



October 25, 2019

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Re: Notice of *Ex Parte*, PS Docket No. 07-114

On October 23, the undersigned met with representatives of the Public Safety and Homeland Security Bureau and the Commission's Chief Technology Officer to discuss the Commission's wireless 9-1-1 location accuracy requirements. APCO expressed concern that we are on a path that will not lead to meaningful improvements in 9-1-1 location information. Absent broader revision of the location accuracy rules, even the most stringent z-axis metric would fail to ensure 9-1-1 professionals receive the information they need. APCO is recommending a holistic approach to achieving the most actionable location information possible, including specific suggestions for the z-axis metric.¹ Without delaying the current location accuracy benchmarks, this approach creates much-needed incentives for the carriers to deliver dispatchable locations, floor numbers, and x/y/z coordinates.

The following sections describe APCO's concerns with the Commission's z-axis proposal, broader problems with the wireless 9-1-1 location accuracy rules, and recommendations for how the Commission should proceed with a z-axis metric and revision of the rules.

I. Concerns with the Z-Axis Proposal
a. Operationalizing Z-Axis Information

Many questions remain about how z-axis information will be operationalized if the information does not include an estimated floor number. Under the Commission's proposal, z-axis information could be delivered as height above mean sea level or some other type of information. To use it, emergency communications centers (ECCs) would need building elevations and indoor

¹ From the record and APCO's discussions with a variety of stakeholders, it's become clear that foregoing the adoption of a z-axis metric and thereby requiring the carriers to comply with the vertical accuracy rules by pursuing the alternative dispatchable location option would not be sufficient. As described in detail below, APCO does not recommend that the Commission decline to adopt a z-axis metric altogether. In the context of broader changes to the rules, an appropriately-defined z-axis metric will be necessary to ensure carriers provide actionable location information.

maps, which would be expensive and take many years to develop, to the point that this is not a viable option. Alternatively, first responders in the field would attempt to match the caller's estimated elevation with their own devices, which delays the response and ignores the need for public safety telecommunicators to know the caller's location to provide assistance before responders are on scene (for example, by directing a caller to safety in a building fire).² 9-1-1 directors across the country have expressed concern with each of these options.

b. Translating the Metric to Real-World Performance

Operational challenges with the Commission's proposed z-axis metric are not the only significant problems. Adopting the proposed z-axis metric of +/- 3 meters for 80% of calls would not mean that the height of 9-1-1 callers will be known within 3 meters 80% of the time.

i. Error from Disparate Devices and Z-Axis Technology Providers

If field responders are attempting to match the 9-1-1 caller's elevation using their own devices, several factors could inject additional, unquantified error beyond what is required by the proposed z-axis metric or what would be reported by confidence and uncertainty information. Field responders who are attempting to match the elevation of a 9-1-1 caller will encounter variations in their own devices and z-axis solutions that will likely inject additional error. According to CTIA's Stage Z Test Report, "Active calibration of individual mobile devices seems essential to achieve consistent, usable Z-axis measurements for indoor wireless 9-1-1 calls because handset barometer biases significantly affect the accuracy of barometric pressure-based estimation systems."³ The results in the test bed "relied on calibration of the barometric sensor in the mobile devices, which had been performed by the applications provided by [the technology vendors]."⁴ To APCO's knowledge, the carriers have not evaluated the uncertainty that will be introduced by matching z-axis measurements with responder devices at all, let alone with devices that are using different z-axis technologies. This latter point is especially important because responders' and callers' elevation estimates will be derived by different technology vendors (unless the assumption is that every carrier will rely on a universal z-axis technology provider).

ii. Challenges Enforcing the Z-Axis Metric

APCO remains concerned with how the proposed metric – +/- 3 meters for 80% of wireless calls – would be enforced. Carriers would have to demonstrate the performance of a z-axis technology in the test bed.⁵ Naturally, testing would include devices that are compatible with that technology but not necessarily be representative of the devices being used in the real world. For example, if the carriers choose to deploy a z-axis technology that is dependent upon a barometric sensing capability, the test bed would only evaluate performance of devices used by a subset of potential 9-1-1 callers (whose devices are capable of delivering barometric pressure sensor-based altitude estimates). How then would the carriers be able to demonstrate compliance with a Commission-mandated metric that applies to 80% of all wireless calls (regardless of whether

² APCO further cautions the Commission against assuming that responders will have devices and applications capable of estimating their elevation.

