

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of)	
)	
Request to Refresh the Record Regarding)	PS Docket No. 07-114
Service Rules for Wireless Enhanced 911)	
Phase II Location Accuracy and Reliability)	
)	
Wireless E911 Location Accuracy)	
Requirements)	
)	
Revision of the Commission's Rules to)	CC Docket No. 94-102
Ensure Compatibility with Enhanced 911)	
Emergency Calling Systems)	

REPLY COMMENTS OF TRUEPOSITION, INC.

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REPLY COMMENTS OF TRUEPOSITION, INC.

I. INTRODUCTION AND SUMMARY

TruePosition, Inc. (“TruePosition”) replies to the comments filed in response to the Public Notice released November 6, 2009 addressing rules concerning the location accuracy of mobile devices.¹ These rules are critical to the location of individuals calling 911 from mobile devices and the dispatch of emergency assistance to those callers. TruePosition urges the Federal Communications Commission (“Commission”) to move expeditiously to formulate rules requiring the location of wireless 911 calls (“E911 calls”) made indoors and in other obstructed environments (that is, environments without line-of-sight to satellites), as well as measurement of the accuracy of such calls. This

¹ See Public Notice, *Public Safety and Homeland Security Bureau Seeks to Refresh the Record Regarding Service Rules for Wireless Enhanced 911 Phase II Location Accuracy and Reliability*, PS Docket No. 07-114, DA 09-2397 (rel. Nov. 6, 2009), as corrected by *Erratum* (rel. Nov. 13, 2009) (“*Public Notice*”).

vital step will recognize the enormous changes in consumer wireless usage and will enable 911 Centers to keep pace with technological advances and consumer expectations.

The Commission should not adopt the technology mandate proposed by some commenters that would result in carriers' reliance predominantly on Assisted GPS ("A-GPS") for their E911 solution. This proposal would lead to inadequate E911 location accuracy in the very urban and indoor environments where an increasing proportion of 911 calls originate. The Commission should recognize that market forces can generate effective E911 solutions, such as a hybrid satellite-network approach, and should provide the discretion to determine how best to meet the revised E911 location accuracy rules. The development of new E911 location compliance and testing procedures is critical; the Commission's Office of Engineering and Technology is best able to meet this responsibility.

II. THE COMMISSION'S FOCUS SHOULD BE ON IMPROVING LOCATION ACCURACY IN AREAS WHERE MOST 911 CALLS ARE MADE

TruePosition is a leading provider of wireless location solutions and technology. Its Uplink Time Difference of Arrival ("U-TDOA") technology is the United States' principal network-based location technology, helping to protect the safety of more than 100 million citizens and locating more than five million E911 calls every month.² TruePosition has been a regular and active participant in the Commission's E911 proceedings, and is committed to achieving materially improved E911 location accuracy that benefits citizens across the nation. TruePosition applauds the Commission's

² U-TDOA has been deployed extensively by two Tier I carriers, AT&T and T-Mobile.

commitment to E911 location accuracy and welcomes the opportunity to address this issue and to respond to the comments filed in response to the *Public Notice*.

We note at the outset that TruePosition agrees with commenters who urge the Commission to move expeditiously to adopt a standardized county-level E911 location accuracy requirement.³ We concur that a phased in approach can improve location accuracy.⁴ Each of the proposals calls for compliance measurements to be made at the county level. Significantly, testing metrics and compliance processes must accompany any such change to the geographic standard and are vital to meaningful improvements in location accuracy.

In evaluating any proposed changes to the current E911 location accuracy requirement, the real question for the Commission is whether those changes will meet consumers' expectations and materially improve emergency responders' ability to render aid, regardless of technology or platform. As TruePosition has stated in this proceeding, meaningful improvement in location accuracy can clearly be made in environments

³ Comments of NENA, PS Docket No. 07-114, at 1 (Nov. 20, 2009) (“NENA Comments”); Comments of APCO – Pennsylvania Chapter, PS Docket No. 07-114, at 1 (Nov. 19, 2009; filed Nov. 20, 2009); Comments of AT&T Inc., PS Docket No. 07-114, at 1-2 (Nov. 20, 2009) (“AT&T Comments”).

