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BY ELECTRONIC FILING

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street S.W.
Washington D.C. 20554

Re: FCC Workshop on E911 Phase II Location Accuracy
WT Docket No. 07-114

Dear Ms. Dortch:

NextNav, LLC ("NextNav") was pleased to attend and present at the Commission's November 18, 2013 Workshop on E911 Phase II Location Accuracy. We applaud the Commission for taking the critical step to bring together stakeholders from public safety, wireless carriers, and the location technology industry. The Workshop provided a tremendous learning opportunity, underscoring both the capabilities of indoor and vertical location technologies and the urgent need for improved indoor and vertical location performance. In closing the Workshop, the Commission thanked all participants and encouraged additional *ex parte* submissions that might be conducive to better understanding the issues. The following observations are offered in response to that request.

The Workshop revealed a substantial level of consensus among stakeholders regarding the critical gating issues that must be addressed to ensure that emergency first responders have access to highly accurate indoor location information for wireless callers to E911 emergency services. The strong technological progress and continuing public safety need that was demonstrated during the Workshop make it clear that the Commission can and should move forward with a Notice of Proposed Rulemaking ("NPRM") on adopting requirements for indoor and vertical location accuracy. Not all matters discussed during the workshop, however, are appropriate or necessary for inclusion in an NPRM. Instead, three broad categories of issues were identified, each with a different path toward resolution.

As discussed in this letter, many issues that were raised during the Workshop involved operational and "best practice" procedural matters that would be best resolved through increased

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communication and coordination between public safety and wireless carriers. A second category of issues involved often discrete, but highly technical issues that likely warrant further investigation by the Commission's Communications Security, Reliability, and Interoperability Council ("CSRIC").

The third category of issues that were discussed during the Workshop involve policy questions that may necessitate a balancing between the critical and immediate needs of public safety and the potential costs of deploying new technologies that can better ensure the welfare and safety of the public. This third category of issues is most appropriately resolved by the Commission utilizing input from the stakeholder community generated through a notice and comment rulemaking process. Each of these categories of issues is discussed further below. Finally, based on the additional information and insight that was developed during the Workshop, NextNav provides herein additional recommendations regarding certain of the policy issues that should be addressed in the Commission's rulemaking efforts.

Operational Procedures and Best Practices between Carriers and Public Safety

A substantial portion of the Workshop focused on the need to ensure that location information that is generated by wireless carriers is conveyed to public safety answering points ("PSAPs") in the most efficient and expeditious manner possible. The Workshop participants discussed various impediments to this process, many of which could be best resolved through additional communication and coordination between public safety and wireless carriers. Discrete issues that are included in this category include:

Automatic Rebidding

The Workshop revealed that wide agreement exists among public safety representatives and carriers that automatic rebidding is now a best practice and should be "standard and ubiquitous."[1] This approach is likely to be communicated to PSAPs through their representative public safety organizations and does not require regulatory intervention or assistance.

Rebid Intervals

The Workshop also determined that the optimum rebid interval differs between carriers based on the location technologies that they employ. These variations complicate the job of PSAP operators that must automatically or manually determine when to rebid for updated

[1] The remarks of the participants in the Commission's Workshop on E911 Phase II Location Accuracy are available at http://www.youtube.com/watch?v=Kt3lWv_oXNY. Remarks of Lisa Hoffman, Deputy Director, Division of Emergency Communications, Department of Emergency Management, City & County of San Francisco, at 2:26:37) ("*Hoffman Remarks*"); Remarks of Terry Hall, Director of Emergency Communications, York-Poquoson-Williamsburg ECC, (on behalf of Association of Public Safety Communications Officials (APCO)), at 0:49:35) ("*Hall Remarks*").

location information.[2] The carriers and the PSAPs can and should coordinate to optimize and, to the extent possible, standardize the rebid interval to ensure the most streamlined treatment of calls by PSAP operators.

