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

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

T-MOBILE USA, INC. REPLY COMMENTS ON THIRD FNPRM ON LOCATION ACCURACY

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I. INTRODUCTION

T-Mobile USA, Inc.[1] ("T-Mobile") agrees with the overwhelming consensus in the record—the ultimate objective for indoor 911 calls should be to provide a dispatchable address whenever possible, whether the call is placed from a wireline or wireless telephone. We recognize that a 911 call can be one of the most important calls a person will ever make and that when summoning emergency assistance, time is essential. T-Mobile, moreover, believes that the provisioning of a dispatchable address provides the best assurance that help can arrive in the shortest period of time. We stand committed to protecting the safety of our subscribers—even more so as they increasingly turn to wireless as their sole means for voice communications.

With carriers such as T-Mobile already pursuing significant improvements in their wide-area radio-based location technologies, including, for T-Mobile, the incorporation of assisted-GLONASS in addition to assisted-Global Positioning System ("A-GPS")—together generically referred to as assisted-Global Navigation Satellite Systems ("A-GNSS")—and the introduction of Observed Time Difference of Arrival ("OTDOA"), wide-area radio location estimates will be improving as carriers implement Voice-over-LTE ("VoLTE"). This process is already underway. T-Mobile, for example, is already selling OTDOA-capable handsets, preparing for the time when it activates OTDOA for VoLTE. T-Mobile anticipates that its LTE network will cover over 250 million people by the end of 2014,[2] especially covering the metropolitan areas in which A-GNSS is most challenged.

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

2 T-Mobile, Press Release, *T-Mobile Celebrates 1st Anniversary of LTE Rollout by Launching Major Network Upgrade Program* (Mar. 13, 2014), http://newsroom.t-mobile.com/news/t-mobile-celebrates-1st-anniversary-of-lte-rollout-by-launching-major-network-upgrade-program.htm.

The choice facing the Commission in this Further Notice of Proposed Rulemaking[3]—as demonstrated by many commenters—is whether it should continue pushing forward with mandating ever smaller radii for latitude and longitude ("x- and y-axis" or "x,y") location estimates, as well as mandating the implementation of a means of estimating the caller's vertical elevation (z-axis), or whether it should shift direction toward the use of small cells, WiFi access points, and other low power beacons to provide street address and unit number or floor, *i.e.*, dispatchable address. While mandating ever decreasing location estimate radii is the well-trodden regulatory path, the record provides strong evidence that it is an evolutionary dead-end that—even with many more years of effort—will never achieve both public safety's and the Commission's stated goal of dispatchable addresses. On the other hand, with the Commission's leadership, it should be possible for carriers, a broad range of network/handset equipment and beacon manufacturers, database providers, public safety, and state and local governments to forge an ecosystem that, within an equivalent number of years, would actually provide dispatchable addresses and floor locations when a wireless 911 call is placed from indoors.

II. SUMMARY

Currently, wireless carrier emergency services networks have limited technical ability to provide dispatchable addresses. Where carriers provide wide-area radio-based location estimates, those estimates will always be transmitted as latitude and longitude, and public safety answering points ("PSAPs") will continue to be responsible for then determining the address for first responder dispatch. However, addresses based on reverse geocoding latitude and longitude rarely provide a correct dispatchable location when using the maps that PSAPs typically rely on,

[3] *Wireless E911 Location Accuracy Requirements*, Third Further Notice of Proposed Rule Making, PS Docket No. 07-114, 29 FCC Rcd. 2374 (2014) ("*FNPRM*").

even if the location estimate is 100 percent accurate.[4] The challenges of providing a dispatchable address for multi-story, multi-unit buildings become even more complex—not least because few PSAPs are currently equipped to receive elevation information, nor do they have a means of translating a measurement provided in terms of feet above mean sea level into the floor and/or unit number of a given building.

The record reflects a strong consensus that the provision of dispatchable addresses will not be possible through wide-area radio technologies.[5] Rather, obtaining dispatchable addresses will require much greater reliance on and use of WiFi access points, small area beacons such as Bluetooth Low-Energy ("BLE") beacons, and commercial Location Based Services ("cLBS"). And while the Commission may have little direct regulatory authority to compel the installation of a small-area beacon infrastructure for E911, other stakeholders—particularly public safety, as well as state and local governments—do have authority to push for and require the creation of significant parts of such infrastructure.[6] The Commission should facilitate the development of this ecosystem.

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[4] Comments of Intrado, Inc. at 5-8, PS Docket No. 07-114 (filed May 12, 2014) ("Intrado Comments").

[5] *See* Comments of Cisco Systems, Inc. at 6, PS Docket No. 07-114 (filed May 12, 2014) ("Cisco Comments"); Comments of AT&T at 4, PS Docket No. 07-114 (filed May 12, 2014) ("AT&T Comments"); Comments of Qualcomm Incorporated at iv, PS Docket No. 07-114 (filed May 12, 2014) ("Qualcomm Comments"); Comments of Verizon and Verizon Wireless at 3, 10-11, PS Docket No. 07-114 (filed May 12, 2014) ("Verizon Comments"); Cisco Comments at 4; AT&T Comments at iv, 1; Comments of iPosi Inc. at 4, PS Docket No. 07-114 (filed May 12, 2014) ("iPosi Comments"); *cf.* Intrado Comments at 4 (x,y location is a "means to an end, not an end in itself"); Comments of Sprint Corporation at 17-18, PS Docket No. 07-114 (filed May 12, 2014) ("Sprint Comments"); Comments of The International Association of Fire Fighters, PS Docket No. 07-114 (filed May 12, 2014) ("IAFF Comments").

[6] *See* AT&T Comments at v, 4.

Carriers, of course, continue to develop and deploy improvements to their location technologies and the record is clear that, with respect to horizontal location estimation, those efforts are paying off. T-Mobile, for example, is already implementing assisted-GLONASS as an additional A-GNSS-based location system to complement A-GPS. T-Mobile is also incorporating OTDOA capability into its VoLTE handsets and network. As T-Mobile launches VoLTE—which it has already done in fifteen markets—it will be able to trial OTDOA in real-world conditions. Other carriers have similar initiatives under way.[7]

But as diverse commenters point out, despite the promise of these technological developments, no existing location technology has proven capable of meeting the Commission's proposed indoor benchmarks.[8] No commenter provides anything more tangible than speculation as to whether technologies will improve sufficiently to provide an indoor location estimate within 50 meters for 67% of indoor calls in two years, much less 80% of calls within five years.

