

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20544**

In the Matter of	)	
	)	
Wireless E911 Location Accuracy	)	PS Docket No. 07-114
Requirements	)	
	)	

**REPLY COMMENTS OF T-MOBILE USA, INC.**

T-Mobile USA, Inc. (“T-Mobile”) is pleased that the record in this proceeding reflects remarkable consensus with respect to certain aspects of implementing z-axis obligations for 911 calls. Commenters generally support adoption of a z-axis metric in which compliance is tied to the ability to use proven technology on proven devices (that is currently, smartphones with barometers and related functionality necessary to estimate vertical location), in those areas where z-axis information is most useful (that is, urban and dense urban areas), and for PSAPs that are capable of receiving and utilizing z-axis information. The record also supports providing the information in a consistent, standardized form (height above the ellipsoid), so that local public safety organizations can properly utilize and, when necessary, convert that information in the way that is the most useful for them.

**Compliance Obligations Should Be Based on Device Capabilities**

Notably, commenters across the ecosystem support adoption of compliance obligations measured with reference to z-axis capable devices in urban and dense urban morphologies, as tested by the carriers in the representative environment of the 9-1-1 Location Technologies Test Bed (“Test Bed”). For instance, NextNav and others argue that compliance measurements must

account for device capabilities.<sup>1</sup> These commenters note that requiring a compliance metric that does not account for the fact that many handsets in use today have neither the necessary functionality to accurately estimate altitude, nor the ability to interface with necessary reference networks, will only impede carriers' ability to meet their regulatory obligations with no public benefit. T-Mobile agrees with these positions and encourages the Commission to account for these factors in its new rules.

Some commenters predict the development of accurate vertical location technologies that do not depend on a barometer in the device.<sup>2</sup> T-Mobile eagerly anticipates these developments but cautions the Commission against adopting new z-axis performance requirements based on these predictions. The record lacks any basis for predictions as to the timing of such developments, or as to the level of performance: both would be entirely speculative.<sup>3</sup> New compliance obligations should only be applied to devices without barometers after such

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<sup>1</sup> See Comments of AT&T ("AT&T Comments") at 3; Comments of CTIA ("CTIA Comments") at 8–9; Comments of Verizon ("Verizon Comments") at 3–4; Comments of NextNav, LLC ("NextNav Comments") at 8; Comments of Qualcomm Incorporated ("Qualcomm Comments") at 6 (further noting that, in addition to sensors, handset capability determination must also account for sensor calibration); *see also* Comments of APCO International ("APCO Comments") at 3 (raising concerns about the use of Z-axis information without standardized calibration); *see also* Comments of Google LLC ("Google Comments") at 12 (advocating for compliance benchmarks that give carriers "[s]ufficient breathing space to sunset support for any older devices with lesser capabilities"). All comments cited herein were filed in PS Docket No. 07-114 on May 20, 2019.

<sup>2</sup> See, e.g., Google Comments at 2–4; Comments of Precision Broadband LLC at 5.

<sup>3</sup> *Sorenson Commc'ns Inc. v. FCC*, 755 F.3d 702, 708 (D.C. Cir. 2014) ("[predictive] judgment[s] must be based on some logic and evidence, not sheer speculation," *quoting Verizon v. FCC*, 740 F.3d 623, 663 (D.C.Cir.2014) (Silberman, J., concurring in part and dissenting in part)).

technologies have been developed, demonstrated in the Test Bed to have the ability to meet the established accuracy metric, and are shown to be broadly available to consumers.

