

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554**

*In the Matter of*

Wireless E911 Location Accuracy  
Requirements

PS Docket No. 07-114

**PETITION FOR LIMITED WAIVER OF T-MOBILE USA, INC.**

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## PETITION FOR LIMITED WAIVER OF T-MOBILE USA, INC.

T-Mobile USA, Inc.<sup>1</sup> seeks a temporary and limited eighteen-month waiver of Section 9.10(i)(2)(ii)(C) of the Commission's rules, and the corresponding requirement for a June 2021 certification filing.<sup>2</sup> Those rules require wireless carriers to provide vertical location information, accurate to within  $\pm 3$  meters, for eighty percent of wireless 911 calls, as demonstrated in the test bed, by April 3, 2021, and to certify that compliance by June 2, 2021. T-Mobile seeks this waiver because compliance is both legally and technically impossible.

First, the COVID-19 pandemic has closed the test bed, the only venue where T-Mobile can conduct the required testing to confirm compliance. Without such testing, T-Mobile cannot certify, as required by 47 C.F.R. § 9.10(i)(2)(iii), that its vertical location solution is deployed in a manner consistent with how such technology was tested in the test bed.

Second, in the testing completed to date, no technology met the accuracy requirements in a commercially deployable configuration. T-Mobile cannot certify compliance based on test bed results that do not exist. It is also well-recognized that it would be arbitrary and capricious for the Commission to attempt to compel compliance with an impossibility.<sup>3</sup>

Third, T-Mobile makes available z-axis data to every PSAP it services in the country, and it is providing vertical location within  $\pm 3$  meters for more than a majority of these calls along with uncertainty information at a 90% confidence level. This empowers those few PSAPs, both within the top 25 CMAs and otherwise, that can actually receive and utilize vertical location information to do so for most of T-Mobile's 911 calls. T-Mobile continues to expend significant

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<sup>1</sup> T-Mobile USA, Inc. is a wholly owned subsidiary of T-Mobile US, Inc., a publicly traded company.

<sup>2</sup> 47 C.F.R. §§ 9.10(i)(2)(ii)(C); 9.10(i)(2)(iii) (2020).

<sup>3</sup> *Alliance for Cannabis Therapeutics v. DEA*, 930 F.2d 936, 940 (D.C. Cir. 1991).

resources and to work closely with vendors to refine and improve the accuracy of the location information provided. It is likely that by the time testing could be re-commenced and completed, that commercially deployable solutions that meet the  $\pm 3$  meters accuracy standard will actually exist.

## **I. BACKGROUND**

T-Mobile is strongly committed to continual improvement of E911 capabilities in its network. T-Mobile has consistently been at the forefront in implementing new, advanced, location-based technologies for E911. T-Mobile was the first wireless carrier to begin using mobile OS-based location technology to improve horizontal location performance, including indoors.<sup>4</sup> Over the five years since T-Mobile first began using device-based location data, it has seen dramatic improvements in location accuracy in its network. Indeed, as of the end of 2020, T-Mobile was able to provide a horizontal location fix within 50 meters for close to ninety percent of wireless 911 calls.<sup>5</sup> Mobile OS-based location technology has enabled high accuracy, high yield, and low latency location data that has greatly enhanced caller location, and increased Phase II delivery to PSAPs.

Mobile OS location technology also enables additional advancements, including 911 Location-Based Routing (LBR)—another area in which T-Mobile is the industry leader. T-Mobile was the first U.S. wireless operator to launch LBR and Next-Generation 911 (NG911)

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<sup>4</sup> See Comments of T-Mobile USA, Inc. at 1, PS Docket No. 07-114, (filed May 20, 2019) (noting that T-Mobile was the “first U.S. wireless carrier to incorporate commercial location technologies from both Apple and Google into its E911 services”) (citing Ryan Knutson, *Why Uber Can Find You but 911 Can’t*, WALL STREET JOURNAL (Jan. 7, 2018) (noting T-Mobile’s use of Apple’s “Hybridized Emergency Location” service for 911 calls); Steven Mucil, *Google Teams Up with T-Mobile on More-Accurate 911 Location Data*, CNET (Sept. 19, 2018), <https://www.cnet.com/news/google-teams-up-with-tmobile-on-more-accurate-911-location-data/>.

<sup>5</sup> See Declaration of Ryan N. Jensen ¶ 12 (attached hereto as Exhibit 1) (“Jensen Declaration”).

capabilities,<sup>6</sup> two critical advancements that speed up emergency response times by helping pinpoint the location of callers, reducing the need for call transfers, and enabling a more efficient and effective 911 communication system, end-to-end. T-Mobile’s LBR implementation significantly reduces 911 call transfers by leveraging low latency mobile OS-based location technology. LBR-enabled areas experience fewer call transfers—in some areas call transfers have been reduced by up to 40%—clearly demonstrating the benefit of this important functionality.<sup>7</sup> T-Mobile has also deployed NG911 connections in all or parts of nine states and is expanding connectivity nationwide as public safety networks are ready.<sup>8</sup> Finally, and critically for this waiver request, T-Mobile today makes z-axis coordinates, obtained through Google’s ELS and Apple’s HELO, available to PSAPs throughout the country, along with uncertainty at the 90% confidence level as prescribed by the rule.<sup>9</sup> While T-Mobile has been unable to conduct formal test-bed evaluation of these mobile OS-based vertical location solutions to fully determine their current performance as the first z-axis milestone nears, it estimates that more than 50 percent of these fixes have accuracy within 3 meters<sup>10</sup>—and these fixes are available from the large majority of all devices on its network, whether those devices have barometers or not.