³ CTIA, 911 Location Test Bed, LLC Report on Stage Z, at 120 (Aug. 3, 2018).

⁴ *Id.* at 59.

⁵ In the Matter of Wireless E911 Location Accuracy Requirements, PS Docket No. 07-114, *Fourth Further Notice of Proposed Rulemaking*, FCC 19-20 (rel. Mar. 18, 2019) ("FNPRM") at para. 11. *See also* 47 C.F.R. § 20.18(i)(2)(iii)(A) ("All CMRS providers must certify that the indoor location technology (or technologies) used in their networks are deployed consistently with the manner in which they have been tested in the test bed.").

the calls are from devices that have barometric sensors)?⁶ It is unclear how to reconcile a technology-neutral metric with a technology-specific compliance process. Limiting applicability of the z-axis metric to devices capable of delivering barometric pressure sensor-based altitude estimates or new devices would violate key principles of the Commission's 4th Report and Order: a technology neutral approach and extension of location accuracy rules to *all* wireless calls to 9-1-1.⁷

iii. Compliance Based on Deployment Benchmarks, as Opposed to Real-World Performance

More fundamentally, the z-axis metric may not be representative of the information received with real-world 9-1-1 calls because the Commission's rules do not explicitly require carriers to provide z-axis information for a specific percentage of 9-1-1 calls. Carriers would arguably be able to comply with the vertical accuracy requirements by deploying z-axis technology consistent with the z-axis metric, but without actually delivering z-axis information to ECCs. This is especially concerning given that original equipment manufacturers (OEMs) and operating system (OS) providers control the information sent when a 9-1-1 call is made. To date, at least one OEM has refused to allow devices to access the National Emergency Address Database (NEAD), apparently due to philosophical differences over the best approach to location accuracy. We cannot assume that OEM or OS providers will cooperate with carriers and z-axis technology vendors to replicate test bed conditions (by permitting active calibration, for example) or that the location information will be provided at all.

II. Bigger-Picture Problems with the Commission's Rules

Dispatchable location is the gold standard for 9-1-1 and was the goal of the 4th Report and Order.⁸ However, the Commission's rules do not actually require carriers to provide dispatchable locations or z-axis information for any specific percentage of wireless 9-1-1 calls. Compliance is dependent upon populating the NEAD or deploying z-axis technology for a subset of the population. The success of this framework depended upon the carriers making a good-faith effort to leverage all viable technologies to deliver the best possible location information for 9-1-1. While there seemed to be good initial progress after the 4th Report and Order, public safety's expectations have not been met. Assumptions have proven to be wrong; unexpected problems have

⁶ Would, for example, the carriers be required to test a collection of devices that are supposedly representative of devices in circulation (including some with and some without barometric pressure sensors) to estimate the percentage of devices in the real world that could be covered by the carrier's choice of a z-axis technology? Then, to comply with the z-axis metric, would carriers be required to discount the performance of their chosen z-axis technology to account for the proportion of devices (and potential 9-1-1 calls) that will be covered by the technology?

⁷ 4th Report and Order at para. 89 ("These elements are consistent with our strong preference for flexible and technologically neutral rules"). *Id.* at para. 8 ("our ultimate objective is that all Americans using mobile phones – whether they are calling from urban or rural areas, from indoors or outdoors – have technology that is functionally capable of providing accurate location information so that they receive the support they need in times of emergency.").