Nor can any new location technology system be deployed in two years. Even NextNav recognizes this.[9] In order to be actually available and operational, several of the "near-term" solutions the Commission cites—including NextNav's technology, as well as OTDOA—require handset changes. But while OTDOA has already been integrated into the chipsets for handsets (handsets which are now beginning to enter the market), NextNav's technology has not been

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[7] *See id.* at 23-24; Comments of CTIA – The Wireless Association at 2, PS Docket No. 07-114 (filed May 12, 2014) ("CTIA Comments"); Verizon Comments at 17-18.

[8] *See* AT&T Comments at 7-9; Cisco Comments at 5; CTIA Comments at 6; Comments of the Information Technology Industry Council at 5, PS Docket No. 07-114 (filed May 12, 2014) ("ITIC Comments"); Comments of Motorola Mobility at 7, PS Docket No. 07-114 (filed May 12, 2014) ("Motorola Comments"); Qualcomm Comments at 7; Sprint Comments at 1-2; Comments of the Telecommunications System, Inc. at 19, PS Docket No. 07-114 (filed May 12, 2014) ("TCS Comments"); Verizon Comments at 13.

[9] Comments of NextNav, LLC at 13, PS Docket No. 07-114 (filed May 12, 2014) ("NextNav Comments") ("such capabilities will not realistically appear in all available handset models by the second year benchmark").

widely integrated at the chipset level. Indeed, NextNav is just beginning to work with the standards-setting bodies, work that in many respects must precede the inclusion of its technology into chipsets or handsets. NextNav also requires deployment of an overlay network. That deployment has only just begun in most of its licensed footprint, a footprint that only covers a portion of the country, and that is complete in only one area.[10]

Similarly, while Uplink-Time Difference of Arrival ("U-TDOA") does not require handset changes, it does require network deployment, in the form of the installation of Location Measurement Units ("LMUs") at virtually all cell sites.[11] Even that deployment would not overcome the well-understood inherent limitations of U-TDOA, limitations which include inability to compute any location in rural areas with insufficient cell site density and poor accuracy performance in areas with less than optimal cell site geometry, such as along highways and near coverage boundaries.[12] In short, to deploy LMUs at each cell site capable of functioning on 3G and 4G networks would be a herculean effort, requiring many years of rollout and testing, not to mention excessive costs.[13] Compounding such an effort is the fact that many modern Universal Mobile Telecommunications System ("UMTS") and LTE cell site deployments are architected with transmitting/receiving equipment mounted on the tower top or

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[10] *See* Letter from Bruce A. Olcott, Counsel, Progeny LMS, LLC, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 11-49, Attachment at 13 (filed Mar. 21, 2013) ("NextNav/Progeny Presentation").

[11] In T-Mobile's network, for example, LMUs previously deployed for Global System for Mobile ("GSM") will not work with UMTS or LTE radio networks. New LMU hardware would need to be deployed.

[12] Declaration of John F. Pottle, Ryan N. Jensen, Daniel H. Wilson ¶ 17 (attached hereto as Exhibit 1) ("Pottle/Jenson/Wilson Declaration").

[13] It took 4 years for T-Mobile's vendor, TruePosition, to roll out U-TDOA on its smaller GSM network.

roof top with the antennas, in some cases mounted inside the antenna.[14] This is done to increase cellular coverage by virtually eliminating cable losses between antennas and transceivers. For these deployed cell sites, connecting the uplink signals required by an LMU would range from very difficult to physically impossible.[15] Even if such an effort could be feasibly undertaken, the end result still would not meet the Commission's proposed indoor accuracy standards.

With respect to vertical location estimates, the technology is even more uncertain. The record—and the scientific literature—raise significant questions whether vertical location technologies are as well-developed and perform as reliably as their advocates proclaim. As catalogued in the attached Declaration of Dennis Roberson, the scientific literature suggests that the use of barometric pressure sensors to estimate a caller's elevation (which will actually be the height above mean sea-level and must be subsequently translated into height above ground and/or an actual building floor to be of any use) to the level of accuracy proposed by the Commission is still very much a "science project." And these issues are entirely separate from the other issues associated with relying on barometric pressure sensor technology, such as incomplete standards. Even if the technology is fully standardized, the Commission cannot ignore the inherent limitations of relying on barometric pressure sensors for z-axis information. Much more development followed by testing and evaluation (preferably in an independent and transparent test bed environment) is necessary before the FCC enshrines vertical accuracy specifications in its E911 rules.

As the Commission considers new rules, it must ensure that they are technically feasible—that the available technologies have demonstrated the ability to meet the proposed requirements—as well as economically feasible, including a robust multi-sourced commercial

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[14] Pottle/Jensen/Wilson Declaration ¶ 20.

[15] *Id*.

ecosystem, so that any new requirements are not pinned to a single technology or vendor. Such issues are not new with this *FNPRM*. Similar issues were raised in the context of the Commission's early Phase II orders, in which reliance on vendor claims ultimately resulted in numerous delays in regards to implementation of the rules as it became clear that carriers simply could not meet the benchmarks with the available technology.[16]

Furthermore, the Commission should not set timelines that, as a transitional matter, dictate particular location technologies. Such a course would risk locking in inferior technologies or solutions for only very short term incremental (if any) gain. A much better approach would be to establish deadlines that run from the completion of tests which are run in an open and independent test bed, validating a compliant solution that is standardized, and thus ready for commercial deployment.

T-Mobile urges the Commission to step back from its proposed new indoor benchmarks and instead focus on the path that would actually meet the overall goal of providing dispatchable addresses—the use of small cell, WiFi, and other low power radio beacon technologies and the development of a dispatchable address E911 location database. With respect to evaluating the intermediate steps carriers are *already* taking to improve wide-area radio location, the Commission should adopt T-Mobile's suggested two-stage test bed process.[17] By allowing for apples-to-apples testing of those technologies, the Commission, public safety and carriers can evaluate whether alternative technologies offer material improvements over the new technologies that carriers are already implementing.

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[16] *See* CTIA Comments at 10-13; *see also* Qualcomm Comments at 12; ITIC Comments at 5.

[17] Comments of T-Mobile USA, Inc. at 5, 8-9, PS Docket No. 07-114 (filed May 12, 2014) ("T-Mobile Comments").

Finally, the Commission should refrain from making any changes to the existing outdoor location accuracy requirements. Changes such as prohibiting carriers from excluding certain geographic areas where outdoor location technologies perform poorly from their compliance reporting, and accelerating the transition to a unitary location accuracy standard will not improve location accuracy. These changes, instead, will only increase the number of carriers that are unable to meet the accuracy benchmarks. Attempting to force technological change by rulemaking will be unsuccessful. Instead, the Commission should allow the current phase-in process to continue, even as carriers, public safety, and other stakeholders work together to investigate the most promising path to improved location accuracy in the form of dispatchable addresses for all wireless 911 calls.