T-Mobile has also taken the following unilateral steps to ensure it has done everything it can to support the continued development and improvement of location technologies: (1)

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<sup>6</sup> See Press Release, *T-Mobile First to Roll Out Cutting Edge 911 Capabilities* (December 17, 2020), <https://www.t-mobile.com/news/network/tmobile-next-generation-911-location-based-routing> (“LBR/NG911 Press Release”).

<sup>7</sup> *See id.*

<sup>8</sup> *See id.*

<sup>9</sup> Jensen Declaration ¶ 14.

<sup>10</sup> *Id.* ¶ 15.

requiring barometers in all new branded devices going forward, recognizing that barometers can improve the accuracy of z-axis locations, (2) setting aggressive barometer performance standards, (3) validating compliance with these barometer performance standards via lab and field tests, (4) working closely with mobile OS providers to aggressively and fully optimize vertical location performance and availability, including backward compatibility to the large majority of existing handsets, (5) working to help close the z-axis utilization gap at PSAPs with active participation in the industry-wide working group currently addressing this need, and (6) leading the industry in enabling and encouraging the adoption of NG911 architectures and functionality that opens entirely new opportunities to 911 callers and first responders.<sup>11</sup>

T-Mobile and other stakeholders have expressed their concern that the Commission's April 2021 z-axis compliance benchmark was unachievable;<sup>12</sup> which may have been the case even without the global COVID-19 pandemic. The pandemic, however, has ensured that it is impossible for T-Mobile to meet this compliance certification deadline, given the complete inability to conduct any of the required formal testing in the testbed.<sup>13</sup> Nonetheless, T-Mobile's existing use of mobile OS-based solutions already allows it to provide more  $\pm 3$  meter z-axis

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<sup>11</sup> *Id.* ¶ 13.

<sup>12</sup> *See* Comments of T-Mobile USA, Inc. at 5, PS Docket No. 07-114, (filed February 21, 2020) (“T-Mobile Fifth FNPRM Comments”) (stating that “[i]ndeed, the Fifth R&O’s  $\pm 3$ -meter metric is, by any measure, extremely aggressive”); *see also* Comments of Google LLC at 5-6, PS Docket No. 07-114, (filed May 20, 2019) (noting that, in light of the current evidence, “it is simply too soon to set an ultimate accuracy metric, such as two or three meters”).

<sup>13</sup> *See* Letter from Scott K. Bergmann and Thomas K. Sawanobori, CTIA, to Marlene Dortch, FCC, PS Docket No. 07-114, at 2 (filed Aug. 21, 2020) (noting that “[t]he COVID-19 pandemic has literally stalled access to building interiors that are essential to the testing process.”); Letter from Scott K. Bergmann and Thomas K. Sawanobori, CTIA, to Marlene Dortch, FCC, PS Docket No. 07-114, at 2 (filed Jan. 8, 2021) (“CTIA January 8, 2021 Ex Parte”) (noting that “[a]s COVID-19 cases continue to increase over the next few months and state and local governments issue new orders to enforce restrictions on indoor activities, we anticipate that most new buildings will not authorize testing in first half of 2021”).

fixes nationwide than would be possible using any of the over-the-top solutions (were apps available to allow those solutions to be loaded onto handsets, which they are not).<sup>14</sup> Therefore T-Mobile seeks a limited waiver of this rule.

## II. ARGUMENT

### A. Legal Standard

The waiver requested by T-Mobile is necessary and justified by the impossibility of compliance with the plain language of the rule. Section 1.925(b)(3)(ii) of the Commission's Rules establish that a request for waiver may be granted when the "unique or unusual factual circumstances" at issue would render application of the rule "inequitable, unduly burdensome, or contrary to the public interest, or [when] the applicant has no reasonable alternative."<sup>15</sup>

Sections 9.10(i)(2)(ii)(C) and (H), and 9.10(i)(2)(iii)(A) of the Commission's rules require wireless carriers to provide vertical location information, accurate to within  $\pm 3$  meters for eighty percent of wireless 911 calls as demonstrated in the test bed, and do so by April 3, 2021. Compliance is presumed if a carrier certifies within 60 days of the compliance deadline that it has "complied with the test bed and live call data provisions" of the rules.<sup>16</sup>

It is well established that the FCC cannot compel compliance with an impossibility, or penalize the failure to take impossible steps. "Impossible requirements imposed by an agency are perforce unreasonable."<sup>17</sup> Consideration of the "technical and economic feasibility of the

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<sup>14</sup> See Letter from Matthew Gerst, CTIA, to Marlene H. Dortch, FCC, PS Docket No. 07-114, Attachment B at 5 (filed June 15, 2020) ("CTIA June 15, 2020 Ex Parte"); Jensen Declaration ¶ 16.