Notification of Changes that May Affect Accuracy

The Workshop also demonstrated a significant desire for greater communication between wireless carriers and PSAPs with regard to procedures and technological changes. The release of such information in a standard format, such as through regular carrier advisories, could facilitate clearer communication and avoid future misunderstandings.[3] Specifically, the implementation over the past several years of new location technologies that provide superior accuracy in outdoor environments, but that also provide Phase II location information somewhat later during the call flow (thus diminishing the percentage of calls with initial availability of Phase II information) impacted PSAP procedures significantly and may not have been sufficiently understood by the Public Safety community.[4] Absent a Commission requirement that carriers regularly provide and update such information, it does not appear that regulatory intervention is required in this regard. Instead, the implementation by stakeholders of an appropriate framework for continuous interaction between public safety and the carriers should be sufficient.

911 Call Data

Public safety representatives noted during the Workshop that 911 carriers need to better collect and analyze 911 call data so that they can do more detailed analysis beyond the focal issues of what location information is being delivered.[5] These efforts would likely be best accomplished within the national public safety organizations, again with communication and coordination with wireless carriers.

Technical Questions Meriting Further Investigation through the CSRIC

A second focus of the Workshop involved often discrete, but highly technical issues that necessitate resolution and potential standardization in order to ensure that all stakeholders in the wireless location process are working in parallel to achieve the same ends. In this regard, the Commission's CSRIC has a critical role in providing an objective, data-driven analysis of technological issues and standards that permit the Commission, carriers, and PSAPs to objectively evaluate evolving options and capabilities. The following questions are examples of

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[2] *Hall Remarks* at 1:35:13; Remarks of Renee Hardwick, Renee Hardwick - Director, Horry County Emergency Management Department, Horry County, South Carolina, at 1:38:55 ("*Hardwick Remarks*").

[3] *Hall Remarks* at 1:35:13.

[4] *Hoffman Remarks* at 1:48:05.

[5] Remarks of Brian Fontes, Chief Executive Officer, National Emergency Number Association (NENA), at 2:29:30 ("*Fontes Remarks*").

issues that may require additional technical study and would be well suited to the consensus-based, industry-driven CSRIC analysis process. The Commission may consider adding certain of these issues to the existing charter of CSRIC IV:

Can updated information be pushed rather than pulled?

The wireless carriers reported during the Workshop that, for technical reasons, location information can only be "pulled" by PSAPs actively requesting it, and cannot be "pushed" if and when updated or improved data is available.[6] At the same time, however, the value of such timely updating makes the potential for pushing location data a "fundamental question."[7] The successful resolution of this highly technical issue would greatly enhance E911 location accuracy and could appropriately be investigated by the CSRIC.

How will changes in network topology affect the location accuracy of Phase I locations?

Changes in network topology due to the introduction of heterogeneous networks combining femtocells, WLAN and other technologies may affect the assumed accuracy of Phase I (cell site location) data due to the much smaller coverage area of these cell locations. For example, with very small cells, Phase I information may even be sufficient to provide dispatchable location.[8] CSRIC III noted the potential value of these new network architectures to gradually improve Phase I location accuracy as they are perpetuated across networks in the future.[9] Further study may be useful to arrive at standards for reflecting such extremely small cell radius information as Phase II rather than Phase I, or otherwise communicating the superior accuracy confidence and uncertainty associated with this category of Phase I location information.

What will PSAPs need to do to use Z-axis information?

According to Workshop participants, many PSAPs are not presently prepared to fully utilize Z-axis data in the emergency dispatch process because they do not have accurate mapping systems to convert Z-axis data into floor-level dispatchable information.[10] The Commission should instruct the CSRIC to determine how such data can best be incorporated into the existing

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[6] Remarks of Ryan Jensen, Director of Technology and Compliance, T-Mobile, at 1:13:04 ("*Jensen Remarks*").

[7] *Fontes Remarks* at 2:04:40.

[8] Remarks of Kirk Burroughs, Senior Director of Technology, Qualcomm Engineering Services Group, at 3:11:25. ("*Burroughs Remarks*").

[9] *See* Report – "Leveraging LBS and Emerging Location Technologies for Indoor Wireless E9-1-1," CSRIC III, Working Group 3, at 10 (March 14, 2013) ("*CSRIC LBS Report*").