III. CONTINUED RELIANCE ON WIDE-AREA RADIO-BASED LOCATION TECHNOLOGIES TO ESTIMATE X,Y (OR Z) COORDINATES IS UNLIKELY EVER TO YIELD DISPATCHABLE ADDRESSES.

Intrado's comments fundamentally call into question whether a wireless E911 location regime focused on x,y estimates can *ever* reliably yield dispatchable addresses—particularly within the limits of PSAP resources. Intrado conducted a study of the accuracy of reverse geocoding, *i.e.*, matching x,y coordinates to a street address, and concluded that, "[r]everse geocoding, the primary technology used today to derive dispatchable addresses from X,Y coordinates, does not provide sufficiently reliable results on its own."[18] Indeed, using the techniques that PSAPs generally use to create their mapping systems, Intrado found that reverse geocoding yielded the proper address just *2%* of the time in rural and suburban areas, and *21%* of the time in urban areas.[19] Using premium commercially available data, this could be improved,

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[18] Intrado Comments at 5.

[19] *Id*. at 6-7.

but even then over a third of rural and suburban locations yielded the wrong address, as did 15% of urban locations.[20]

It is important to recognize that Intrado's reverse geocoding results assume that the x,y estimate itself was 100% accurate, *i.e.*, it matched an x,y associated with a known address against the reverse geocoded result. Adding an error range to the x,y estimate—for example, 50 meters as proposed in the FNPRM—makes these results substantially worse.

Intrado's study only focused on x,y location estimates. However, it should also raise considerable doubt as to whether z-axis location estimates would be reliably correlated with a floor and/or unit of a caller's building. Z-axis estimates of height above mean sea level will be extremely challenging to translate into floor levels, given differences in ground elevation and in individual building design.

Intrado's reverse geocoding study provides a significant warning: if we ultimately want to obtain dispatchable addresses for indoor calls, even the most accurate x,y,z estimates will not do so for significant numbers of calls. Intrado concludes—as do many other commenters—that getting to dispatchable addresses requires focusing on other solutions, such as small cells, WiFi devices, and Bluetooth beacons.[21]

IV. A Collective Stakeholder Effort Can Create an Ecosystem to Support Dispatchable Addresses for Many Indoor 911 Calls.

A. Provision of a Dispatchable Address Will Never Be Possible if Carriers Bear Sole Responsibility for Wireless E911 Location.

The goal of providing a dispatchable address for wireless 911 calls is a worthy one, but as noted in the record, the responsibility for reaching this goal cannot rest solely on carriers.[22] As

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[20] *Id*. at 7.

[21] *Id*. at 8, 10-11.

[22] Cisco Comments at 6; AT&T Comments at 4.

discussed above, no matter how much carriers can improve wide-area radio-based location estimates, such estimates will always be in the form of latitude and longitude coordinates (and perhaps an elevation estimate) that must then be reverse geocoded. A marginally smaller radius will simply never be as good as a validated, actionable address, despite claims by some that trilateration techniques can provide addresses that are "clearly of great value to first responders."[23]

It is increasingly clear from the record—and from advances in technology—that provision of dispatchable addresses for indoor wireless 911 calls will require some kind of technology overlay that includes provisioned addresses (including floor and unit number) within buildings, whether in the form of low power radio beacons such as WiFi access points, Bluetooth, small cells, some other technology, or—as seems most likely—a combination of all of these technologies.[24]

But carriers alone cannot be responsible for the build out and address provisioning for such low power beacons; in fact, it is not possible. Carriers do not, for example, control the placement of WiFi access points or Bluetooth beacons in buildings. Carriers can, of course, promote the development of standards that provide for the necessary handset and network capability that permit the use of such tools. Carriers can also provision civic addresses for their own small cells, femtocells, and, where applicable, their own commercial WiFi access points into the necessary database for use on 911 calls. But carriers generally do not own or control the premises where such WiFi or BLE beacon overlays would be deployed, cannot require building

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[23] NextNav Comments at 24; *see also, e.g.*, Comments of TruePosition, Inc. at 21, PS Docket No. 07-114 (filed May 12, 2014) ("TruePosition Comments"). These claims are discussed further below.

[24] *See* AT&T Comments at 2-4, 24.

owners to undertake installation and deployment of the necessary access points or beacons, and cannot provision the civic addresses for these "non-controlled" access points and beacons.[25]

B. The Path Forward Requires Buy-In from Carriers, Public Safety, State and Local Governments, Premises Owners, Handset Manufacturers, Operating System Developers, and Others.

With sufficient support from all stakeholders, including carriers, public safety, state and local governments, premises owners, handset manufacturers, operating system developers, and others, provision of dispatchable addresses can be achieved over a reasonable number of years. This effort should leverage and embrace technologies and methods for emergency services that have naturally and successfully developed for cLBS. In many cases, such technologies provide a more efficient overall path for 911; it thus makes much more sense to look to these already viable technologies for future improvement than continuing to sink large sums of money into incremental and highly speculative location accuracy improvements that will not result in provision of dispatchable addresses.

For instance, civic addresses associated with commercial WiFi access points could be provisioned in a database and could be passed to PSAPs when a 911 call comes in from a WiFi-enabled handset. Because tenants and building owners are already deploying WiFi widely, these networks by and large already exist—or do not require much external incentive for deployment—and adding public safety capabilities to them would be a relatively small step for a large return. In fact, it is reasonable to believe that many tenants and owners would see

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[25] *Cf. id.* at 3-4 (noting that the goal of providing dispatchable addresses can be furthered by "legislation aimed at modifying building codes to require installation of location beacons" and that "many of the complications and difficulties in providing good ALI result from the construction and sale of high-rise residential buildings").

substantial benefit to their WiFi access points enabling the provision of highly accurate location information to PSAPs during emergency calls and would welcome their use for that purpose.[26]

Similarly, Bluetooth beacons and small cells could be likewise provisioned. As noted by AT&T, such beacons are small enough, and use sufficiently low power, that they can be deployed in many existing fixtures, such as exit signs or emergency lighting.[27] Indeed, Bluetooth beacons can easily be deployed, even in existing buildings, in light bulbs; LED manufacturers are already marketing BLE-enabled lighting systems.[28] Small, inexpensive standalone BLE beacons are also already commercially available.[29] These devices can run for multiple years on a small button battery and are designed to be easily attached to almost any surface. Taking the additional step of provisioning detailed location information (civic address with floor/suite information, for example) for these beacons into an emergency services location database could allow smartphones to be located indoors with high accuracy and reliability.