<sup>15</sup> 47 C.F.R. § 1.925(b)(3)(ii).

<sup>16</sup> 47 C.F.R. §§ 9.10(i)(2)(ii)(C) and (H); 9.10(i)(2)(iii)(A).

<sup>17</sup> *Alliance for Cannabis Therapeutics v. DEA*, 930 F.2d at 940. See also *Nat. Res. Def. Council, Inc. v. Train*, 510 F.2d 692, 713 (D.C. Cir. 1974) (stating that "[i]t would be

deadline” are “made necessary by the bar against arbitrary and capricious decision-making.”<sup>18</sup> Accordingly, when confronted with impossibility of compliance, the Commission must grant a waiver.

The plain language of the rule requires carriers to certify deployment of vertical location technology “*consistently with the manner in which [the technologies] have been tested in the test bed.*”<sup>19</sup> Without such testing, carriers cannot certify that any deployed technology meets the accuracy requirements. Although the testbed had been scheduled to conduct additional z-axis solution tests in the fourth quarter of 2020, which could have been the basis for carrier compliance certifications, those tests were postponed due to the COVID pandemic. As of the date of this petition, the indoor test bed remains shut down, and, optimistically, testing is unlikely to resume before the fourth quarter of 2021. Prior to the test bed shut down, no technology had been shown to meet the accuracy benchmark in a commercially deployable configuration as tested in the test bed.<sup>20</sup> As a result, T-Mobile is unable to certify that it has

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unreasonable and unjust to hold in contempt a defendant who demonstrated that [it] was powerless to comply.”).

<sup>18</sup> *Nuvio Corp. v. FCC*, 473 F.3d 302, 303 (D.C. Cir. 2006).

<sup>19</sup> 47 C.F.R. § 9.10(i)(2)(iii)(A) (emphasis added).

<sup>20</sup> See CTIA Reply to Oppositions at 4-6 PS Docket No. 07-114 (filed Nov. 13, 2020) (“CTIA Reply to Oppositions”) (stating that “the Commission’s rules require a solution to be validated in the Test Bed and no solutions have been so validated”); CTIA Petition for Reconsideration at 7, PS Docket No. 07-114 (filed Sept. 28, 2020) (“CTIA Petition for Reconsideration”) (noting that “no Z-axis solutions have been validated to achieve the Commission’s performance standards and, now because of the COVID-19 pandemic challenges, there will be no new opportunities for validation before the April 2021 deadline”); CTIA January 8, 2021 Ex Parte at 2 (noting the urgency of conducting Stage Zb testing “as soon as possible in order to certify Z-axis solutions that can meet the Commission’s requirements”); CTIA June 15, 2020 Ex Parte at 2 (“to date no commercial z-axis solutions have yet been validated to achieve the Commission’s current benchmark of  $\pm 3$  meters for 80% of calls in the Test Bed across all of the test regions and morphologies”); cf. T-Mobile Fifth FNPRM Comments at 7 (“The results from recent testing in Stage Za will, for

deployed vertical location technologies that have been shown to meet the  $\pm 3$  meter accuracy benchmark. Requiring compliance would therefore be “inequitable, unduly burdensome, [and] contrary to the public interest.”<sup>21</sup> In addition, T-Mobile “has no reasonable alternative”—given that no technologies have been certified as meeting the accuracy benchmark in a commercially deployable configuration. This is particularly true given that T-Mobile has already deployed the only commercially available vertical location solutions and is already sending z-axis information to PSAPs and, through these efforts, believes it has reached near, though not full, compliance.

**B. Deficiencies in Technologies Previously Tested Make It Impossible for T-Mobile to Certify Compliance by April 2021.**

Prior to the test bed shut down, three location technologies were tested in the test bed—those from NextNav, Polaris Wireless,<sup>22</sup> and Google.<sup>23</sup> Only Google’s testing was conducted in a commercially deployable configuration. The Stage Z testing, in which NextNav’s and Polaris’s solutions were tested, was described as “proof of concept” testing, as neither solution was available in a commercially deployable configuration when presented to the test bed. In addition, NextNav’s solution was not tested in all required test areas or in rural morphologies.<sup>24</sup>

As noted in the Stage Z Test Bed Report and its cover letter submitted to the Commission in August 2018, artificial steps and accommodations had to be taken to produce the location

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the first time, provide indispensable insight into what may be achievable now in a real-world production deployment. . .”).

<sup>21</sup> 47 C.F.R. § 1.925(b)(3)(ii).

<sup>22</sup> *See generally* 911 Location Test Bed, LLC Report on Stage Z, PS Docket No. 07-114 (filed Aug. 3, 2018) (“Stage Z Report”).

<sup>23</sup> Letter from Scott K. Bergmann & Thomas K. Sawanobori, CTIA, to Marlene H. Dortch, Secretary, FCC, PS Docket No. 07-114 (filed Apr. 29, 2020) (“Stage Za Submission”).

