

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

Wireless E911 Location Accuracy Requirements)	PS Docket No. 07-114
)	
E911 Requirements for IP-Enabled Service Providers)	WC Docket No. 05-196
)	

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Verizon¹ and Verizon Wireless hereby submit their initial comments on the Commission's Further Notice of Proposed Rulemaking (FNPRM) and Notice of Inquiry (NOI) in this proceeding.² We support the Commission's efforts to study how it can enhance emergency communications services provided to the public, particularly through the work of the Communications Security, Reliability and Interoperability Council (CSRIC). We look forward to working with the Commission, the public safety community and other stakeholders to assess whether new technologies can improve public safety's ability to locate and respond to 911 calls.

I. COMMENTS ON THE FURTHER NOTICE OF PROPOSED RULEMAKING

A. The Commission Should Adopt Uniform Accuracy Standards for All Wireless Carriers.

The Commission has maintained for many years separate and distinct E911 requirements for wireless-based emergency services, depending on whether the wireless carrier used a handset-based solution or a network-based solution. Now that network-based carriers are adopting location-based services, including E911, that rely on Global Positioning System (GPS) devices in customers' mobile devices, the technological distinctions between handset- and network-based wireless E911 solutions have faded, undermining the rationale for different rules based on technology. Nonetheless, in its recent *2010 Accuracy Order*, the Commission continued a bifurcated regulatory regime, adopting one set of rules for existing handset-based

¹ In addition to Verizon Wireless, the Verizon companies participating in this filing ("Verizon") are the regulated, wholly owned subsidiaries of Verizon Communications Inc.

² See *Wireless E911 Location Accuracy Requirements; E911 Requirements for IP-Enabled Service Providers*, Further Notice of Proposed Rulemaking and Notice of Inquiry, PS Docket No. 07-114, WC Docket No. 05-196 (Sept. 23, 2010) ("*FNPRM and NOI*").

carriers and another for network-based carriers that are adding handset-based solutions.³ The Commission correctly raises now whether it should adopt a uniform E911 rule for all wireless carriers, regardless of the technology they use in their networks.⁴ It is time to do precisely that.

Verizon Wireless has both a hybrid technology (handset and network location finding ability) and can operate in a hybrid mode, which combines information from both types of solution sources to produce a location fix that is then transmitted to the Public Service Answering Point (PSAP). The Assisted Global Positioning System (AGPS)/Advanced Forward Link Trilateration (AFLT) technology Verizon Wireless uses is a fully integrated solution that seamlessly draws upon GPS satellites and network ranging measurements, using whichever produces the most accurate fix in a given situation, but combining the two methods when applicable to produce a hybrid fix.

As Global System for Mobile Communications (GSM) carriers deploy handsets that contain GPS chipsets, they are deploying handset-based GPS location solutions. By layering a handset-based GPS solution over their existing Uplink Time Difference of Arrival (UTDOA) solution, GSM carriers are deploying a hybrid approach to E911 (although not all hybrid approaches also have a hybrid mode that integrates information from handset and network solution sources).

The Commission should streamline and harmonize its existing wireless E911 rules to recognize this industry convergence of approaches. Moreover, it should not perpetuate further the bifurcated approach to wireless E911 requirements for any new obligations that it may ultimately adopt in this proceeding.

³ *Wireless E911 Location Accuracy Requirements*, Second Report and Order, PS Docket No. 07-114 (Sept. 23, 2010) (“*2010 Accuracy Order*”).

⁴ *FNPRM and NOI*, ¶ 17.

As the Commission found in 1994, when Congress amended Section 332(c) of the Communications Act the previous year, it “mandated that similar commercial mobile radio services be accorded similar regulatory treatment under the Commission’s Rules.”⁵ The Commission should adopt a single E911 accuracy rule for all wireless carriers in order to meet this cardinal statutory goal. Moreover, in its E911 rulemaking proceedings in particular, the Commission has generally sought to promote a policy of technological and competitive neutrality.⁶ Even when the Commission allowed carrier size to determine the timing for E911 deployments, the Commission affirmed its desire to unify the Phase II location accuracy rules into a single standard:

Eventually, it may be possible to adopt unified rules, with a single accuracy requirement for all technologies, as technologies improve and as we move beyond the initial installation period for ALI technologies. To the extent possible, we would prefer to move toward a uniform rule for all Phase II solutions.⁷

⁵ *Implementation of Sections 3(n) and 332 of the Communications Act; Regulatory Treatment of Mobile Services*, Third Report and Order, 9 FCC Rcd 7988, ¶ 4 (1994). The Commission has confirmed that Section 332’s regulatory parity mandate applies to “technical and operational rules.” See *Year 2000 Biennial Regulatory Review – Amendment of Part 22 of the Commission’s Rules to Modify or Eliminate Outdated Rules Affecting the Cellular Radiotelephone Service and other Commercial Mobile Radio Services*, Order on Reconsideration, 19 FCC Rcd 3239, ¶ 16 (2004).