⁴ The proposals for a phased in approach are embodied in the APCO/NENA letter to Chief Derek Poarch of July 14, 2008; the APCO/NENA and Verizon letter to Chairman Martin of August 20, 2008; and the APCO/NENA and AT&T letter to Chairman Martin of August 25, 2008. *See* Letter from Willis Carter, APCO International, and Ronald Boneau, NENA, to Chief Derek Poarch, Public Safety and Homeland Security Bureau, FCC, PS Docket No. 07-114 (July 14, 2008) (“July 14 Letter”); Letter from Brian Fontes, NENA, Robert M. Gurss, APCO, and John T. Scott III, Verizon Wireless, to Chairman Kevin Martin, FCC, PS Docket No. 07-114 (Aug. 20, 2008) (“August 20 Letter”); Letter from Brian Fontes, NENA, Robert M. Gurss, APCO, and Robert W. Quinn, Jr., AT&T, to Chairman Kevin Martin, FCC, PS Docket No. 07-114 (Aug. 25, 2008) (“August 25 Letter”). As indicated in their respective comments, AT&T and NENA continue to support all of the elements of their August 2008 proposal. *See* AT&T Comments at 1-2; NENA Comments at 1-2.

where the preponderance of 911 calls are made.⁵ There is substantial basis to conclude that improved location accuracy in these environments is achievable, and that this improvement can be measured. In this context, it is critical to note that U-TDOA technology provides accurate location estimates for calls placed within buildings and for calls placed outdoors in urban and suburban locales.

As discussed *infra* at 9-10, carriers can achieve significant improvement in location estimates in all environments using a hybrid technology consisting of U-TDOA and A-GPS. There is no significant developmental risk associated with this hybrid; indeed, it has the ability to overcome many of the limitations of handset technology in urban and in-building settings and network technology in rural settings.

Other variants of hybrid handset-network technology will not produce significant performance improvements.⁶ Specifically, A-GPS + AFLT hybrid is a technology used by IS-95/CDMA 2000 operators in North America.⁷ It helps overcome the problems experienced with A-GPS due to visibility issues with the satellite signals and provides significant improvement over the A-GPS-only solution.⁸ This approach provides good performance in rural areas, but testing shows that it failed to perform in dense urban areas and in buildings constructed of concrete, steel, and glass. Verizon's previous comments

⁵ Comments of TruePosition, Inc., PS Docket No. 07-114, at 2-3, 9-13, 25 (Aug. 20, 2007) ("TruePosition August 2007 Comments").

⁶ *Id.* at 13-17.

⁷ For a description of the technology, *see* Comments of Verizon Wireless, PS Docket No. 07-114, at 16-22 (July 5, 2007) ("Verizon Wireless 2007 Comments").

⁸ *See infra* at 8-9.

acknowledge that the AFLT + A-GPS hybrid that it has deployed cannot reliably meet Commission requirements in these urban, dense urban, and indoor environments.⁹

III. TO ACCOUNT FOR CHANGES IN CONSUMER WIRELESS USE, THE COMMISSION SHOULD ESTABLISH TESTING STANDARDS RELATING TO INDOOR ACCURACY

Since location accuracy rules were first implemented, mobile devices have emerged as the primary means of telecommunication for a growing population of consumers. Wireless calls have risen from 30% of total industry revenue in 2002 to 41.25% of total industry revenue in 2007.¹⁰ Actual PSAP calls reflect an even more dramatic shift to mobile devices, as analysis indicates that wireless calls as a percentage of total 911 calls received by PSAPs now surpass wireline 911 calls.¹¹ The Commission's E911 rules must reflect this reality. As advanced mobile services become more prevalent, it is crucial that the Commission's location accuracy standards, including those addressing the indoor environment, keep pace with consumer expectations and emergency response requirements.

⁹ See Verizon Wireless 2007 Comments at 17-20. See also Comments of Qualcomm Inc., PS Docket No. 07-114, at 5 (July 5, 2007) ("Qualcomm 2007 Comments"); Sprint Nextel Comments, PS Docket No. 07-114, at 11-12 (July 5, 2007).

¹⁰ *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993; Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services*, Eighth Report, 18 FCC Rcd 14783, ¶ 102 (2003); Industry Analysis and Technology Division, Wireline Competition Bureau, FCC, *Trends in Telephone Service*, at Table 15.1 (August 2008), available at: <http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-284932A1.pdf>.