[10] Remarks of John Snapp, Senior Technical Officer and Vice President, Intrado Corporation, at 2:26:00. ("*Snapp Remarks*").

information used and displayed on PSAP systems to resolve Z-axis data into floor-level location information. The question of how Z-axis information is ultimately implemented into PSAPs, however, need not delay the adoption of vertical accuracy rules because such information can be useful to first responders with or without accompanying mapping systems.[11]

Policy Issues Appropriate For Commission Action through an NPRM

The final major category of issues addressed during the Workshop involve public policy questions regarding the necessary level of accuracy that is needed for wireless location services and the timeframe and phasing that is appropriate to reasonably achieve these goals, specifically as they relate to wireless emergency calls from indoor environments which are currently exempted from testing requirements. The substantial documentation developed through the CSRIC process over the past few years, this docket, and the Workshop provide a sufficient record to support the adoption by the Commission of an NPRM that includes tentative conclusions regarding the technical capabilities of location services, achievable accuracy levels by wireless carriers, and the importance of fulfilling the public safety need for improved location information.

As several Workshop presenters noted, Commission leadership is critical to provide the expectations toward which public safety and the industry will work.[12] As NENA explained, a lack of Commission action through an NPRM creates uncertainty for carriers that may impede or delay efforts to improve location accuracy capabilities.[13] The presentations by carriers and location services providers indicated a "strong ecosystem" with multiple vendors offering market-ready location technology.[14] The time is therefore right for the Commission to develop firm requirements that can provide concrete standards to meet the needs of public safety and the expectations of the public. At a minimum, these requirements should encompass necessary metrics for time-to-first-fix, yield, confidence/uncertainty, accuracy in the X/Y/Z axes, and a reasonable timeline for implementation.

<u>Time-to-First-Fix</u>

A threshold assumption in the work of prior CSRIC working groups was that delivery of Phase II location information within 30 seconds would be adequate to serve the needs of public safety. During the Workshop, however, public safety representatives indicated that a time-to-first-fix of 30 seconds is often too long to assist adequately 911 operators because many calls last less than 30 seconds.[15] PSAP representatives explained during the Workshop that, rather than

[11] Remarks of Gary Parsons, CEO, NextNav LLC, at 4:41:11 ("*Parsons Remarks*").

[12] Remarks of Rob Anderson, Chief Technology Officer, TruePosition, at 3:24:05 ("*Anderson Remarks*").

[13] *Fontes Remarks* at 2:28:45.

[14] *Burroughs Remarks* at 3:13:27; *Anderson Remarks* at 3:24:05.

[15] *Anderson Remarks* at 3:19:19; *Hall Remarks* at 2:08:52.

wait 30 seconds for Phase II location information, 911 operators often spend the critical initial portion of an E911 call orally eliciting location information from the caller, substantially negating the benefit of Phase II location capabilities that require a full 30 seconds to become available to the public safety dispatcher.[16]

At the same time, carriers and location providers indicated during the Workshop that they are capable of providing Phase II information for some portion of emergency calls in substantially less than 30 seconds[17] or supplementing initial Phase II information with additional higher-accuracy but later-arriving Phase II information.[18] Given these facts, the Commission's NPRM should consider adopting rules that encourage carriers to provide their 'best available' Phase II location information at the earliest possible time following the initiation of an emergency call, followed by more accurate Phase II location information in a subsequent data transmission with the PSAP within 30 seconds of the call's initiation.

Yield

Yield is an essential component in evaluating the overall performance of a location accuracy system and must be included in any indoor location accuracy requirements adopted by the Commission.[19] The CSRIC test bed and the presentations during the Workshop confirm that multiple location service providers are capable of providing reliably high yield for indoor positioning.[20] Thus, the Commission should require a high yield percentage (measured across all

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[16] *Hoffman Remarks* at 1:48:29; (noting that operators can often elicit location information manually in less time than it takes to rebid); Remarks of Jennifer Green, District of Columbia Office of Unified Communications, at 2:02:10.