<sup>24</sup> Stage Z Report at 4.

estimates from NextNav and Polaris in the test campaign.<sup>25</sup> For example, no actual 911 calls or even simulated 911 calls were placed during the Stage Z proof-of-concept demonstration, and neither solution was integrated into the handset at the chipset, mobile-OS, or device application level, which is required for operation as a native 911 location solution on a commercially available off-the-shelf handset.<sup>26</sup> In normal real-world usage, the handset chipsets, operating system, and OEM firmware control access to required device resources, including sensors (such as the barometer), the dialer, and all signaling between the handset and the network. But for these proof-of-concept demonstrations, NextNav and Polaris used test handsets operating in “developer mode” running non-OS approved applications designed to run over-the-top of the mobile OS.<sup>27</sup> These test handsets were unable to initiate 911 calls and were artificially given unrestricted access to all device sensors and unlimited access to data signaling, without regard to privacy, battery life, or data signaling bandwidth concerns that govern these processes in normal use.

Both NextNav and Polaris rely on active barometric sensor bias calibration unique to each individual mobile device to produce accurate z-axis measurements. As noted in the Stage Z Report, “This calibration capability would need to be built into ‘live’ production solutions and retested at scale to fully assess performance.”<sup>28</sup> The Report further cautioned,

While the results of Stage Z testing provide helpful data and lessons learned, numerous key questions remain that could not be answered through Stage Z testing completed to date. For example, questions remain about how a barometric

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<sup>25</sup> See, e.g., *id.* at 47 (stating that “[n]o actual call was placed to produce a Z-axis fix in this testing [of NextNav’s solution] and standardized 9-1-1 signaling was not used.”); *id.* at 54 (noting that “[n]o actual call was placed to produce a Z-axis fix in this testing and standardized 9-1-1 signaling was not used.”).

<sup>26</sup> See *id.*

<sup>27</sup> See *id.*

<sup>28</sup> *Id.* at 4.

pressure-based altitude estimation system would perform in a real-world production deployment and how such a system would scale to hundreds of millions of devices across the U.S.<sup>29</sup>

In other words, a successful proof-of-concept demonstration does not equate to a successful production location solution in a real-world deployment. Since NextNav and Polaris were evaluated under artificial circumstances using a non-deployable configuration, the accuracy performance achieved is not extensible to normal 911 caller user experience and therefore does not permit carriers to certify that they have deployed the technology as it was tested in the test bed. The Stage Z Report concluded that “[f]or these reasons, further testing is needed to validate and confirm performance expectations of Z-axis solutions for live wireless 9-1-1 calling environments.”<sup>30</sup> As such, “barometric pressure sensor-based Z-axis solutions [(e.g., those proffered by NextNav and Polaris Wireless)] require further development, ... implementation into wireless network systems and production mobile devices, and then re-testing in a production configuration to determine whether the Stage Z results can be replicated and deployed ubiquitously in real-world production and live wireless 911 call environments.”<sup>31</sup> T-Mobile cannot conduct that development, nor can it develop the apps that would be loaded onto a handset. Those development tasks must be done by the solution providers in conjunction with the mobile OS providers, the handset OEMs, and/or the mobile chipset providers.

In addition, Polaris’s test bed results in and of themselves do not establish that Polaris’s technology can meet the  $\pm 3$  meter accuracy requirement. The FCC has apparently accepted representations from Polaris that with further algorithm refinements that have not yet been tested

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<sup>29</sup> *Id.* at 5.

<sup>30</sup> Letter from Scott K. Bergmann, Thomas K. Sawanobori, CTIA, et al., to Marlene Dortch, FCC, PS Docket No. 07-114, at 6 (filed Aug. 3, 2018) (“Stage Z Cover Letter”).

<sup>31</sup> Stage Z Report at 4.

in the test bed, its technology will meet the  $\pm 3$  meter 80% accuracy standard.<sup>32</sup> But that assumption ignores some of the fundamental concerns with Polaris's testing. Polaris re-processed their test bed data and attempted to remove the barometer biases from each of the test handsets via post-processing that was not overseen or validated in any way by the Test Bed process.<sup>33</sup> In reality, to establish their ability to reduce sensor biases in practice, they would need to re-enter the Test Bed and collect new field data with a bias calibration process actually deployed and running in the background. The actual real-world effect of such a calibration process cannot be determined after the data has been collected. In other words, the Commission's predictive conclusion, made in 2019, that Polaris could meet the accuracy standard with a yet-to-be-tested calibration process has not, and currently cannot, be validated in the Test Bed, as required by 47 CFR § 9.10(i)(3).

Polaris, moreover, did not test on a representative mix of common mobile OS platforms.<sup>34</sup> Specifically, it did not test on any iOS devices, which means there is no basis on which to evaluate its performance with respect to the substantial mix of iPhones in T-Mobile's subscriber base. T-Mobile does not expect, at this point in time, that either NextNav's or Polaris's location solutions will become available on any iOS devices, leaving wireless carriers with no real alternatives as to which technology paths to pursue. An Android-only z-axis solution, no matter how well it performed, would not allow T-Mobile to comply with the requirement to provide vertical location information meeting the  $\pm 3$  meter accuracy standard for eighty percent of wireless 911 calls—not just by April 2021, but at any time.