⁸ *See* Wireless E911 Location Accuracy Requirements, Fourth Report and Order, 30 FCC Rcd 1259 (2015) (4th Report and Order). For example, para. 8 of the Order explained that the FCC's "ultimate objective is that all Americans using mobile phones – whether they are calling from urban or rural areas, from indoors or outdoors – have technology that is functionally capable of providing accurate location information so that they receive the support they need in times of emergency." And at para. 42, explaining that while the Commission had viewed dispatchable location as a long-term goal in the 2014 FNPRM, the record indicated that technology developments had made dispatchable location technically feasible quickly enough for incorporation into the 4th Report and Order. Then-Commissioner Pai's statement accompanying the Order supported this aspect of the item in particular: "I am also glad that the framework we're putting in place puts us on a path to providing emergency responders with a 'dispatchable location' - that's the room, office, or suite number where the 911 caller is located. Public safety organizations have described this as the 'gold standard' for indoor location accuracy because it tells first responders exactly which door they need to knock on, or in some cases, kick in during an emergency."

arisen.⁹ The carriers have been silent concerning efforts they could be taking to provide dispatchable location without the NEAD, such as solutions leveraging Bluetooth beacons, carrier-provisioned home and business products, interfaces with Internet Service Providers, and emerging 5G offerings. Since 2015, it has become increasingly clear that problems are arising from limiting the rules to wireless carriers, reliance on deployment benchmarks instead of real-world performance, limiting vertical location accuracy requirements to the top 50 CMAs, and treating dispatchable location and z-axis technologies as mutually-exclusive.

a. The Rules Are Limited to Wireless Carriers

Four years since adoption of the 4th Report and Order, the landscape has evolved in terms of the companies that are offering wireless communications services or developing location technologies. While the Commission’s wireless 9-1-1 location accuracy rules rightly hold the carriers accountable for improvements, entities including the cable industry, Apple, and Google have useful data and control over how location information is provided for 9-1-1 calls. APCO believes that many of the challenges for the carriers to achieve dispatchable location, whether populating the NEAD with data held by other industries and companies, or accessing location technologies developed by companies like Apple and Google, are business matters for the carriers to resolve. Yet the Commission may need to revise its rules and exercise its broad authority to promote safety of life and property¹⁰ to ensure that ECCs receive the location information they need to protect the public.

b. The Rules Do Not Explicitly Require Carriers to Provide Dispatchable Location or Z-Axis Information for a Specific Percentage of 9-1-1 Calls

To comply with the rules, carriers must either populate the NEAD with access points totaling up to ¼ of the population of each of the top 50 CMAs, or implement z-axis technology across 80% of the area of each of the top 50 CMAs capable of achieving 3-meter accuracy 80% of the time. Thus, the rules impose a deployment requirement, as opposed to requiring delivery of dispatchable location or z-axis information with a certain percentage of 9-1-1 calls. This deployment requirement for vertical accuracy is not aligned with the horizontal accuracy requirement, which says carriers must provide a dispatchable location or x/y within 50 meters for a certain percentage of calls. While the NEAD population benchmarks initially seemed an appropriate method for tracking carriers’ progress, APCO is increasingly concerned that carriers will not provide dispatchable

⁹ For example, our understanding is that entities with databases of WiFi access point locations have not assisted with populating the NEAD, and Apple has declined to permit the carriers to access handset information needed for the NEAD to be used for 9-1-1 calls. *See* Letter from Matthew Gerst to Marlene H. Dortch, Secretary, Federal Communications Commission, PS Docket No. 07- 114 (Apr. 26, 2019).

