9-1-1 caller's accurate latitude and longitude.	NENA Wireless Phase I and II Features and Functions Operational Information Document, NENA 57-501 Final 01/20/04
Reverse geocoding	"The process of finding a street address from a point on a map."	Environmental Systems Research Institute (ESRI) Glossary; ESRI is an international supplier of Geographic Information System (GIS) software, web GIS and geodatabase management applications.

TERM	DEFINITION	SOURCE
Uncertainty	Uncertainty: The mathematically derived statistical estimate, expressed in meters, indicating the size of the area used in the calculation of Confidence. The specific value IS NOT representative of the accuracy of the PDE locating system. *NOTE: Because of the differences in the way that location vendors have implemented their technologies, the resulting Confidence & Uncertainty values cannot be viewed consistently across multiple carriers. The Uncertainty factor is key to the PSAPs being able to ascertain the accuracy of the latitude and longitude being provided to them by the wireless carriers and subsequently, assist in determining where to dispatch emergency help. For example, the default latitude/longitude of the cell sector centroid may have an uncertainty of over 3000 meters while a latitude/longitude provided via the GPS technology may have an uncertainty of 20 meters. Without the Uncertainty factor, the PSAP has no way of distinguishing between those two latitude/longitudes and may incorrectly rely on the inaccurate default latitude and longitude. The Local Exchange Carriers must pass through the Uncertainty factor, when provided, to the PSAP.*	NENA Master Glossary of Terms, NENA ADM-000.18-2014, July 29, 2014