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<sup>32</sup> See *Wireless E911 Location Accuracy Requirements*, Report and Order and Further Notice of Proposed Rulemaking, 34 FCC Rcd. 11592, ¶ 12 (2019) (“*Fifth R&O*”).

<sup>33</sup> Jensen Declaration ¶ 7; see Stage Z Report at 54-55.

<sup>34</sup> See Stage Z Report at 75 (listing handsets tested by Polaris); Stage Z Cover Letter at 3.

In addition to these fundamental deficiencies of the technologies evaluated in Stage Z, even in a future production configuration, both NextNav and Polaris apparently intend to rely on a device-level application that may require a user opting-in (or at least consenting) to facilitate generation of vertical location estimates.<sup>35</sup> Since these applications are intended to operate outside the mobile OS and chipsets, they must be approved and integrated onto the mobile device platform with the full cooperation of the device OEM. This integration is required to ensure the applications have the necessary permissions and ability to access device resources, such as the dialer (to detect the initiation of a 911 call), barometric pressure sensor information, and required data signaling resources. Based on the record to date, however, neither NextNav nor Polaris has obtained the necessary approvals and completed the necessary device-level integration of their applications for mobile devices in common use.<sup>36</sup> With no such device-authorized applications yet available, T-Mobile cannot make them available for installation – and once they become available, these solutions will need to be tested in the test bed prior to certification.

In contrast to NextNav and Polaris, Google’s solution was tested in a commercially deployed configuration as required by the certification rule. But at that time, testing did not show its solution could meet the compliance benchmark—although it did achieve  $\pm 3$  meter accuracy for more than half of the calls in the test bed and exceeded the 80<sup>th</sup> percentile metric in

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<sup>35</sup> See, e.g., Letter from Bruce A. Olcott, Counsel to NextNav, LLC, to Marlene H. Dortch, FCC, PS Docket No. 07-114 at 2 (filed Apr. 1, 2020) (noting that “the key task that remains is uploading software that supports 3-meter compliant z-axis solutions, which can either include technologies developed by handset/OS suppliers or third party vendors selected by the carriers, so long as the solutions are 3-meter compliant.”); Letter from Ian D. Volner and Meryl E. Bartlett, Counsel to Polaris Wireless, Inc., to Marlene H. Dortch, FCC, PS Docket No. 07-114, at 5 (filed May 27, 2020) (“As an alternative to the standards-based approach, proprietary software is required on devices to extract the necessary barometric sensor information.”).

<sup>36</sup> See Letter from Matthew Gerst, CTIA, to Marlene Dortch, FCC, PS Docket No. 07-114, at 2 & n.6 (filed July 9, 2020) (“CTIA July 9, 2020 Ex Parte”).

one morphology.<sup>37</sup> Furthermore, unlike NextNav and Polaris, Google's solution, in the same production configuration evaluated in the test bed, is available on the vast majority of Android handsets in use today and produces  $\pm 3$  meter or better location fixes for the majority of those 911 callers.<sup>38</sup> Google is working in cooperation with wireless carriers to move from a majority to 80%, as required by the rule. It is T-Mobile's belief that the performance of Google's solution has further improved since it was last evaluated in the test bed at the beginning of 2020.<sup>39</sup> The ability of those improvements to meet the  $80\% \pm 3$  meter requirement, though, cannot be determined until formal evaluation in the test bed is again possible.

It is abundantly clear from this and other evidence in the record that no z-axis solutions have been validated in the Test Bed to be able to meet the required accuracy metric in a production configuration, such that T-Mobile could certify deployment of a demonstrated compliant solution. Moreover, it is also apparent that the technologies proffered by both NextNav and Polaris require further work to integrate proof-of-concept technologies into commercially available handsets, whether that integration is accomplished via the mobile OS systems or integrated into the devices with the cooperation of the handset OEMs through over-the-top applications. These steps must be followed by evaluation in the test bed in a commercial configuration to ensure the accuracy standards are met in production.

Additional testing of technologies in commercially deployable configurations scheduled for the fall of 2020 that could have been used for certification as per the Commission's rules has been postponed and it is not yet clear when that testing will take place, due to the COVID-19

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<sup>37</sup> See Stage Za Submission at 3.

<sup>38</sup> See *id.*

<sup>39</sup> See Jensen Declaration ¶¶ 9, 15.

pandemic. Apple, for instance, intended to test its mobile OS-based solution in the test bed during the fall of 2020 for the first time;<sup>40</sup> like Google’s solution, this solution is available on a substantial percentage of iOS devices in use today and will be tested as used in production. T-Mobile currently believes test bed testing is likely to resume no earlier than the fourth quarter of 2021.<sup>41</sup>

Ultimately, and despite its best efforts, T-Mobile’s ability to comply with the rule will rely on factors outside its control—critically, the easing of COVID-19 pandemic restrictions allowing the test bed to secure access and safely conduct testing within buildings in near-normal use in all morphologies and required test cities. Further, the commercial availability of location solutions on consumer devices in normal use capable of meeting the required vertical location accuracy is a necessary prerequisite to carriers’ ability to certify compliance.