¹⁰ One of the Commission’s primary objectives is to “make available, so far as possible, to all people of the United States . . . a . . . wire and radio communication service . . . for the purpose of promoting safety of life and property.” 47 U.S.C. § 151. Congress has repeatedly and specifically endorsed a role for the Commission in the nationwide implementation of advanced 9-1-1 capabilities. *See* Wireless Communications and Public Safety Act of 1999, PL 106–81, 113 Stat 1286 §§ 3(a), (b) (1999) (codified at 47 U.S.C. § 251(e)(3), 47 U.S.C. § 615) (directing the Commission to “designate 911 as the universal emergency telephone number within the United States for reporting an emergency to appropriate authorities and requesting assistance” and to “encourage and support efforts by States to deploy comprehensive end-to-end emergency communications infrastructure and programs, based on coordinated statewide plans, including seamless, ubiquitous, reliable wireless telecommunications networks and enhanced wireless 911 service.”); *see also* New and Emerging Technologies 911 Improvement Act of 2008 (NET 911 Act), PL 110–283, 122 Stat 2620 (2008) (codified at 47 U.S.C. § 615a-1(a), (c)(1)(B)) (requiring “each IP-enabled voice service provider to provide 9-1-1 service and enhanced 9-1-1 service to its subscribers in accordance with the requirements of the Federal Communications Commission”); Twenty–First Century Communications and Video Accessibility Act of 2010, PL 111-260, 124 Stat 2751 § 106(g) (2010) (CVAA) (codified at 47 U.S.C. § 615c(g)). *See also* Section 506 of the Repack Airwaves Yielding Better Access for Users of Modern Services Act of 2018 (RAY BAUM’S Act), Pub. L. No. 115-141, 132 Stat. 348, 1095 (codified at 47 U.S.C. § 615 note) (directing the Commission to consider adopting rules to ensure a dispatchable location is conveyed with a 9-1-1 call regardless of the technological platform used).

locations unless explicitly required to do so by the rules. Further, the NEAD population benchmark has created confusion over whether a NEAD-derived location automatically constitutes a dispatchable location and whether there are other acceptable methods of providing dispatchable locations.

c. The Vertical Accuracy Rules Are Limited to the Top 50 CMAs

As noted above, the vertical accuracy rules only impose requirements for the top 50 CMAs. This leaves out a significant number of areas – potentially some of the top 50 most populated CMAs¹¹ – that desperately need actionable vertical location information. For example, millions of potential 9-1-1 callers in Atlantic City each year and the University of Florida’s 50,000+ students in high-rise dormitories and campus buildings would be unprotected by the Commission’s vertical location requirements.¹² Had the Commission’s 2014 proposal been adopted, carriers would have been required to provide vertical location estimates within 3 meters for 80% of calls in 2020.¹³ While there is merit to focusing efforts to derive actionable vertical location information in areas with tall buildings, the current vertical accuracy rules might not be the best approach.

d. The Rules Treat Dispatchable Location and Z-Axis Technologies as Mutually-Exclusive

While this distinction might have made sense in 2014, today’s it’s clear that an effective dispatchable location solution likely would leverage z-axis information, and z-axis solutions can leverage WiFi location information (which is generally considered part of a dispatchable location approach). The Commission’s rules should incentivize carriers to leverage any useful technologies to provide the best possible location information for 9-1-1. Even when a dispatchable location is provided, responders might benefit from having supplemental information such as x/y coordinates and a z-axis estimate to corroborate, judge likelihood that the dispatchable location is accurate, or engage in a search if the dispatchable location proves inaccurate.¹⁴

III. Suggested Path forward

The Commission should revise its rules to address the issues described above, but doing so should not result in any delay to the current location accuracy benchmarks or the obligations of the carriers to meet these benchmarks. Accordingly, APCO offers suggestions for establishing a z-axis metric and further steps to improve the location accuracy rules.

a. Establishing a Z-axis Metric

In establishing a z-axis metric, the Commission should require that z-axis information 1) be shown to be accurate within 3 meters for at least 80% of calls, 2) be delivered in a default elevation format (such as height above mean sea level or height above ellipsoid) unless a different format is specified by an ECC, and 3) include

¹¹ The Commission’s 4th Report and Order referenced a static list of the top 50 most populous CMAs, as defined by the 2010 Census. It is unclear whether areas that have experienced a population surge to become one of the 50 most populous CMAs after 2010 would be covered by the vertical accuracy requirements.

¹² 4th Report and Order, Appendix B, List of the Top 50 Most Populous Cellular Market Areas (citing UNITED STATES CENSUS BUREAU, 2012 Statistical Abstract at Table 20).

¹³ Wireless E911 Location Accuracy Requirements, PS Docket No. 07-114, *Third Further Notice of Proposed Rulemaking*, 29 FCC Rcd 2374, at para. 38 (2014).