¹¹ See Comments of Intrado, Inc. and Intrado Communications on NBP Public Notice #8, GN Docket No. 09-47, at 4 (Nov. 12, 2009) (noting that the States of Alabama, Texas, Virginia, Washington, Massachusetts, Delaware, and Michigan report that the percentage of wireless calls in those states ranges from 52% to 72% of all calls received by PSAPs).

With consumers increasingly substituting wireless devices for wireline service, approximately 40%-60% of E911 calls are now made indoors.¹² Indoor accuracy for E911 calls has therefore become vital, and the Commission must align its rules with this emergency call usage pattern. Specifically, the Commission's rules should require carrier E911 compliance testing to include measurements in indoor environments; a carrier's indoor test results for E911 location accuracy should be weighted in accordance with its estimated percentage of indoor E911 calls. Contrary to past claims, there are no legitimate logistical or technical obstacles to indoor E911 accuracy testing.

The Commission should also closely evaluate claims of inability to comply with E911 location accuracy standards that encompass E911 calls inside buildings.¹³ Existing technology is able to achieve a high level of accuracy in indoor environments. U-TDOA technology provides excellent performance indoors, particularly in areas where carriers have deployed U-TDOA LMUs on more than 90% of cell sites.¹⁴ TruePosition has previously provided the Commission with data addressing the indoor performance of U-TDOA, including tests in a major city encompassing a high percentage of calls from inside high-rise buildings.¹⁵ These test results from 2000-2001 demonstrate the accuracy

¹² "E911 Location Technology" at 6, attached to Letter from Philip L. Verveer, Counsel to TruePosition, to Marlene Dortch, FCC Secretary, PS Docket No. 07-114, (Sept. 11, 2008).

¹³ Comments of T-Mobile USA, Inc. and the Rural Cellular Association on the 911 Location Accuracy Remand, PS Docket No. 07-114, at 23-24 (Oct. 6, 2008).

¹⁴ U-TDOA performance indoors does not include vertical location estimates in buildings. TruePosition believes that no existing technology offers a reasonable prospect of such estimates in the near term.

¹⁵ *See, e.g.*, TruePosition August 2007 Comments at 11-16. These calls were "placed on the ground floor, mid floor, and top floor of numerous buildings, where on each of the floors the test locations were evenly distributed between locations near windows, interior room locations, and locations at the core of the building." *Id.* at 12.

of U-TDOA inside buildings, even when utilized on the CDMA networks that today rely on handset-based solutions. Significantly, the indoor performance of U-TDOA is even better today than it was in those tests eight years ago, given subsequent advances in wireless technology and cell network designs.

U-TDOA enjoys a substantial advantage in indoor environments because of a number of technical factors. First, U-TDOA LMUs are extremely sensitive receivers that are capable of picking up a signal below the noise floor, enabling numerous measurements to be included in each location calculation. In addition, high levels of signal processing in U-TDOA systems promote precise location estimates for signals that have to propagate through high loss paths. U-TDOA accuracy also benefits where mobile phones operate at a higher power level, since such higher power signals allow U-TDOA systems to locate a wireless device indoors with high accuracy and yield.

IV. THE COMMISSION SHOULD NOT ADOPT ANY PROPOSAL FOR EXCLUSIVE RELIANCE ON A SPECIFIC TECHNOLOGY

Several filers propose that the Commission require that (1) all 3G handsets manufactured in or imported into the United States be A-GPS capable after a date certain, and (2) carriers enable their entire network to be able to handle, and to provide to PSAPs, GPS-based location data from A-GPS-capable handsets.¹⁶ Adopters would be permitted to transition to A-GPS without any deadline as their subscriber bases gradually shift to 3G A-GPS handsets.

¹⁶ Comments of T-Mobile USA, Inc., Rural Cellular Association, and the Rural Telecommunications Group, Inc., PS Docket No. 07-114, at 3-4 (Nov. 20, 2009).

The Commission should, consistent with its long standing policy, not mandate use of any specific E911 location technology.¹⁷ This is particularly true given that the proposed technology – A-GPS – does not work in environments from which most E911 calls are made. This mandate would not only result in inadequate accuracy in the short term, in the long term it would lead to reliance on only one technology for E911 location capability.