### **Compliance Mandates Should Facilitate Deployment in Critical Areas First**

Verizon suggests that the Commission should focus its compliance benchmarks on those areas with the most critical need for Z-axis information with 911 calls—specifically, urban and dense urban morphologies.<sup>4</sup> Verizon argues that regulatory benchmarks that focus initial compliance on these areas will ensure the greatest impact of deployment efforts. T-Mobile encourages the Commission to explore this proposal—which would not only allow the greatest benefit to the public in the near term but would also facilitate the geographically targeted deployment of vertical solutions that require a reference network.<sup>5</sup>

With respect to compliance measurement, BRETSA suggests that carriers should provide first responders with testing procedures and assist them in conducting tests.<sup>6</sup> BRETSA also calls for requiring carriers to conduct “proofs-of-performance” testing in each market—essentially asking the Commission to measure compliance based on live call performance.<sup>7</sup> Such an

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<sup>4</sup> See Verizon Comments at 4–5 (“[T]he Commission should refine the per-CMA requirement to enable service providers to target deployment of network-level capabilities in urban and dense urban areas. . . . The Commission’s public safety objectives would not be served if deployment of the capability in a suburban area helps achieve the 80 percent coverage benchmark, but the result is that Z-axis coverage is provided for single-story residential dwellings, rather than the multi-story buildings where those residents work (but do not live).”); see also NextNav Comments at 18–19 (“[O]ne factor that might reduce the costs of vertical location compliance while potentially improving the benefit would be requiring compliance based on coverage of 80 percent of the buildings that exceed three stories in each of the top 50 CMAs, rather than based on the residential locations of 80 percent of the population.”).

<sup>5</sup> See Verizon Comments at 4; NextNav Comments at 19; Qualcomm Comments at 6.

<sup>6</sup> See Comments of the Boulder Regional Emergency Telephone Service Authority (“BRETSA Comments”) at 7.

<sup>7</sup> See *id.* at 5–7.

approach to assessing z-axis compliance is clearly infeasible. The impracticality of conducting indoor test calls in each market is what led the Commission, in the *Fourth Report & Order*, to direct the wireless carriers to establish a representative Test Bed to validate technologies for indoor location.<sup>8</sup> The Test Bed process has proven to be an effective approach to assessing indoor 911 location performance, and there is no basis to argue for testing in each and every market. As recognized by numerous other commenters, the only feasible way to measure compliance is through performance in the Test Bed.<sup>9</sup>

NENA's comments raise concerns about PSAPs' ability to use z-axis information.<sup>10</sup> This highlights the important fact that z-axis information will only be beneficial to a 911 caller once PSAPs are able to receive and properly utilize this new parameter. There is an important role for Public Safety to play in bringing this new location information to fruition. As the Commission reviews the record, it may wish to consider adopting phased-in compliance based on PSAP capabilities, much as it did with Phase II E911. It makes little sense to require carriers to institute z-axis capabilities in areas within the top 25 or 50 CMAs where a PSAP is not ready and able to use such data to aid first-responders in locating a 911 caller. A phased-in approach based upon PSAP readiness would allow carriers to focus their z-axis development efforts in those areas where PSAPs are able to accept and use z-axis information.

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<sup>8</sup> See *Wireless E911 Location Accuracy Requirements*, 30 FCC Rcd. 1259 ¶ 36 (2015).

<sup>9</sup> See AT&T Comments at 3; CTIA Comments at 8; Verizon Comments at 3.

<sup>10</sup> See generally Comments of NENA: The 9-1-1 Association ("NENA Comments") (arguing for adoption of NG911-based OSP-delivered object location, while noting that such information may not be usable for legacy PSAPs).

## **Local Authorities Are Best Positioned to Convert Altitude Information**

Despite broad consensus in the record that that consistent information on specific floor numbering is not available and local authorities—including first responders—are best positioned to decide how to use z-axis information to locate callers,<sup>11</sup> APCO continues to argue that carriers must provide floor-level information along with altitude information. Indeed, APCO goes so far as to allege that “[i]dentifying the floor level is technically feasible today.”<sup>12</sup> This statement, though, is overwhelmingly contradicted in the record.<sup>13</sup> APCO points to academic research suggesting various methods of generating floor level information using in-building small cells and Wi-Fi hotspots,<sup>14</sup> but as indicated by those sources, such capabilities are not currently in use, have not been evaluated in the Test Bed, and cannot be the basis for compliance obligations beginning in 2021.