¹⁴ Dealing with dispatchable location information that ends up being inaccurate can partially be addressed by communicating confidence and uncertainty data with a dispatchable location (the details of which are likely best left to the standards process, not set by the Commission), but the Commission’s rules don’t explicitly require any z-axis information to be delivered if carriers use a dispatchable location approach.

an estimated floor number (which, consistent with the +/- 3 meter requirement, should be accurate within 1 floor for 80% of calls).

In establishing the metric, the Commission should confirm that the metric is performance-based. The metric should be technology-neutral, meaning that compliance is not limited to a subset of devices (such as those with barometric sensors). The Commission should require that confidence and uncertainty data for the vertical location information be provided to the ECC. Ideally, this would be harmonized with the uniform confidence level of 90% established for horizontal location information.

i. Requiring Carriers to Provide a Floor Number that Corresponds to the Estimated Elevation is Technically Feasible

The Commission would be justified in requiring that z-axis information include a floor number. Several academic studies have demonstrated the ability to identify the correct floor at rates that would exceed a requirement of identifying the correct floor (+/- 1 floor) for 80% of tests.¹⁵ Further, as part of APCO's recommendations for broader revision of the location accuracy rules, the Commission should clarify that z-axis and dispatchable location technologies are not mutually-exclusive. This would further support the establishment of a z-axis metric that includes an estimated floor that corresponds to the elevation. As the CTIA test bed demonstrated, even a limited, NEAD-based approach to vertical location is capable of identifying the correct floor level (+/- 1 floor) for nearly 40% of calls.¹⁶ Thus, a barometric-pressure derived elevation may not always be the best approach, and in some cases may not be necessary to provide a floor level. Requiring carriers to provide an estimated floor level that corresponds to the elevation would ensure that carriers and technology providers are pursuing a goal that aligns with what's needed for 9-1-1.

ii. Ensuring Real-World Performance Aligns with the Z-Axis Metric

The Commission should require carriers to take additional steps to verify that real-world performance is consistent with test bed evaluation of z-axis technology. As the z-axis Report noted, the active calibration performed by NextNav's system would need to be built into "live" solutions and retested at scale to fully assess performance, the test did not assess whether existing standards support the signaling necessary to perform this function at scale nationally, and it is not clear what software changes would be needed to device middleware and OS. Carriers' experience with the NEAD raises the need to ensure the device OS won't be a limiting factor on location technology performance in the real world. If OEM/OS providers or others are determined to be unreasonably impeding improvements by, for example, objecting to send device data to a location technology vendor when a 9-1-1 call is made, the Commission should use its regulatory authority to require cooperation.

In addition to verifying that the test bed results are replicated in the real world, the Commission should encourage carriers and technology vendors to evaluate performance for a variety of unique public safety use cases. For example, to what extent would barometric-based z-axis information be impacted by the various conditions that might arise during a high-rise apartment fire (temperature changes, pressurizing stairwells, etc.)?

¹⁵ See William Falcon & Henning Schulzrinne, Predicting Floor Level for 911 Calls with Neural Networks and Smartphone Sensor Data (2018), available at <https://arxiv.org/pdf/1710.11122.pdf> (describing a system capable of predicting the correct floor level – as an "absolute floor level" – with 100% accuracy that does not require the use of beacons, prior knowledge of the building infrastructure, or knowledge of user behavior); Min Yu, Feng Xue, Chao Ruan & Hang Guo, Floor Positioning Method Indoors with Smartphone's Barometer, *Geo-spatial Information Science*, 22:2, 138-148, available at <https://www.tandfonline.com/doi/full/10.1080/10095020.2019.1631573> (describing an indoor floor positioning method that achieved a correct floor identification rate above 80%).

¹⁶ See E911 Location Test Bed Dispatchable Location Summary Report, ATIS Test Bed Program Management, at 10 (Apr. 2019).