Deployment of such technologies can only be realized with the involvement of key players other than carriers. Public safety entities should encourage state and local governments, for example, to modify local building and fire codes to require deployment of emergency location devices throughout buildings; fire marshals can ensure address provisioning is completed during regular inspections. Such action would be similar to the steps taken by many municipalities to require commercial building owners to install sprinkler systems in multi-story,

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[26] One notable benefit for property owners and tenants could be the potential for improved insurance rates through the provision of such public safety improvements within their facilities.

[27] AT&T Comments at 3-4.

[28] *See, e.g.*, ilumi, http://www.ilumi.co/#smartbulbs.

[29] *See, e.g.*, Steve Ranger, *What Is Apple iBeacon? Here's What You Need to Know*, ZDNET (June 10, 2014), http://www.zdnet.com/what-is-apple-ibeacon-heres-what-you-need-to-know-7000030109/.

multi-unit buildings on a going-forward basis.[30] Existing buildings of highest interest, such as large multi-unit facilities (especially residences) and hotels, could be prioritized for earliest deployment and largest return on investment.

These small area solutions can also work in conjunction with carrier-based location technologies, allowing PSAPs to verify the provisioned address information. For instance, if the provisioned address of a WiFi router does not correspond to carrier-provided x,y information—either cell sector ID information or more refined A-GNSS or network-based estimates—the call taker could be alerted to the possibility that the provisioned address might be out of date or inaccurate, and would prompt additional questioning or other actions by the call taker to ensure proper call handling.

In focusing here on small area solutions that are capable of yielding dispatchable addresses, T-Mobile is not proposing to abandon wide-area radio-based location solutions, nor its efforts to improve those solutions, as discussed in greater detail below. Such systems will still be needed for outdoor location estimates. Shifting the primary emphasis for indoor calls to small area location solutions, however, moves to an evolutionary path that actually reaches the ultimate objective, rather than *never* getting there.[31]

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[30] These efforts were, in large part, spearheaded by an industry and standards-setting group, the National Fire Sprinkler Association. *See generally* Russell P. Fleming, National Fire Sprinkler Association, *The Fire Sprinkler Situation in the United States* (2002), *available at* http://www.sprinklerworld.org/vds.doc.

[31] *Cf.* PSCR, Bob Johnk, Indoor/In-Building Testing, PSCR Stakeholder's Meeting (June 4, 2014), http://www.pscr.gov/projects/broadband/700mhz_demo_net/meetings/stakeholder_mtg_062014/slides/day_2/PSCR_stakeholders_june_2014_Johnk_in_building.pdf (testing the best means of supplementing wireless signals within buildings and finding the best results with small cell supplementation).

C. Carriers Can Take Several Steps to Facilitate the Long-Term Vision of Providing Dispatchable Addresses.

Carriers, of course, have an important role to play in ensuring the success of the Commission's long-term goal, and can take several steps to facilitate the transition to a system that provides dispatchable addresses for indoor wireless 911 calls. For instance, carriers can commit to including Bluetooth and WiFi in all future VoLTE handsets offered for sale beyond a reasonable transition time. They can also commit to implementing any necessary handset firmware changes that would allow a forced user interface override for WiFi and Bluetooth during 911 calls, similar to what is done today with GPS.[32] Associated with this, they could require the addition of software on handsets that would scan for WiFi access points and Bluetooth beacons in response to a 911 call, and report results from that scan back to the network. Carriers can also investigate the concept of supporting an option for subscribers to affirmatively consent to be tracked in the background in advance of a 911 call, with the limitation that such active tracking would only be used for emergency services. The privacy ramifications of this approach, of course, need further exploration,[33] but there are also clear location performance benefits to such an option.

Carriers can also investigate, along with Public Safety and other relevant stakeholders, the development of a database of known commercially controlled WiFi access points and Bluetooth beacons. On the WiFi side, that information would likely come from a combination of carrier-controlled access points (*e.g.*, hotspots), other third-party controlled commercial access points, and (potentially) crowd-sourced access points. On the Bluetooth beacon side, it is less clear who would maintain the location information, though, as noted above, it could be any or a

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[32] When a user with a GPS-enabled handset dials 911, the GPS receiver in the phone will be turned on, no matter what the user's settings may be.

[33] *See, e.g.*, TCS Comments at 32.

combination of building owners that have deployed in-building technology overlays, public safety entities, local governments, security and alarm companies, or an independent third party tasked with maintaining such information as a public resource. In general, T-Mobile believes that public safety entities are uniquely positioned to take the lead in coordinating efforts to generate and maintain such trusted WiFi/BLE databases for the purposes of emergency location information. Finally, carriers can commit to sponsoring and promoting required standards changes, both in the handset to network, and in the network to ALI interfaces.

V. UNPROVEN TECHNOLOGY CANNOT BE THE BASIS FOR NEW LOCATION ACCURACY MANDATES.

As the Commission considers the record in this proceeding, it must ensure that it does not adopt any new rules that rely on unproven claims by technology vendors. Any new requirements must be technically and economically feasible. Where a candidate technology has not been shown capable of meeting the proposed benchmarks in the proposed timeframe—whether because it will not be commercially available, will not be integrated into handsets or networks, or will be economically infeasible to deploy in that timeframe—it cannot serve as the basis for those proposed benchmarks.[34]

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[34] Deployment of new location technologies—or improvements to existing technologies—can only assist public safety where it takes advantage of those advancements. For instance, a recent report by FindMe911, a group funded by TruePosition, *see* Gary Allen, *Editorial: Despite Claim, DC Is Not a City in Crisis*, DISPATCH MAGAZINE ON-LINE (July 11, 2014), http://www.911dispatch.com/2014/07/11/editorial-despite-claim-dc-is-not-a-city-in-crisis/, claims that PSAPs in Washington, D.C., receive Phase II location estimates for only approximately 10 percent of calls. *FCC Data: 9 Out of 19 Wireless 9-1-1 Calls in D.C. Lack Accurate Caller Location Information*, FINDME911 (July 10, 2014), http://findme911.org/news/fcc-data-9-out-of-10-wireless-9-1-1-calls-in-d-c-lack-accurate-caller-location-information/. When CalNENA made similar claims in the summer of 2013, it quickly became clear that the problem was not that carriers were not making Phase II information available but rather was that the PSAPs were failing to rebid for updated data. *See* Comments of T-Mobile USA, Inc. at 4-5, PS Docket No. 07-114 (filed Sept. 25, 2013); *see also* Letter from Marlys R. Davis, E911 Program Manager, King County, WA, to Marlene H. Dortch, Secretary, FCC, at 3-4, PS Docket No. 07-114 (filed Sept. 25, 2014)

A. No Currently Available or Near-Term Technology Is Capable of Meeting the Proposed X,Y Benchmarks on the Proposed Timeline, Even for LTE Networks.