As noted by various public safety commenters, carriers lack the visibility into hyper-local topography and building configurations that local authorities have.<sup>15</sup> Requiring carriers to

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<sup>11</sup> See, e.g., AT&T Comments at 3 (“First responders are more familiar with the terrain and structures in their jurisdictions and are in the best position to use the z-axis data to identify emergency caller location in a given structure.”); NENA Comments at 6 (“[A]llowing public safety agencies the freedom to use more accurate local data sources to produce a single, authoritative geodetic-to-civic reference will preserve the power of local PSAPs to choose software and hardware that best meets their needs, while simultaneously minimizing induced errors from multiple transformations between these two formats”); BRETSA Comments at 9 (“BRETSA would prefer vertical location information be presented as a height AGL and AMSL, with accuracy and confidence data. This would best provide dispatchers and First Responders an accurate picture of the area within which a caller may be located, and allow them to apply local knowledge, experience and CAD premises and incident data to estimate the caller’s location.”); NextNav Comments at 11 (“A requirement that z-axis data be reported as actual floor level would add even more variables and inconsistency to the indoor location reporting process. As noted above, an initial problem with translating altitude to floor level information is that this cannot be reliably calculated absent precise x/y information regarding the horizontal location of a device. . . . Even if the correct building is identified, actual ‘floor level’ is often based on conditions that are very specific to the building in question and would require detailed mapping and information collection regarding every building. No better example exists than the Commission’s headquarters,

reverse geocode altitude information into floor number is technically infeasible and a mandate to do so would result in wasted time and effort. The record is clear that if carriers are required to provide altitude information to local emergency authorities, they should utilize the WGS-84 standard which provides altitude information as height above the ellipsoid to ensure the best and most consistent information<sup>16</sup>—and allow those authorities to use that information as best meets their needs and capabilities.

It is clear from the record that high accuracy vertical location estimation is only feasible for certain handsets with the necessary capabilities, including barometers and the related functionality required for barometer calibration and reporting of in-building pressure measurements. While new technologies may develop that do not rely on barometers, until that

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where the Eighth Floor is not on the eighth story of the building. Such variations in floor numbers (such as skipping the thirteenth floor) are very common, but not applied in a sufficiently consistent manner to be computed by location service providers without local inspection of each building.”); Google Comments at 10–11 (“There is now no sufficiently reliable solution to pinpoint user location on a floor-by-floor basis. The user’s height within a building is not a proxy for floor number, because floors may differ in height within a building or from building to building. . . . Even information collected from building owners about the number of floors in their structures could prove unreliable due to a lack of a standard floor numbering system or nomenclature.”).

<sup>12</sup> APCO Comments at 7.

<sup>13</sup> See NENA Comments at 5–6; NextNav Comments at 4; CTIA Comments at 3; Comments of the Alliance for Telecommunications Industry Solutions (“ATIS Comments”) at 3; BRETSA Comments at 7–8; Google Comments at 11.

<sup>14</sup> APCO Comments at 6 n.22.

<sup>15</sup> See NENA Comments at 5–6 (“An authoritative reference source for the number and height of floors in a given building does not currently exist.”); BRETSA Comments at 7–8 (“One would not expect the required [floor elevation] information to be readily available to wireless providers.”); *see also* Comments of the Alliance for Telecommunications Industry Solutions (“ATIS Comments”) at 3 (“there currently exists no data source that correlates any form of z-axis data to a floor index or floor label”).

<sup>16</sup> See NextNav Comments at 9–10; NENA Comments at 2–4; Initial Comments of the Texas 9-1-1 Entities at 4; ATIS Comments at 4.

happens, the FCC needs to remain cognizant of device limitations in determining the applicability of any new z-axis requirements. The record also affirms that compliance should be assessed in the representative Test Bed that has been established by direction of the Commission for this express purpose. Furthermore, by focusing compliance obligations on areas where it will have the most impact, *i.e.*, urban and dense urban environments, and where emergency services can accept and utilize standardized information from z-axis capable devices, the Commission can ensure the greatest public benefit.

Respectfully submitted,

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