Critically, A-GPS does not provide adequate E911 location accuracy in all environments. While A-GPS provides greater accuracy than U-TDOA in rural areas with few cell sites, in areas with poor cell site geometry (*e.g.*, “strings of pearls” along rural highways), and in areas with signal-blocking terrain, A-GPS does so only as long as there is an unblocked or partially unblocked sky. Most E911 calls are not made from such environments.

A-GPS does not perform inside buildings made of concrete, steel, and glass, or in urban canyons where the view of the sky is significantly obstructed. These types of buildings are found not only in urban areas, but are also prominent in suburban areas in shopping malls, stores, schools, and apartments. A-GPS is severely challenged with

¹⁷ See, *e.g.*, *Section 6002(b) of Omnibus Budget Reconciliation Act of 1993; Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services*, Thirteenth Report, 24 FCC Rcd 6185, ¶ 126 (2009) (“The Commission has adopted flexible licensing policies instead of mandating any particular technology or network standard.”); *2004 Biennial Regulatory Review; Wireless Telecommunications Bureau*, Staff Report, 20 FCC Rcd 124, 138 (2005) (“Minimal and flexible technical standards facilitate the introduction of new technologies.”); *The 4.9 GHz Band Transferred from Federal Government Use*, Memorandum Opinion and Order and Third Report and Order, 18 FCC Rcd 9152, ¶ 48 (2003) (“We decline to require any particular broadband technology for equipment in the 4.9 GHz band. . . . [T]he adoption of any particular standard could preclude newer technologies, and hence impose restrictions on users that would impede their ability to benefit from future equipment that enhances public safety operations.”).

regard to indoor performance, since the GPS signal must come from the satellite.¹⁸

While a subscriber making a call indoors is able to connect with the nearby cell tower, the far-travelling GPS signal is unable to penetrate the building structure and accurately locate that caller. Statements in the record by Verizon and Qualcomm confirm this premise.¹⁹

With a majority of E911 calls originating in these urban, suburban, and indoor environments, A-GPS falls far short of public safety requirements for location accuracy. While cloaked as an equipment authorization requirement, the A-GPS proposal is quickly revealed to be a technology mandate. This mandate will delay, not expedite, improved location accuracy, and it will freeze progress. It will not produce improved location accuracy in areas where most 911 calls take place. Subscribers to the promised advanced services have a reasonable expectation of improvements in location accuracy. Reliance exclusively on A-GPS conflicts with any sense of meaningful progress.

The existence of a credible market-based E911 solution further demonstrates the absence of any need for the proposed technology mandate. In particular, TruePosition continues to believe that a hybrid satellite-network solution combining the strengths of U-TDOA and A-GPS presents the most reasonable path to improved accuracy in all environments. In combination, these existing and widely deployed technologies are superior to any other E911 location solution. The two technologies are highly complementary, and this U-TDOA/A-GPS hybrid solution would likely meet the

¹⁸ Testimony of Dale N. Hatfield Before the Senate Committee on Commerce, Science, and Transportation Hearing on Voice over Internet Protocol (VOIP) and the Future of 9-1-1 Services, April 10, 2007, *available at*: <http://commerce.senate.gov/public/index.cfm?FuseAction=Hearings.Testimony&Hearing_ID=574099ef-977f-4ca6-9dea-95a6584cc2dc&Witness_ID=1ca16256-df5d-41b1-b9f5-6a1b65abe711>.

¹⁹ See Verizon Wireless 2007 Comments at 17-20; Qualcomm 2007 Comments at 5.

Commission's 100/300 meter accuracy standard in virtually all cases and the 50/150 meter accuracy standard in the vast majority of cases.

The Commission's E911 location accuracy requirement is crucial to aligning the evolving advanced services with emergency response requirements and consumer expectations regarding E911. Carriers are continuing to build out their 3G and 4G advanced services networks, and the Commission now has the opportunity to unify all mobile devices under one standardized E911 location accuracy requirement. Mobile devices providing advanced services over emerging 3G and 4G networks should also provide consumers with advanced location capability.

The Commission should establish precise accuracy standards that allow efficient compliance determinations and agency enforcement. Carriers should have the flexibility to select whatever technology best meets their needs as they work to comply with the Commission's E911 performance requirements.