Of the most developed candidate technologies for improved horizontal location accuracy, none can meet the proposed benchmarks. In addition, certain of those candidate technologies—NextNav's overlay network and TruePosition's U-TDOA solution—also have additional issues that would create further delay in deployment, as well as unnecessary expense and burden on carriers, issues that do not apply to LTE-based OTDOA.

The chart below sets forth a comparison of these three technologies:[35]

	NextNav	**U-TDOA**	**OTDOA**
Standardization/ Industry Adoption	• Not standardized for any radio access network • Proprietary, sole-sourced technology • No marketplace demand	• Version most recently proposed and tested by TruePosition is not standardized for UMTS or LTE networks • Proprietary, sole-sourced technology • No marketplace demand beyond GSM	• Standardized and committed for implementation by all major carriers in association with VoLTE • Available from multiple vendors • On-going performance enhancements currently in work in 3GPP
Coverage / Deployment	• Overlay • Beacon network in very early deployment stage • Limited geographic coverage (top metro areas) due to spectrum licenses and costs • No plans for national coverage	• Overlay • Deployed by two major carriers on GSM network • No implementations to date on UMTS or LTE networks	• Integral to LTE networks • Currently being deployed nationally in association with LTE network rollout

(showing higher Phase II yields than CalNENA, attributed to a policy of automatically rebidding for location information after a set interval); Letter from Stan Heffernan, COO, Greater Harris County Emergency Network, to David Siehl, Public Safety and Homeland Security Bureau, FCC, at 1 (Sept. 16, 2013), *available at* http://transition.fcc.gov/bureaus/pshs/911/Phase%202/TX/Greater%20Harris%20Co%20TX%20FCC%20WPH2%20Letter%20091613.pdf (same).

35 Pottle/Jensen/Wilson Declaration ¶ 10.

	NextNav	U-TDOA	OTDOA
Network Impacts	• Independent beacon overlay network • Following standardization—requires SMLC and other network modifications for control plane implementation	• Complex LMU deployment at each cell site with multiple spectrum bands • Runs counter to goal of co-locating transceivers and downlink antennas on towers • Following standardization—requires SMLC and other network modifications for control plane implementation	• Network support inherent in LTE deployment is already in place
Handset Impacts	• Requires handset change-out • New functionality integrated into GPS chipset and minor hardware impacts to handset • One minor chipset vendor produced a functional chip—major chipset vendors have not committed to this technology	• None	• Requires handset change-out • New functionality widely integrated into GPS chipsets, adopted in VoLTE handsets beginning 2014
Cost to Deploy, Operate, and Maintain	• Very high service fees to access beacon network which scale even higher with growth of business • While costs could be shared across carriers, extreme costs to deploy/maintain the non-revenue producing independent beacon network results in a very high per-carrier cost burden	• Extreme costs for deployment (LMU at every site), network maintenance, and licensing—costs cannot reasonably be shared across carriers[36] • Economically infeasible to deploy and maintain	• Reasonable costs to deploy in handset and network • Significant initial engineering effort to calibrate timing/ synchronization
Horizontal Accuracy **Yield** **Latency**	• 30-85m / 67% • > 93% • 27 sec (based on CSRIC III Indoor Test Bed results, prototype hardware implementation)	• 80-200m / 67% • 85-94% • 7-20 sec (Typical U-TDOA performance outdoors on GSM network—Valid indoor performance figures not available)	• Expected to be High • Expected to be High • Expected to be Low (CSRIC testing required for specific performance figures)

[36] While theoretically possible to share LMUs across different wireless carriers, in practice, this is not a workable option. Carriers will likely never share their network backhaul outside their own network with other carriers, due to a variety of technical, privacy, and competitive issues.

	NextNav	U-TDOA	OTDOA
Maintenance / Support Complexity	• Independent from carrier network • Increased complexity for handset validation	• Significant operational effort to maintain network nodes: LMU performance, system capacity requirements, components reaching end of life • Ongoing effort to maintain accurate provisioning database	• Significant effort to initially calibrate system • Ongoing effort to maintain accurate provisioning database • Increased complexity for handset validation
Commercial Availability—Time to Market Estimates	• Beacon network availability is uncertain and at best—several years away • RAN network functionality for position calculation would likely take 1-2 years after standardization • No commercial handset availability—likely no significant quantity of handsets available sooner than 2018 (based on required standardization, chipset development, and handset integration)	• Likely 8 year network rollout (based on standardization, developing and testing on LTE network, integrating network equipment, and deploying LMUs) • No impact to handsets	• Release 9 OTDOA network integration started—performance testing planned for late 2014—OTDOA activation expected early 2015 • Performance improvements committed in Release 10 • Initial handsets now available—virtually all VoLTE handsets going forward will be OTDOA capable

Addressing each technology in turn, it is clear from the record that these purported solutions cannot meet the proposed benchmarks within the proposed timeframe.

NextNav. First, NextNav suffers from critical issues related to integration of its technology into handsets.[37] Commercial availability of handsets capable of using NextNav's technology is several years away; T-Mobile engineers estimate that NextNav is "realistically a minimum of four years away from commercial handset availability."[38] Even NextNav acknowledges it only anticipates "commercial availability of new handsets incorporated with MBS [Metropolitan Beacon System] location technology by the Commission's second year benchmark" and that "such capabilities will not realistically appear in all available handset

[37] *See* Pottle/Jensen/Wilson Declaration ¶¶ 12-15.

[38] *Id*. ¶ 15.

models by the second year benchmark."[39] Given that necessary standardization work has only just begun,[40] NextNav's estimates are optimistic.

Furthermore, because NextNav's technology is not yet built into any commercially available handset, the Communications, Security, Reliability and Interoperability Council ("CSRIC") III test bed results may overstate NextNav's potential accuracy. In those tests, NextNav used a prototype "sleeve"—containing a dedicated antenna used to receive the terrestrial beacon transmissions, hardware, software, and sensors—to connect to the test handset.[41] But performance in an external receiver will almost always be superior to a receiver built into the handset; thus, there is a reasonable expectation that NextNav's technology will not perform as well in the real world as it did in the test bed.[42] Of course, even in the test bed, its technology could not meet even the proposed near-term 67th percentile 50 meter accuracy benchmark in all environments, particularly the urban and dense urban environments where A-GPS faces its greatest performance challenges.[43]

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39 NextNav Comments at 13.