**C. Under the Plain Language of the Rule, Predictive Judgments Are Not Sufficient to Allow Carriers to Show Compliance.**

When the Commission adopted the  $\pm 3$  meter accuracy metric in the *Fifth R&O*, it made a predictive judgment that this metric would be achievable by April 2021.<sup>42</sup> It did not make a final judgment based on testing as shown in the test bed. And it certainly could not have contemplated or anticipated a global pandemic that would shut down all indoor testing for more than a year. Prior to issuance of the *Sixth R&O*,<sup>43</sup> carriers noted their concerns that the COVID-

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<sup>40</sup> Letter from Paul Margie, Counsel for Apple Inc., to Marlene Dortch, FCC, PS Docket No. 07-114 (filed Nov. 3, 2020).

<sup>41</sup> See Jensen Declaration ¶ 3.

<sup>42</sup> See *Fifth R&O* ¶¶ 11-12.

<sup>43</sup> *Wireless E911 Location Accuracy Requirements*, Report and Order and Order on Reconsideration, 35 FCC Rcd 7752 (2020) (“*Sixth R&O*”).

19 pandemic would impact compliance,<sup>44</sup> but it was not clear at the time what precise impact the pandemic would have on the test bed, nor was it clear how long the pandemic would impact ordinary operations in buildings that could be used for testing. These same concerns were reiterated in CTIA’s petition for reconsideration; CTIA argued that the Commission should reconsider rules and timelines implementing the  $\pm 3$  meter metric on the basis of this new information,<sup>45</sup> but the Commission denied that petition.<sup>46</sup>

**D. A Waiver Is Justified Because T-Mobile has Moved Aggressively to Deploy Z-Axis Solutions that Provide the Best Performance to the Largest Number of Users and Has Sought to Comply With the Intent of the Rule.**

T-Mobile has been vigorous in implementing commercially available z-axis solutions that provide highly accurate vertical location data for the large majority of existing devices and the majority of 911 calls on its network, nationwide. In addition, as noted above, T-Mobile has deployed NG911 connections in all or parts of nine states. T-Mobile is also the first carrier to deploy LBR, which cut 911 call transfers by up to 40% in some jurisdictions and is now available for PSAPs nationwide.<sup>47</sup> Notably, Location-Based Routing is enabled by the same

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<sup>44</sup> See, e.g., Letter from John Nakahata, Kristine Laudadio Devine, and Landyn Wm. Rookard, Counsel to T-Mobile USA, Inc., Harris, Wiltshire & Grannis LLP, to Marlene H. Dortch, Secretary, FCC, PS Docket No. 07-114, at 11-12 (filed July 9, 2020) (stating that the COVID-19 pandemic “has jeopardized testing plans for the remainder of 2020 and potentially beyond”); Letter from Joseph Marx, AT&T, to Marlene H. Dortch, FCC, PS Docket No. 07-114, at 2 (filed July 9, 2020) (stating that “AT&T anticipates challenges associated with the testing required to demonstrate compliance for the upcoming April 2021 benchmarks as a result of the current COVID-19 pandemic”).

<sup>45</sup> CTIA Petition for Reconsideration at 3-5 (describing the COVID-19 related limitations on building access and other resources necessary to permit the test bed to validate z-axis technologies).

<sup>46</sup> *Wireless E911 Location Accuracy Requirements*, Order on Reconsideration, FCC No. 21-11, PS Docket No. 07-114, ¶ 18 (rel. Jan. 11, 2021) (“*Order on Reconsideration*”).

<sup>47</sup> See LBR/NG911 Press Release.

mobile OS-based location solutions that T-Mobile has advocated for z-axis compliance, further leveraging these commercially successful location solutions for the benefit of the public.

Nor has T-Mobile been dilatory by not installing a purported z-axis solution that does not integrate with the rest of the wireless ecosystem, and which will require substantial consumer cooperation to be effective.<sup>48</sup> The record contains a significant and pointed history of dead-end attempts to develop, deploy, and maintain purpose-built, sole-sourced, overlay 911 location solutions that ultimately frustrate the public safety community and do not best serve the broader public. This list includes Enhanced Observed Time Difference (E-OTD), Uplink Time Difference of Arrival (U-TDOA), and the National Emergency Address Database (NEAD). History ignored tends to be history repeated.

The mobile OS-based location solutions that T-Mobile relies on for LBR have proved indispensable in meeting and exceeding the aggressive horizontal location accuracy requirements phased in over the last several years, and clearly demonstrate the benefit of leveraging commercial location solutions for emergency services, over adoption of proprietary, 911 only location solutions. Indeed, across the ecosystem, stakeholders are acknowledging the importance of mobile OS solutions for 911—from location-based routing to NG911 to supplemental caller data useful to first responders.<sup>49</sup> T-Mobile has also actively and aggressively worked with the mobile OS-based location solution providers to further optimize z-axis accuracy and availability, and has put in place all network components necessary to receive and make available z-axis

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<sup>48</sup> See *Sixth R&O* ¶ 39; CTIA Reply to Oppositions at 6-7 & n.19; CTIA Petition for Reconsideration at 8-9; CTIA July 9, 2020 Ex Parte at 3; CTIA June 15, 2020 Ex Parte at 2.