[17] See e.g. Presentation of Verizon Wireless, E911 Phase II Location Accuracy Workshop, PS Docket No. 07-114, at 5 (Nov. 18, 2013); (http://transition.fcc.gov/bureaus/pshs/911/Phase%202/Workshop_11_2013/VZW_E911_Location_Overview_Nov2013.pdf) ("*Verizon Wireless Presentation*").

[18] *Snapp Remarks* at 4:39:05; *Parsons Remarks* at 4:41:00.

[19] *See* Final Report – Outdoor Location Accuracy, CSRIC III, Working Group 3, at 29 (March 14, 2012) ("*CSRIC III Outdoor Location Report*").

[20] *See e.g.*, "Indoor Location Test Bed Report," CSRIC III, Working Group 3, at 54 (March 14, 2013) ("*CSRIC Test Bed Report*") (noting that "all technologies tested demonstrated relativity high yield and various levels of accuracy in indoor environments"); Presentation of Polaris Wireless, E911 Phase II Location Accuracy Workshop, PS Docket No. 07-114, at 12 (Nov. 18, 2013) (available at http://transition.fcc.gov/bureaus/pshs/911/Phase%202/Workshop_11_2013/Polaris_at_FCC_Workshop_final.pdf); Presentation of Qualcomm, E911 Phase II Location Accuracy Workshop, PS Docket No. 07-114, at 2 (Nov. 18, 2013) (available at http://transition.fcc.gov/bureaus/pshs/911/Phase%202/Workshop_11_2013/QCOM%20FCC%20Meeting%20on%20Indoor%20Location%20Accuracy.pdf).

location fixes) such as 95 percent as a component of the E911 Indoor Location Accuracy requirements in its upcoming NPRM.

Standardization of Confidence and Uncertainty Values

The Workshop participants acknowledged that the value of confidence and uncertainty information to PSAPs has in the past been uncertain. Some carriers may collect but, at the request of public safety, not transmit confidence level information to the PSAP.[21] Other PSAPs have indicated, however, that having values for confidence and uncertainty of location fixes is useful and that the Commission should take steps to ensure that the provision of this information is standardized across all providers.[22] Given the support for both the inclusion of such data and the agreement as to a standard confidence level, the Commission should consider formalizing this requirement in the NPRM. In this regard, the Commission may wish to follow the guidance of the ATIS Emergency Services Interconnection Forum ("ESIF"), which recommends 90 percent be used as a standard required confidence level.[23]

Horizontal Indoor Location Accuracy

Each of the four major vendors of indoor location services that made presentations at the Workshop indicated that their technologies can or will in the near future be able to meet the Commission's existing wireless E911 location accuracy rules of 50/150 (67 percent of the time and 90 percent of the time, respectively) even indoors.[24] These comments are consistent with the findings of the March 14, 2013 *CSRIC LBS Report*, which identified several other vendors with technologies that would be able to satisfy Phase II handset-based accuracy requirements in indoor locations, including Navizon, Skyhook, and CSR,[25] and are also consistent with the filings of other location technology vendors in this docket.[26] Thus, the Commission should propose the adoption of indoor location accuracy rules that are consistent with the existing outdoor location accuracy rules, and continue to tighten its requirements over time to afford

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[21] Presentation of Ryan Jensen, T-Mobile, at 3 (available at http://transition.fcc.gov/bureaus/pshs/911/Phase%202/Workshop_11_2013/T_Mobile_Nov2013_FINAL.pdf) ("*T-Mobile Presentation*").

[22] *Hoffman Remarks* at 2:27:09; *Hall Remarks* at 1:34:03.

[23] *T-Mobile Presentation at 3*; *Snapp Remarks* at 0:24:30.

[24] *Burroughs Remarks* at 3:59:15; *Polaris Presentation* at 5;

[25] *See* Report – "Leveraging LBS and Emerging Location Technologies for Indoor Wireless E9-1-1," CSRIC III, Working Group 3 (March 14, 2013) ("*CSRIC LBS Report*") at 26, 26, 33, 54.