40 Letter from Bruce A. Olcott, Counsel, NextNav, LLC, to Marlene H. Dortch, Secretary, FCC, PS Docket No. 07-114 (Apr. 23, 2014).

41 *See* CSRIC III, Working Group 3, E9-1-1 Location Accuracy, *Indoor Location Test Bed Report*, 24 (Mar. 14, 2013), *available at* http://transition.fcc.gov/bureaus/pshs/advisory/csric3/CSRIC_III_WG3_Report_March_%202013_ILTestBedReport ("CSRIC III WG3 Indoor Test Bed Report"). *See also* Pottle/Jensen/Wilson Declaration ¶ 13.

42 *See* Qualcomm Comments at iii, 14-15; *see also* Pottle/Jensen/Wilson Declaration ¶ 13 ("There is a reasonable possibility that NextNav's performance will be degraded once their technology is internally integrated into real wireless handset products—especially bringing the antenna used to receive the terrestrial beacons into close proximity of other RF components and noise sources."); CSRIC III Working Group 3 Indoor Test Bed Report at 54 ("Technical performance of some position methods was determined in the test bed using non-production form factor hardware. Care must be exercised in applying these results to production handsets").

43 *See* CSRIC III WG3 Indoor Test Bed Report at 27; Pottle/Jensen/Wilson Declaration at 13.

Additionally, as T-Mobile and others noted in the initial comment round, NextNav's technology is reliant on the availability of its beacon network, which NextNav only intends to deploy in certain urban areas. It is clear from NextNav's published plans that large areas of the country will go unserved by its technology.[44] In its comments in this proceeding, NextNav admits that its initial deployment is limited to 47 Economic Areas ("EAs");[45] it has stated in other proceedings that it holds licenses in only 115 EAs of the 176 designated by the Commission.[46] Moreover, NextNav acknowledges that its average population coverage "exceeds 45 percent in [the] top 40 EAs"[47]—poor coverage even in its initial deployment markets. Yet even as it calls for the Commission to adopt the proposed nationwide benchmarks, NextNav acknowledges the limited reach of its own technology, and suggests that indoor location accuracy outside of its coverage areas can be addressed with A-GPS.[48] This suggestion, of course, creates more problems than it solves. For instance, if NextNav is the technology of choice for indoor location estimates, will carriers then be exempted from meeting the indoor benchmarks in markets where NextNav has not deployed and has no intention to deploy its system? Furthermore, does NextNav intend to say that those small- to medium-sized cities outside of their deployment areas do not have equally critical indoor location challenges as the top 47 metropolitan areas? NextNav's own suggestion—that A-GPS can be relied upon as the fallback to its technology—illustrates the importance of ensuring a healthy ecosystem for location technologies before imposing a regulatory mandate. The simple fact is that carriers

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44 *See* Progeny/NextNav Presentation at 13.

45 NextNav Comments at 10.

46 Progeny/NextNav Presentation at 13.

47 *Id*.

48 NextNav Comments at 10.

cannot rely on an urban-areas-only technology to meet nationwide location accuracy benchmarks; the Commission likewise should not rely on such a geographically limited technology to establish those nationwide benchmarks.

U-TDOA. TruePosition's claims for U-TDOA are likewise unsupportable. Despite its claims to the contrary, U-TDOA will not be available to all carriers immediately or even over the short term—but would take something like eight years to be developed and fully deployed.[49] Though it is true that handset turnover is not required to use U-TDOA for location estimates, a widespread and costly network deployment must take place.[50] TruePosition's LMUs must be deployed to essentially every cell site, before a carrier can rely on it for location estimates, and a carrier might be required to deploy LMU-only sites to ensure ubiquitous indoor coverage.[51] Given that currently deployed LMUs are incapable of supporting U-TDOA for UMTS or LTE networks, not only would this network-wide deployment be extremely labor-intensive and expensive, it would also be infeasible because of tower- and roof top-mounted antennas with integrated transceivers, which in many cases are physically incapable of porting required uplink signals to an LMU.[52] A reliance on U-TDOA also presumes that TruePosition is able to adapt its technology for use in non-GSM networks—something that has not been done in commercial deployments—and manufacture sufficient numbers of LMUs to meet the needs of carriers for network-wide deployment.[53] Furthermore, even if all the above availability and deployment challenges associated with U-TDOA were somehow resolved, TruePosition has yet to provide

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49 *See* Pottle/Jensen Wilson Declaration ¶ 22.

50 *Id*. ¶ 19.

51 *Id.*

52 *See id.* ¶ 20.

53 *See id.* ¶¶ 20, 21.

any substantiation that U-TDOA technology is capable of meeting the proposed accuracy standards across all indoor environments.[54] Finally, although TruePosition advocates for a ten second time-to-first-fix requirement,[55] its most recent tests—the ones that supposedly show that U-TDOA can meet the Commission's proposed requirements—used 26 seconds as an allowable time-to-first-fix.[56]

RF Pattern Matching. Though not reflected in the above chart, Polaris Wireless's Radio Frequency ("RF") Pattern Matching technology also bears some criticism. First, it cannot meet the proposed indoor accuracy benchmarks, as clearly demonstrated in the CSRIC III test bed. This technology falls well short in each indoor environment, at both the 67th and the 80th percentiles.[57] In addition, it was noted from the CSRIC III tests that RF Pattern Matching has a fundamental limitation that precludes its use to further the goal of improved indoor location accuracy in high rise settings—RF Pattern Matching performance degrades with the height of the test point.[58] As CSRIC III Working Group 3 reported, "the signal environment in the upper floors of a high rise building is significantly different from that on the lower floors because of the difference in obstructions to the signal paths."[59] The implication is that if the RF environment at the upper floors of high rise buildings is not calibrated, you cannot get accurate horizontal location performance on those upper floors.[60] Even if an initial calibration at higher

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54 *Id.* ¶ 18.

55 TruePosition Comments at 21-22.

56 Pottle/Jensen/Wilson Declaration ¶ 18.

57 *See* CSRIC III WG3 Indoor Test Bed Report at 27.