<sup>49</sup> See LBR/NG911 Press Release.

location information to PSAPs nationwide.<sup>50</sup> This proven-successful technology path is the exact one the Commission and carriers should follow for vertical location information.

It is clear that these technologies are still developing, but they are widely available, perform well, and are improving rapidly. Indeed, the number of calls that would not be able to meet  $\pm 3$  meter accuracy is steadily decreasing. As noted, T-Mobile has recently made z-axis data available for all PSAPs that receive 911 calls from T-Mobile. While formal test bed evaluation is required to validate, by T-Mobile's estimate, more than fifty percent of these vertical location estimates have accuracy within 3 meters,<sup>51</sup> and all are delivered with uncertainty at a 90% confidence level so that PSAPs can decide how best to utilize a specific location estimate.

**E. Grant of the Waiver will not Deprive Public Safety of the Tools Needed to Respond Quickly to a 911 Call.**

Grant of this limited and temporary waiver will not reduce or fail to improve public safety's ability to respond to 911 calls. In the first instance, this is because, as discussed above, there is currently no vertical location solution that meets the rule's requirement to have demonstrated  $\pm 3$  meter accuracy in a commercially deployable configuration. This is also the case because T-Mobile is delivering  $\pm 3$  meter locations for a majority of calls to those few PSAPs capable of receiving and utilizing them. In order to consider all important aspects of the issue and thus not be arbitrary and capricious,<sup>52</sup> in evaluating this waiver the Commission must

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<sup>50</sup> See Jensen Declaration ¶ 14.

<sup>51</sup> See *id.* ¶ 15.

<sup>52</sup> See, e.g., *Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983) (“[A]n agency rule would be arbitrary and capricious if the agency has . . . entirely failed to consider an important aspect of the problem . . .”).

recognize the substantial number of  $\pm 3$  meter location estimates that T-Mobile already provides. It would be a false depiction to equate T-Mobile's compliance efforts with no compliance.

First, the Commission must consider how few PSAPs are actually capable today or within the period of this waiver of receiving and utilizing z-axis data. By all accounts, the answer is very few. T-Mobile recently surveyed PSAPs serving certain core urban areas in the top 24 CMAs. Of those, even though T-Mobile is making z-axis information available with almost every 911 call, only four are capable of displaying that data to their telecommunicators.<sup>53</sup> More generally, T-Mobile also evaluated a sample of PSAPs nationwide. It found that approximately 3% of PSAPs are currently able to receive and display z-axis location data for 911 calls.

Even for those few PSAPs able to receive and display vertical location information, it is not apparent they are yet able to use this information to actually benefit 911 callers. Moreover, it is not an adequate answer to assert that PSAPs will only upgrade to utilize z-axis capability when 80% of calls in the test bed reach the  $\pm 3$  meter standard. Such behavior would be irrational, both because T-Mobile is already delivering a majority of its vertical locations estimates with  $\pm 3$  meter accuracy, and because even less accurate fixes will narrow the search range on calls. Even once location solutions demonstrate  $\pm 3$  meter 80% accuracy in the test bed, there will still be estimates that do not reach that level of accuracy. First responders will always need to adjust search areas to reflect the actual estimate received, taking into account its uncertainty range, which T-Mobile is already providing.

Second, over the course of the waiver period, mobile OS-based z-axis solutions will continue to improve, and those improvements are automatically populated throughout the handset ecosystem – another benefit of OS-based solutions. The Commission has already

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<sup>53</sup> Jensen Declaration ¶ 11.

concluded that it is simply a brief matter of time before mobile OS-based solutions will meet the  $\pm 3$  meter standard. The Commission in 2019 predicted that this would occur by 2021,<sup>54</sup> and while it is not yet clear if that has in fact occurred, it reiterated its prediction that this will happen in the *Sixth R&O* adopted last year.<sup>55</sup> Thus, those few PSAPs that can already receive and utilize vertical location information can expect to see that data continue to improve during the waiver period.

Third, there is no readily available, fully compliant alternative, and even if the candidate over-the-top solutions were available today (which they are not), they would not assure delivery of more  $\pm 3$  meter vertical location estimates than T-Mobile is already providing. Since the Commission has contended (erroneously) that NextNav and Polaris demonstrated that they can meet the  $\pm 3$  meter standard,<sup>56</sup> we consider those solutions. As discussed above, to be able to generate an estimate, the third party applications would have to be approved and integrated onto the device platform by the handset OEM or integrated into the mobile OS (which they are not) and one of these over-the-top solutions would need to be installed and activated on the consumer device, including granting permission to track the caller's location outside of 911 calls. In addition, the consumer device would have to contain a barometer for these solutions to function. Finally, the caller would need to be within one of the CMAs where the required purpose-built barometric pressure reference network has been deployed. Although the Commission finds it sufficient for compliance for a carrier to make the over-the-top solution available to consumers, irrespective of whether it is ever installed or retained on the device,<sup>57</sup> that is not an adequate

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<sup>54</sup> See *Fifth R&O* ¶¶ 13, 15.