[26] *See, e.g.*, *Ex Parte* Letter of Polaris Wireless, Inc., PS Docket No. 07-114, at 1 (Aug. 14. 2013); *Ex Parte* Letter of NextNav, LLC, PS Docket No. 07-114, at 6 (Aug. 14, 2013); *Ex Parte* Presentation of Qualcomm Incorporated, PS Docket No. 07-114, at 6-7 (Aug. 15. 2013).

accuracy closer to the within 50 meter accuracy required for a "specific dispatchable building" as specified in the CSRIC Test Bed Report.[27]

Vertical Indoor Location Accuracy

For indoor locations, particularly in urban areas, public safety participants in the Workshop confirmed that vertical information is "imperative."[28] The Workshop presentations and previous CSRIC reports establish that multiple technologies are capable of providing vertical location information, including floor-level location in the near future.[29] Thus, the Commission should expect indoor vertical location accuracy technologies to be able to meet floor-level accuracy, and should propose the adoption of such requirements accordingly, potentially three to five meter accuracy initially, reducing to less than three meters (floor-level) over time.

Timeline for Implementation

All four major wide-area location service providers presenting at the Workshop confirmed that their most advanced location technologies can be deployed and in commercial operation within two years.[30] Certain carriers noted, however, that carrier adoption and deployment of such advanced location services may require additional time for comprehensive implementation. Carriers employing handset-based location solutions, for example, may require a staged implementation period as consumers replace older generation handsets over a number of years.[31] Likewise, network-based location methods require time to construct positioning networks or retrofit equipment to support the location technology. These network deployments will likely focus initially in urban areas where advanced indoor location services are most needed and can reach the most people.[32] The Commission's implementation rules should follow a similar approach, with initial implementation within two years and a suitable phase-in period and coverage beginning in urban core areas.

Given the substantial consensus on these points demonstrated by the participants at the Workshop, it is appropriate for the Commission to initiate a rulemaking to establish wireless

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[27] *CSRIC Test Bed Report* at 9.

[28] *Hoffman Remarks* at 2:27;49; *Hall Remarks* at 53:50.

[29] *See, e.g.*, Remarks of Ganesh Pattabiraman, Co-Founder and President, NextNav LLC, at 3:03:47 ("*Pattabiraman Remarks*"), *Polaris Wireless Presentation* at 5-6; *CSRIC LBS Report* at 37, 40, 49, 54.

[30] *See, e.g.*, *Anderson Remarks* at 3:24:00; *Pattabiraman Remarks* at 3:06:45; *Burroughs Remarks* at 3:12:52; Remarks of David De Lorenzo, Principal Research Engineer, Polaris Wireless, at 3:44:15.

[31] *See. e.g.*, *Jensen Remarks* at 4:18:07 (noting that handset changes require 5-6 years to reach high penetration among subscribers); *Burroughs Remarks* at 4:18:45.

[32] *See, e.g.*, Comments of TruePosition, *Amending Part 20 of the Commission's Rules to Improve Indoor E911 Location, Accuracy and Enhance Public Safety*, PS Docket No. 07-114, GN Docket No. 11-117, at 23 (Aug. 6, 2013); *Parsons Remarks* at 4:18:31.

indoor and vertical location accuracy standards and eliminate the current exemption from testing afforded to indoor wireless emergency calling. The Commission can continue to further refine its understanding of the capabilities and limits of existing technology through the CSRIC working groups and through other processes, but such further inquiry need not, and should not, delay the adoption of initial indoor location accuracy rules that can drive improved indoor and vertical location accuracy for first responders.[33] By adopting clear rules and providing a reasonable timeline for implementation of necessary handset and network upgrades, the Commission can ensure that next-generation location services will soon be available to first responders and to the public without imposing unreasonable or excessive costs on the wireless industry. NextNav therefore recommends that the Commission release an NPRM that proposes the adoption of a phased approach to its indoor location rules that incorporates requirements for time-to-first-fix, yield, confidence, and accuracy in the X, Y, and Z axes.

Thank you for your attention to this matter. Please contact the undersigned if you have any questions.

Sincerely,

Bruce A. Olcott
Counsel to NextNav, LLC

[33] *See Fontes Remarks* at 4:28:28.