58 CSRIC III WG3 Indoor Test Bed Test Report at 31. *See also* Pottle/Jensen/Wilson Declaration at ¶ 25.

59 CSRIC III WG3 Indoor Test Bed Test Report at 40.

60 Pottle/Jensen/Wilson Declaration at ¶ 25.

elevations could be accomplished—and this would be very challenging—the fact that radio networks are routinely reconfigured to optimize capacity and spectrum utilization, means that the required recalibration would rapidly become infeasibly expensive.[61]

OTDOA. The viability of these other candidate technologies for indoor location is further undermined by the fact that carrier-deployed OTDOA is expected to provide low latency x,y location estimates that are more accurate than the estimates that would be available with U-TDOA or RF Pattern Matching. And OTDOA's location estimates should improve over time, through continuing advancements in standardized options, such as the ability for the handset to measure eNodeB beacons on multiple LTE frequency bands—functionality inherent in 3GPP release-10.[62]

Although OTDOA is not solely network-based (it relies on both the handset and the network), it is integrated into the LTE standard, such that anywhere a caller can make a VoLTE call, the network will typically be able to provide an OTDOA position estimate, once OTDOA has been fully implemented. Handset turnover is required—but this turnover is already occurring as customers move to VoLTE capable handsets that have chipset support for OTDOA.[63] Thus as carriers and subscribers move to 4G and VoLTE, OTDOA will become widely available. The critical factors in favor of OTDOA are that some carriers are already beginning to integrate OTDOA into their networks as part of their LTE deployments and VoLTE handsets (and others plan to do so in the near future) and the technology does not require building out a network-wide overlay, as is required for NextNav and U-TDOA.[64]

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61 *See id.*

62 *Id.* ¶ 26.

63 *See id.* ¶ 27.

64 *See id.*

B. Vertical Location Technology Remains an Insufficiently Tested "Science Project" and Thus Vertical Location Requirements are Premature.

The Commission cannot adopt an indoor vertical location estimate benchmark without real-world testing of z-axis candidate technologies. Furthermore, the Commission cannot rely on the vertical location results from the CSRIC III test bed, which was not specifically designed to test vertical location under the conditions that most challenge the use of barometric pressure sensors and did not test the use of barometric pressure sensors in a production handset.[65]

For instance, as T-Mobile noted in its initial comments and as supported by the attached Declaration of Dennis Roberson, barometric sensors must be calibrated by reference sensors at known elevations *within the same air column environment as the handset* to allow an accurate absolute elevation measurement.[66] Many buildings have significant differences between outdoor and indoor pressure levels, at a given elevation, due to both mechanical systems and environmental conditions. To overcome these differences and obtain high accuracy in-building elevation estimates using barometric pressure sensors may require including reference sensors inside each building at known elevations within the air column.[67]

In addition, the CSRIC III test methodology was not designed to account for a variety of real-world conditions involving the use of barometric pressure sensors to estimate absolute altitude. Thus, for instance, the test calls were made at fixed time intervals, subject to just-in-time calibration of sensors prior to the experimental measurements.[68] These conditions,

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65 *See* Declaration of Dennis Roberson ¶ 9, (filed July 14, 2014) (attached hereto as Exhibit 2) ("Roberson Declaration"). *See also* Qualcomm Comments at 14 (noting that no barometric pressure sensor integrated into a handset has shown the same performance capabilities as the sensor in NextNav's test "sleeve" used during the CSRIC test bed).

66 *See* T-Mobile Comments at 13; Roberson Declaration ¶ 10.

67 *See* Roberson Declaration ¶ 8.

68 *Id.* ¶ 9.

however, do not replicate real-world emergency calling conditions that affect barometric pressures sensors, such as different climatic and weather conditions, different pressures inside and outside the building, different types of high-rise buildings in different areas of the country, and the effect on the integrated sensor of being within a particular building environment for a sustained period of time.[69]

If barometric reference sensors were to be required in buildings, a preferable solution would be the use of in-building beacons, as described above, which would provide not only accurate vertical information—in the form of provisioned dispatchable addresses rather than altitude measurements relative to mean sea level—but also accurate horizontal location for indoor 911 calls.

Finally, a raw, vertical (z-axis) measurement of altitude above mean sea level is useless for public safety without translation to a specific floor in a specific building; as of today, no such translation databases exist.[70] Creation of such databases, moreover, would be a massive undertaking, requiring years of effort and tremendous expense, and with questionable utility, given the technological limitations of barometric pressure sensors for providing accurate, absolute altitude information.[71] Moreover, as Roberson points out, Intrado's data with respect to the inaccuracy of reverse geocoding for x,y significantly calls into question whether 3-dimensional reverse geocoding will yield sufficiently reliable results.[72]

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69 *Id*.

70 *Id*. ¶ 19.

71 *Id*. ¶ 21.

72 *Id*. ¶ 20.

C. The Commission Should Not Mandate New Indoor Horizontal Accuracy Standards for non-LTE, Legacy Networks.

The Commission should reject calls to extend any new indoor accuracy requirements to non-LTE legacy networks. Neither the GSM nor the UMTS standards were designed to incorporate multiple location technologies running simultaneously, a key feature of LTE standards that will enable optimal utilization of available location technologies. Furthermore, neither GSM nor UMTS standards are undergoing any further location-related development, precluding necessary standardization of any new location technologies. Moreover, OTDOA is standardized only for LTE.

Within the time that it would take to retrofit any non-LTE legacy network, LTE networks will be further deployed and VoLTE will be widely available, especially in urban areas. As the Commission has recognized, some carriers assert that LTE already reaches 95 percent of the U.S. population, and other carriers such as T-Mobile are rapidly expanding their LTE footprints.[73] A mandate to retrofit existing non-LTE networks—if it could even be done—would impose an extreme cost to cover an ever diminishing geography and customer base. It would also be an impossibility: standards bodies simply are not entertaining significant changes to legacy technologies and there is almost no chance that standards bodies would undertake the necessary GSM, CDMA or UMTS standards work that would be required in an attempt to meet possible new FCC rules. Standards bodies have "frozen" GSM/GPRS/EDGE standards, with the last

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[73] *See Connect America Fund; Universal Service Reform – Mobility Fund; ETC Annual Reports and Certifications; Establishing Just and Reasonable Rates for Local Exchange Carriers; Developing a Unified Intercarrier Compensation Regime*, Report and Order, Declaratory Ruling, Order, Memorandum Opinion and Order, Seventh Order on Reconsideration, and Further Notice of Proposed Rulemaking, FCC 14-54, ¶ 238 (rel. June 10, 2014).

location-related change approved in 2007.[74] As a result, only "essential corrections," and no additional functions or features, would be approved for these legacy networks.[75] Similarly, the last location-related change for UMTS/HSPA standards was in 2011.[76] Since 2011, all location-related standards activities have been directed to LTE networks.[77] Moreover, the areas that would lie outside of LTE coverage are unlikely to be the urban and dense urban environments in which A-GNSS will be most challenged.

As Verizon points out, including legacy networks in any indoor accuracy standard guarantees that the proposed new standards will be technically infeasible.[78] While none of the proposed wide-area radio-based location technologies have been shown to be capable of meeting the proposed new standards, it is quite clear that the LTE network, and not legacy networks, holds the most promise for making real improvements in location technology performance.