<sup>55</sup> See *Sixth R&O* ¶ 19.

<sup>56</sup> See *Fifth R&O* ¶ 12; *Order on Reconsideration* ¶ 28.

<sup>57</sup> See *Sixth R&O* ¶ 32.

basis for evaluating the relative benefit of T-Mobile's performance under a temporary waiver with the alternative. T-Mobile provides substantially more 3 meter or better z-axis location estimates for 911 callers nationwide today using mobile OS-based solutions than would be the case using NextNav or Polaris if those solutions were available on consumer handsets.<sup>58</sup>

Fourth, it will not speed the delivery of more  $\pm 3$  meter location solutions to divert T-Mobile from its current path of implementing these quickly improving and widely available OS-based location solutions. T-Mobile will continue to invest in mobile OS-based solutions because they already provide more  $\pm 3$  meter z-axis location fixes everywhere in the country and are already fully integrated into consumers' handsets. No over-the-top application can match that, even were one to exist. Adding NextNav or Polaris as a temporary additional location solution for the top 25 CMAs (were that to become a possibility) would distract and detract from T-Mobile's and its location technology partners' efforts to continue to improve and fully optimize mobile OS-based z-axis solutions, slowing the full benefit of a superior solution in favor of a temporary patch.

Thus, a limited suspension of the z-axis certification requirement for 18 months will benefit, and will not harm, the public interest. As z-axis technologies continue to improve, and as z-axis location solutions are able to re-enter the test bed for evaluation and validation, T-Mobile is confident it will be able to make the required certification; in the meantime, it will continue to provide z-axis information that is available for live 911 calls today. In summary, there is no location technology path that T-Mobile could have selected that would have resulted in being able to verify compliant accuracy performance in the test bed and certify deployment consistent with the manner in which the technology was tested, by April 2021.

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<sup>58</sup> See CTIA June 15, 2020 Ex Parte, Attachment B at 5; Jensen Declaration ¶ 16.

**F. Grant of a Waiver Serves the Public Interest by Allowing Time for Resumption of Testing, Enhancement of Public Safety Systems to Receive and Use Z-Axis Information, as well as Continued Improvement of Vertical Location Technologies.**

In order to allow time for the required testing to resume following easing of the global pandemic and the return to near-normal real-world building use conditions, T-Mobile is requesting the Commission waive compliance with the initial vertical benchmark and the parallel certification for a period of 18 months. The inability to conduct any widescale indoor testing in real-world conditions deprives T-Mobile and the Commission of up-to-date data with which to determine the incremental difference (if any) between full compliance and a brief delay to permit OS-based solutions to mature. As explained above, T-Mobile believes that incremental difference is tiny given the number of PSAPs that can actually receive and use z-axis locations today. T-Mobile trusts that, over the coming months, public safety organizations will do their part to enhance their systems to allow telecommunicators to view and use the z-axis information that T-Mobile is providing today.<sup>59</sup> A temporary waiver so that testing can occur promptly once COVID-19 permits is necessary simply so that the Commission can have a fully informed weighing of the incremental costs and benefits between full compliance, and the current state of mobile OS-based solutions. In any event, this additional time necessary to resume test bed activities will be well utilized as wireless carriers and their location technology partners continue to work closely together to improve and fully optimize z-axis performance, to the benefit of consumers and the public interest.

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<sup>59</sup> While no standardized method or format for public safety to display and effectively use z-axis location information exists today, NENA is currently leading an industry-wide effort via its 3D GIS Working Group to address this deficit and develop such a standard. NENA, *Requirements for Using 3D Location Data for E9-1-1 and NG9-1-1*, [DRAFT]. T-Mobile is an active participant in this standardization process.

### III. CONCLUSION

The underlying reality is that all vertical location technologies are still being fully developed and refined, with a unified goal of meeting the FCC's extremely aggressive accuracy benchmarks. Another reality is that each of the technologies currently under development, both the mobile OS-based and the third party solutions, perform well, particularly given their still-evolving nature and despite the fact that none have demonstrated the ability to meet the Commission's requirement as commercially deployed. The key differentiators between the two technology paths have proven to be the real-world availability of high-accuracy vertical location data (how many 911 calls will actually result in a 3 meter or better location estimate) and the likelihood of continued refinement and improved performance over time for a given technology. These key differentiators overwhelmingly favor the mobile OS-based solutions.

Both Google and Apple are continually improving their location technologies—both horizontal and vertical. This continual drive toward improvement is powered by the parallel commercial use of these same location technologies. The combination of continually improving mobile OS-based location technologies, and the superiority of those solutions for location availability, is highly likely to provide the most optimal user experience for 911 callers nationwide, both today and in the foreseeable future, something squarely in the public interest.

For these reasons, T-Mobile's request for a temporary and limited 18-month waiver of the z-axis location requirement and compliance certification should be granted.

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