As a matter of best practice, the first time a public safety technology is tested to a particular use case should not be the first time public safety professionals are relying on it during an emergency.

iii. Avoiding Problems when Field Responders Attempt to Match a Caller’s Height

Because first responders in the field may attempt to match the estimated vertical measurement of a caller (especially if the Commission adopts its proposed z-axis metric relative to AMSL without requiring a corresponding floor estimate), carriers should be required to demonstrate that the solutions they’re relying on to comply with the metric will meet the 3-meter baseline regardless of whether the position estimates of the caller and field responder are both derived from the same technology provider. The Commission cannot assume that responders will have devices being calibrated by the same solution used by the carriers for the 9-1-1 caller. In other words, if the NextNav solution is used by the carrier serving the 9-1-1 call but the firefighter attempting to locate the caller has a device using the Polaris solution or Apple’s compass app, the Commission must ensure that the use of different solutions does not produce additional error that exceeds the +/- 3 accuracy baseline. Unquantified sources of additional error will make locating 9-1-1 callers more difficult, and will increase frustration for public safety telecommunicators who are being misled regarding the reported confidence and uncertainty information.

Fundamentally, the Commission must ensure that the information being provided pursuant to the z-axis requirements is more actionable than the uncompensated barometric pressure data that carriers have been required to provide since 2018.

b. Broader Changes Needed to the Wireless Location Accuracy Rules

Consistent with the improvements described here for the wireless location accuracy rules, the Commission should issue a statement of policy, declaring that wireless carriers and location technology providers should seek to provide ECCs with the “door, floor, and coordinates” for every indoor wireless 9-1-1 call, using any combination of available technologies. ECCs should receive the most actionable information possible, which could entail both a dispatchable location and x/y/z coordinates. All stakeholders – CMRS providers, cable companies, ISPs, device manufacturers and operating system providers, etc. – should contribute to improving location information for 9-1-1. The goal should be a holistic approach that reaffirms dispatchable location as the gold standard, but recognizes that there is a continuum of what constitutes actionable information:

Door

Aim to identify the dispatchable location, the specific door to kick down (with x/y/z coordinates as useful information to confirm or to provide a search area).

Floor

If the door cannot be identified with sufficient confidence, provide the estimated floor (with x/y/z coordinates as useful supplemental information).

Coordinates (x/y/z)

Provide x/y/z coordinates as supplemental information useful for corroborating door/floor information, and as a resource when the correct door/floor is not provided or is estimated with a low confidence.

The Commission should leave the current benchmarks in place, but establish a more certain path to improving location accuracy. As part of the proposal, the Commission should seek comment on the extent to which the Commission’s rules should impose requirements on parties other than wireless carriers (including companies

like Apple and Google, cable companies, and ISPs) to ensure 9-1-1 location accuracy improves and that the Commission's and public safety's need for transparency and accountability are met.¹⁷

i. Vertical Accuracy April 3, 2021

The Commission should keep the current compliance benchmarks (which are focused on populating the NEAD or deploying z-axis technology) and create an additional, more relevant option to comply with vertical accuracy requirements by actually providing dispatchable location or z-axis information (which would include a floor number). For simplicity, the suggested changes are presented as underlined text in a summary of the current benchmark:

Nationwide carriers must provide either (1) dispatchable location, or (2) vertical (z-axis) location information in compliance with the Commission-approved metric, in each of the top 25 CMAs. If dispatchable location is used, there must be a density of reference points distributed throughout the CMA equivalent to 25 percent of the population in that CMA, or carriers must provide dispatchable location for 20% of all indoor wireless calls. If vertical location technology is used, it must be deployed to cover 80 percent of the CMA population, or carriers must provide z-axis information consistent with the Commission-approved metric¹⁸ for 80% of all indoor wireless calls.

In addition to creating an option to comply with the vertical location requirements by providing dispatchable location for a specific percentage of calls, the Commission should clarify that dispatchable location can be provided without the NEAD and that use of the NEAD to estimate a caller's location does not de facto mean a dispatchable location has been provided.

ii. Vertical Accuracy April 3, 2023

Expand the revised 2021 benchmark to the top 50 CMAs and raise the percentage in the new dispatchable location option.

Nationwide carriers must provide either (1) dispatchable location, or (2) vertical (z-axis) location information in compliance with the Commission-approved metric, in each of the top 50 CMAs. If dispatchable location is used, there must be a density of reference points distributed throughout the CMA equivalent to 25 percent of the population in that CMA, or carriers must provide dispatchable location for 40% of all indoor wireless calls. If vertical location technology is used, it must be deployed to cover 80 percent of the CMA population, or carriers must provide z-axis information consistent with the Commission-approved metric for 80% of all indoor wireless calls.