⁶ See *Service Rules for the 698-746, 747-762 and 777-792 MHz Bands; et al.*, Report and Order and Further Notice of Proposed Rulemaking, 22 FCC Rcd 8064, ¶¶ 124,135 (2007); *Revision of the Commission’s Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems*, Report and Order and Second Further Notice of Proposed Rulemaking, 18 FCC Rcd 25340, ¶ 19 (2003) (“*Second FNPRM*”); *Revision of the Commission’s Rules To Ensure Compatibility with Enhanced 911 Emergency Calling Systems*, Third Report and Order, 14 FCC Rcd 17388, ¶¶ 79-82 (1999) (“*Third Report and Order*”); *Revision of the Commission’s Rules to Ensure Compatibility With Enhanced 911 Emergency Calling Systems*, Memorandum Opinion and Order, 12 FCC Rcd 22665, ¶ 123 (1997).

⁷ *Revision of the Commission’s Rules To Ensure Compatibility with Enhanced 911 Emergency Calling Systems*, Fourth Memorandum Opinion and Order, 15 FCC Rcd 17442, ¶ 41 (2000) (internal citation omitted).

Technological and competitive neutrality and consumers' public safety interests are converging today to warrant adoption of uniform Phase II accuracy and deployment obligations for all wireless carriers, because "a policy of technological and competitive neutrality best promotes the public safety and welfare goals of this proceeding, especially in the critical area of ALI."⁸ In a subsequent order the Commission again stressed the importance of competitive and technological neutrality in a proceeding focused on adopting E911 criteria for a host of new services.⁹ The Commission's precedent should inform and guide action now.

B. Handset-Based GPS Accuracy Solutions Are the Best Available Technology But Also Present Challenges.

Verizon Wireless selected the handset-based approach to E911 in 2001 because it was the most accurate solution available for locating emergency callers. That is still the case today.

Despite the success of GPS for accurately locating most wireless E911 calls, the basic attributes of the technology are unchanged from 2007, when the Commission sought input on changes to its E911 rules.¹⁰ In brief, the technology's accuracy depends upon satellite line-of-sight visibility to the handset. A GPS-based location solution can achieve very accurate location fixes, with fifty meters or less in error, if the handset has line-of-sight visibility to multiple satellites. In other cases, providing a location will require assistance from the less accurate, network-based solutions that employ ranging measurements, based on trilateration of signals, to derive a location fix. A fix that uses network-based methods likely will not comply with the FCC's handset-based accuracy standards, even as modified by the *2010 Accuracy Order*.

Obstacles to the device "seeing" a sufficient number of GPS satellites include: multipath delays

⁸ *Third Report and Order*, ¶ 81.

⁹ *See Second FNPRM*, ¶¶ 18-19.

¹⁰ *See Comments of Verizon Wireless, Wireless E911 Location Accuracy Requirements*, PS Docket No. 07-114, WT Docket No. 94-102, WC Docket No. 05-196, at 16-20 (July 5, 2007).

when radio transmissions reflect off buildings; the limited search window, in seconds, for acquiring satellite signals; weak signal strength or penetration of GPS signals in challenged environments (GPS satellite transmissions operating at 1.5 GHz are low power and do not penetrate structures well); and inherent difficulties posed by calls placed from indoor locations because the most advanced GPS techniques only provide an extra six to ten feet of penetration within a building.

1. Verizon Wireless Is Working With Vendors To Improve AGPS Technology and Test New Technologies.

Because of the limitations of AGPS, Verizon Wireless has pursued improving this core technology. For example, Verizon Wireless has continuously worked with its GPS chipset vendor, Qualcomm, to develop chipsets with increasingly sensitive GPS receivers, which have yielded some benefits in accuracy. Also, Verizon Wireless is aware of an effort by other countries to launch additional satellite constellations to the existing thirty-one actively broadcasting satellites of the GPS space-based global navigation satellite system maintained by the U.S. government. The U.S. GPS constellation increased from twenty-four active satellites in 1973 when the Department of Defense initiated it to thirty-one by March 2008, which improved the precision of GPS receiver calculations by providing redundant measurements. The availability of even more satellites from other constellations would provide a similar benefit.