V. THE OFFICE OF ENGINEERING AND TECHNOLOGY SHOULD DEVELOP THE NEW E911 LOCATION TESTING AND COMPLIANCE PARAMETERS

In conjunction with a revised E911 location accuracy standard, there must be fair and clear parameters by which progress and compliance are evaluated. TruePosition believes that the Commission's Office of Engineering and Technology ("OET") is best situated to lead the development of the new E911 compliance and related test procedures. Relying on its extraordinary technical expertise, OET has played a critical role in the deployment of E911 capability across the United States. For instance, in 2000, OET played an invaluable part in the initial roll-out of E911 technology with its development

and release of the OET Bulletin 71 (“OET-71”) guidelines.²⁰ OET should play a similar, integral role in developing the technical parameters by which the revised, standardized E911 location accuracy requirement will be implemented. This work should commence with the Commission acting on its commitment in its 2007 *NPRM* to conduct analyses and publish reports on indoor accuracy and hybrid technologies.²¹

The Commission should not assign the responsibility to determine the new E911 location accuracy standard or the compliance/testing parameters to the Communications Security, Reliability, and Interoperability Council (“CSRIC”) or any other advisory committee. While CSRIC may have a role in other areas addressing emergency communications, it has no independent location accuracy expertise within its membership. OET has demonstrated its expertise in this area and is also able to call upon public and industry participation via a transparent process.²² Assigning this responsibility to CSRIC or any other advisory body would extend the timetable for substantive action by a significant margin, given the additional committee approvals and procedural hurdles inevitably associated with such advisory roles.

²⁰ Since 2000, accuracy measurement has been a function of the guidelines set forth in OET Bulletin 71, and performance has been a function of the Commission’s “best practices” requirement, requiring carriers to provide as high a level of accuracy as possible in the circumstances. The practical consequence of these policies generally has been to afford carriers some latitude in the manner of their E911 location investment and the measurement of its effectiveness.

²¹ *Wireless E911 Location Accuracy Requirements; Revision of the Commission’s Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems; 911 Requirements for IP-Enabled Service Providers*, Notice of Proposed Rulemaking, 22 FCC Rcd 10609, ¶ 19 (2007).

²² See, e.g., Public Notice, *FCC Announces Membership of the Communications Security, Reliability, and Interoperability Council (CSRIC)*, DA 09-2297 (rel. Oct. 26, 2009). As CTIA points out in its comments, CSRIC does not include all of the stakeholders that would be affected by new E911 requirements. Comments of CTIA, PS Docket No. 07-114, at 6-7 (Nov. 20, 2009).

Location testing protocols should not be defined in detail by the Commission. Rather, the Commission should establish appropriate requirements – such parameters as time and confidence intervals and percentage of indoor calls reflecting actual usage – and permit industry and public safety agencies to develop appropriate testing procedures. It is important not to underestimate the difficulty of this task. The circumstances of the country’s approximately 6,000 PSAPs vary significantly. System compliance needs to be understood in terms of the local conditions of, for example, mobile system design, population density, E911 calling patterns, topology, and cultural features.

Comments note that the Commission should examine the benefits of using horizontal uncertainty (“HUNC”) as the initial and primary criteria for meeting location performance standards and for the location information provided to PSAPs.²³ While HUNC can be valuable information to the responding PSAP and TruePosition supports transmitting this information, it is not clear that HUNC can be a substitute for Accuracy and Yield testing of any selected location method. Just like a caller’s reported location, the reported HUNC is also an estimate based on observed measurements. The testing required to validate that the reported HUNC is reliable across different environments and at different times could just as well be used to validate the Accuracy and Yield performance in those environments at those times.

VI. CONCLUSION

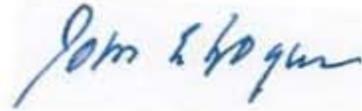
For the reasons described, TruePosition urges the Commission to move expeditiously to adopt E911 location accuracy requirements that embrace measurable indoor and outdoor coverage metrics. Measurement and compliance procedures are vital

²³ Updated Comments of Telecommunication Systems, Inc., PS Docket No. 07-114, at 2-3 (Nov. 20, 2009).

to the integrity of any geographical parameter and critical to the objective of meaningful improvements in wireless location accuracy. In addition, the Commission should refrain from mandating a particular technological solution; instead, it should create rules requiring a high level of location accuracy in the urban and indoor environments where a majority of E911 calls now originate.

Respectfully Submitted,

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A handwritten signature in blue ink that reads "John E. Logan". The signature is written in a cursive style and is positioned above the typed name and address of John E. Logan.

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