VI. T-MOBILE CONTINUES TO ENCOURAGE THE COMMISSION TO SUPPORT A TWO-STAGE TEST BED PROCESS IN ADDITION TO PURSUING A SMALL AREA BEACON DISPATCHABLE ADDRESS DATABASE.

Rather than basing rules on unproven technology, the Commission must base them on fully tested technologies and commercial availability.[79] Near-term technologies like OTDOA and A-GNSS are becoming market-ready and commercially viable—and are already being deployed. Without further testing, the Commission will have no basis from which to determine the anticipated performance of the location technology solutions that carriers are *already*

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[74] Pottle/Jensen/Wilson Declaration ¶ 7.

[75] *Id*.

[76] *Id*.

[77] *Id*.

[78] *See* Verizon Comments at 17-18; Declaration of Richard Craig ¶ 7 (Appendix to Verizon Comments).

[79] *See, e.g.*, Qualcomm Comments at 12; Sprint Comments at 4-5; TIA Comments at 4-5; Motorola Comments at 10-12; *see also* CTIA Comments at 10-12.

implementing for their LTE networks/handsets, the extent to which any other proposed solutions will yield meaningful additional performance benefits. Similarly, cLBS technologies, including WiFi and Bluetooth systems, are available and in many handsets, and use of those technologies for emergency communications is being explored.[80] These technologies should be the focus of the expedited test bed, which should be established as soon as possible to allow apples-to-apples testing and evaluation of technologies that have not been sufficiently evaluated in such a context.

In the longer term, if continued evaluation of candidate wide-area radio-based location technologies is necessary, a permanent test bed should be established for on-going tests of emerging technologies side-by-side with existing technologies, to determine their technical capabilities as well as the economic feasibility of promoting their deployment. Any such permanent test bed should be based on the requirements developed by the Emergency Services & Methodologies subcommittee of the Alliance for Telecommunications Industry Solutions ("ATIS") Emergency Services Interconnection Forum ("ESIF").[81]

T-Mobile urges the Commission to be wary of taking any actions that might result in stranded investments. One way it can do so is by encouraging the establishment of a well-designed test bed to permit side-by-side comparison of candidate technologies. By ensuring that any new proposed indoor location accuracy rules are grounded in the result of technological evaluation in the test bed, the Commission can avoid imposing technically and economically infeasible mandates—as well as any unnecessary expense and effort to deploy technologies that will not materially improve location estimates.

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80 *See, e.g.*, Cisco Comments at 3-4; Comments of Polaris Wireless, Inc. at 4, PS Docket No. 07-114 (filed on May 12, 2014) ("Polaris Comments").

81 ATIS: ESIF, http://www.atis.org/esif/esifsubcommitteeg.asp.

VII. ELIMINATING EXCLUSION ZONES FROM EXISTING ACCURACY REQUIREMENTS AND TRUNCATING THE TRANSITION FROM NETWORK TO HANDSET-BASED STANDARDS WOULD BE ARBITRARY AND CAPRICIOUS.

T-Mobile opposes proposals to eliminate the rules excluding certain counties or portions of counties from compliance measurements[82] and to accelerate the transition to a unitary outdoor location standard. Neither proposal will result in improved location accuracy. They would only result in an increase in the number of carriers that are unable to meet the Phase II compliance benchmarks currently in place.

Carriers are permitted to exclude certain areas where currently available technologies do not perform well.[83] For instance, even though A-GPS can provide a highly accurate location estimate, it can only do so where a handset can "hear" sufficient satellites to obtain a good fix. Thus carriers can exclude areas of heavy forestation. Similarly, network-based technologies are hampered in areas with few cell sites or poor cell site geometry. Thus, exclusion areas are allowed for regions where triangulation is not technically possible—such as where too few cell sites exist to allow triangulation.

Eliminating exclusion zones is not going to make these problems go away. Though the National Emergency Number Association states that carriers are using exclusion zones to avoid providing Phase II service to requesting counties,[84] it does not substantiate that claim. The exclusion rules simply acknowledge the fundamental limitations of wide-area radio-based location technologies and do not hold carriers responsible for reduced accuracy in areas where location estimates are unlikely to be accurate. Take for example a county in which a T-Mobile

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82 *See, e.g.*, Comments of the National Emergency Number Association Comments at 6-7, PS Docket No. 07-114, (filed May 12, 2014) ("NENA Comments").

83 47 C.F.R. § 20.18(h)(1)(vi), (h)(2)(i).

84 *Id.* at 7.

handset can never simultaneously “hear” three cell sites. In these counties, it is not possible to utilize U-TDOA or any other terrestrial triangulation-based technology because triangulation is impossible. A-GPS will either provide estimates meeting the standard, or it won’t, and there is no way to change that. It is important to note that exclusion areas pertain only to how compliance is measured under the rules—not to whether carriers provide Phase II service to requesting counties. Carriers make all reasonable efforts to provide accurate Phase II results where ever possible.

Moreover, to the extent that there are areas today outside of the exclusion zones that cannot meet the handset-based outdoor standards, changing the mandate to truncate the transition from network to handset-based standards will not improve the delivered results. For all the reasons discussed above, no new location technologies would be able to be deployed and operational on legacy networks/handsets before either the legacy network is retired or the transition process is completed under the current rules. The solution lies in moving forward to LTE, not in altering the accuracy requirements applicable to legacy air interfaces

Carriers are today only three years into an eight year phase-in process, and it is too early in that process to consider modifications. There is no evidence that truncating the existing benchmarks is feasible for all carriers. Changing the current timeframe is therefore only likely to introduce uncertainty without any real corresponding benefit.

Carriers are not actively delaying the transition to a unitary standard. The transition is necessary to allow time to implement new technologies, equipment, and for customers to obtain new handsets. Shifting the deadline up is only likely to result in a flurry of waivers, with no real change in the ultimate timeframe for all carriers to meet the unitary standard.

VIII. CONCLUSION

T-Mobile urges the Commission to recognize that focusing simply on decreasing the required accuracy radius for a carrier-provided wide-area radio location estimate will not bring us any closer to the long-term goal of providing public safety with dispatchable addresses for every wireless 911 call. Rather than propose new indoor location accuracy rules that no carrier will be able to comply with because they are technically and economically infeasible and that will incorrectly divert valuable resources, the Commission, public safety, and carriers should work together to focus on how to develop a wireless E911 ecosystem that will yield actionable addresses for wireless 911 calls placed from indoors, complemented by reasonable improvements in location-estimation, over realistic timeframes.

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