Beginning in 2008, Verizon Wireless began reviewing and testing accuracy solutions, including the newest generation of the Qualcomm GPS solution. It also tested its existing AGPS/AFLT solution for purposes of comparison. As a practical matter, any additional technology would need to work with the existing AGPS/AFLT solution. That means that a technology proven in isolation would also need to be tested to ensure integration with the Position Determining Equipment (PDE) and Mobile Positioning Center (MPC) that currently

comprise the carrier's E911 network – and would likely require chipset changes in order to identify additional parameters. All the messaging and interfaces required to provide an integrated solution would also need to be developed and tested.

Verizon Wireless's testing focused on the performance of supplemental technologies in urban canyons and indoor environments. Verizon Wireless completed full location accuracy testing trials with vendors of the following solutions: Kalman Filtering, Radio Frequency (RF) Fingerprinting, and WiFi Fingerprinting. Verizon Wireless investigated several other solutions to varying degrees, depending upon the readiness of the particular vendor to go beyond the concept phase, the logistics of testing, and, where applicable, obtaining modified handsets to test the solution. In one case, the vendor went out of business before it could provide a modified handset for testing. Verizon Wireless compared these solutions to Qualcomm's existing and next generation chipsets. Verizon Wireless's efforts to evaluate the viability of vendor solutions are ongoing. Reproducing the test results in a commercial environment and fully integrating a new solution with AGPS will require significant work. For example, both the RF Fingerprinting and WiFi Fingerprinting solutions require a concentration of cell sites or access points in order to produce good location accuracy in urban and dense urban scenarios. In addition, both of these solutions require frequent calibration of the cell site or access point database in order to maintain accuracy. In addition to resources required to update and maintain a database-dependent solution, development work for both the network and wireless devices will be necessary. Neither the development efforts on the network and device level, nor the capital and operational resources required to integrate those solutions, have been determined; but, they are expected to be significant.

2. Further Evaluation of Vendor Solutions to Supplement GPS-Based Solutions Is Best Done By Industry As Part Of The CSRIC Process.

The Commission should allow CSRIC, or a similar or successor technical group, to continue to work through issues regarding existing and prospective location technologies. Now that network based carriers are migrating to employ GPS technology in handsets and as part of their E911 solutions, there is even more industry knowledge regarding GPS-based solutions. Verizon Wireless is an active participant in CSRIC. One of this working group's tasks is to "Identify emerging location technologies, including combining multiple technologies to improve location accuracy." To that end, Working Group 4C will soon release a draft report that should provide the Commission with basic information regarding the underlying technology of various proposed vendor solutions. The FCC should task the CSRIC's Working Group 4C to respond to the questions raised in the FNPRM about available technologies and should provide financial support for these efforts. Another of this group's assignments -- the identification of standards work that needs to be done -- will be paramount to ensure common protocols and practices for the industry.

C. Verizon Wireless Has Pursued Ways To Improve E911 Service Accuracy Indoors And Access By Persons With Disabilities.

In addition to exploring ways to improve AGPS chipset technology, satellite availability and reception, and testing vendor solutions to supplement AGPS as described above, Verizon Wireless also began looking at: 1) a solution that would assist with indoor location finding; and 2) a variety of solutions for sending text messages to PSAPs by persons with disabilities who today use Teletype (TTY) devices.

1. Although Indoor Location Accuracy Can Be Improved In Some Cases With Pilot Beacons, A Separate Indoor Accuracy Standard Is Needed.

The existing accuracy standards apply only to outdoor environments,¹¹ because public safety and the Commission realized that indoor accuracy is a difficult technological challenge for any location technology. Several parties commented in 2007 that indoor calls comprise a large percentage of wireless calls.¹² Data about the incidence of non-emergency indoor calls, however, does not equate to data about the incidence of indoor E911 calls. By far most calls for emergency assistance are made on highways and other outdoor locales. Regardless, all parties can agree that dealing with the challenges of locating wireless callers during an emergency when they are indoors is an important goal.

It is equally true, however, that achieving the levels of accuracy currently prescribed for outdoor systems is not possible with AGPS technology. Building materials often prevent handsets from acquiring satellite signals for GPS-based location-finding, which means that handsets will attempt network-based location solutions like AFLT. But building materials also will often block signals from nearby cell towers. In addition, the following will introduce error to AFLT in indoor environments or prevent an AFLT fix:

1. Repeaters – AFLT solutions can be challenged by either poor geometry (relative locations of cell sectors) or time-based ambiguity because of repeater delays.

¹¹ See *Applications of Cellco Partnership d/b/a Verizon Wireless and Atlantis Holdings LLC*, Memorandum Opinion and Order and Declaratory Ruling, 23 FCC Rcd 17444, ¶¶ 198-201 (2008); see also *2010 Accuracy Order*.