Note that the existing benchmarks in 2022 and 2024 for non-nationwide carriers could be adjusted consistent with the suggested revisions for 2021 and 2023.

iii. Vertical Accuracy April 3, 2025

The Commission's existing framework for combining test bed results and live call data reporting to monitor carriers' compliance would remain in place. Carriers would still be required to certify that they have deployed location technologies throughout their coverage area consistent with the manner in which the technologies have

¹⁷ The Commission should clarify, however, that while it seeks comment on additional ways to achieve the best possible location information for 9-1-1, it will hold the carriers to the current requirements and pursue enforcement action if necessary.

¹⁸ To be clear, this assumes that the Commission-approved metric includes a corresponding floor number.

been tested in the test bed. The existing benchmarks are modified by establishing vertical accuracy requirements that apply nationwide (as opposed to only the top 50 CMAs), requiring dispatchable location information to be accompanied by supplemental coordinate data when available, and setting minimum percentages of calls that must be delivered with varying degrees of actionable vertical location information (as opposed to using technology deployment benchmarks for compliance). Dispatchable location must be provided for a specific minimum percentage of indoor calls. Recognizing that dispatchable location can't be provided with every call (and the value of supplemental coordinate-based information to corroborate the location or as a back-up if the estimated dispatchable location is inaccurate or delivered with low confidence), carriers should at least deliver z-axis information (which, consistent with the metric, means +/- 3 meters and a corresponding floor) for a certain percentage of calls.

Nationwide carriers shall provide:

- 1) dispatchable location for 65% of all indoor wireless 9-1-1 calls; and
- 2) z-axis information consistent with the Commission-approved metric for 80% of all indoor wireless 9-1-1 calls.

These percentages are technically feasible.¹⁹ The Commission must establish a specific minimum percentage of calls and should not be limited to relying on the carriers to demonstrate technical feasibility. For compliance, the percentage of calls meeting the first prong (provided with a dispatchable location) would count toward the percentage meeting the second prong (providing z-axis information consistent with the Commission-approved metric for 80% of calls). Thus, if a carrier provided a dispatchable location for 65% of calls in a reporting period, only an additional 15% of calls would need to be provided with location information meeting the second prong. The Commission could establish an estimated percentage of all wireless 9-1-1 calls that are made indoors, which carriers would then use when computing compliance estimates with live 9-1-1 call data.²⁰

IV. Conclusion

To ensure 9-1-1 location is actionable for emergency response, the Commission's location accuracy rules must be revised. As suggested here, the Commission can create more effective benchmarks, without delaying existing benchmarks, and immediately establish a z-axis metric that is consistent with achieving the best possible location information for 9-1-1.

Pursuant to Section 1.1206 of the Commission's rules, this letter is being filed electronically with your office.

Respectfully submitted,

APCO INTERNATIONAL

¹⁹ See Marcus Andronici, Principal Sales Engineer, West Corporation, VoWiFi 911 and Application of Proximity Check (Jan. 7, 2018) available at <https://www.west.com/blog/safety-services/wireless/vowifi-911-proximity-check/> (finding that 65% of VoWiFi 9-1-1 calls were delivered with a likely dispatchable address, based on an assessment of the caller's proximity to a subscriber-provisioned address). Carriers could utilize billing information, ask wireless users to input Registered Locations (home/work locations) into their devices for sharing when a 9-1-1 call is made, provision Bluetooth beacons that are programmable with an address, or leverage other sources of data about a caller to determine a caller's home and/or work locations. For example, Google and Apple maps have a common feature to label "home" and "work" locations.

²⁰ Our understanding is that carriers currently assume that half of 9-1-1 calls are made indoors, which is reflected in their computations of technology performance measures with quarterly reports of live 9-1-1 call data, and may actually underestimate the number of calls made indoors. One recent survey indicated that more than half of 9-1-1 calls are made indoors. See Comments of Precision Broadband LLC, PS Docket No. 07-114 (May 20, 2019).

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