¹² See, e.g., Comments of APCO, *Wireless E911 Location Accuracy Requirements*, PS Docket No. 07-114, CC Docket No. 94-102, WC Docket No. 05-196, at 4 (Aug. 20, 2007); Comments of Texas 9-1-1 Alliance & Texas Commission on State Emergency Communications, *Wireless E911 Location Accuracy Requirements*, PS Docket No. 07-114, CC Docket No. 94-102, WC Docket No. 05-196, at 10 (Aug. 20, 2007); Reply Comments of NENA, *Wireless E911 Location Accuracy Requirements*, PS Docket No. 07-114, CC Docket No. 94-102, WC Docket No. 05-196, at 4 (Sept. 18, 2007).

2. Tunnels – By design, tunnels are poor geometry for AFLT because there is usually only one pilot. At least three separate pilots from nearby cell sites that are configured in a manner that allows for trilateration are required for an AFLT fix.
3. Indoor Distributed Antenna Systems – Simulcasting signals obtained from sectors located outside the building may not offer accurate location finding because outdoor cell sites are positioned best for outdoor use, resulting in poor geometry for AFLT.
4. Engineering to reduce interference – Often the macro network is optimized to reduce interference, but this optimization lessens the number of AFLT contributions to make accurate indoor measurements.

Other, less accurate network-based solutions are also challenged indoors by building materials.

Moreover, the proximity of the caller to the exterior of the building has a major impact on the ability of any system to assign a location for the caller.

Given the different constraints that attach to indoor location accuracy, the Commission should explore, and ask CSRIC to explore, adopting a separate accuracy standard for indoor environments. That approach avoids the need to revisit the parameters of the existing accuracy standard, which were set based on the capabilities of handset- and network-based solutions to locate outdoor wireless calls, while recognizing the physical limits to accurately identifying the indoor location of a call.

Developing a separate indoor accuracy requirement does not mean that industry, public safety and the Commission should give up on looking for ways to improve and enhance the technological capabilities of existing systems or search for new technologies to supplement existing systems. Verizon Wireless has already studied one new technology that has the potential to accurately locate wireless callers in certain indoor environments. It participated in a study by the University of Colorado at Boulder to research the efficacy of pilot beacons for improving location accuracy for various indoor environments. Pilot beacons are low power transmitters that, unlike a normal base station, do not carry traffic. Pilot beacons only transmit the pilot channel, which is used for ranging measurements. They can serve as additional

reference points and can work in conjunction with existing network cell sites. This can be important because when GPS satellites are not available for accurate location finding, the E911 system must rely on ranging measurements from network base stations in the vicinity of the mobile device – and that is challenged by the need for a sufficient number and geometric positioning of base stations to allow triangulation.

Experiments using pilot beacons were conducted for three types of indoor locations: typical work or lodging environments referred to as “indoors;” tunnels; and arenas. During the experiments, the university and Verizon Wireless conducted tests by repeatedly initiating position requests from test phones that were placed at known ground truth positions inside buildings, tunnels, and arenas within the test area of the university. The university published its findings in June 2010.¹³

In general, pilot beacons hold some promise as a way to enhance indoor location finding, the efficacy of which varies somewhat with the number of beacons used, the geometry of the deployment of beacons in the venue, venue size, and characteristics. Specifically, the study found that pilot beacons can be beneficial where placement and calibration of beacons is tightly coordinated with carrier network. Thus, indoor installations commissioned by large venue owners with the engineering resources to understand how to install and maintain the system, even with carrier assistance, is required. The coordination and ongoing system maintenance required to make use of pilot beacons as a reliable assist to AGPS positioning makes this potential solution limited in its practical appeal. In addition, the purchase of a sufficient number of pilot beacons is not likely economical for many landlords.

¹³ See Gokul Rameshkrishnaa and Kenneth R. Baker, “An Experimental Study on Improving the Accuracy of Indoor User Positioning in CDMA,” <http://wireless.vt.edu/symposium/2010/preliminarytechnicalprogram/sessiontwo.html> (June 2, 2010).

2. Texting To 911 By Persons With Disabilities Will Require Substantial Upgrades By Carriers And PSAPs.

Verizon Wireless is evaluating solutions which would allow persons with disabilities to use the native keyboard of their wireless handset for emergency calls, eliminating the need to tether a wireless device to a TTY machine. Text messaging has the potential to allow this, but there are limitations that need to be overcome, and the Commission has started a new proceeding to review texting to emergency services and other NG911 capabilities.¹⁴ Enabling the ability to locate and route the emergency text in the same manner as a 3G voice 911 call will require not only modifications to the handset emergency service processing functions, but also to all end-to-end systems in the E911 voice and data paths. Specifically, the handset enters emergency mode when a user dials 911. Emergency mode allows the handset to lock onto the strongest signal to ensure the best possible voice connection (could be home carrier or roaming carrier), overrides location privacy settings, and initiates an origination request for call routing and location information. The handset does not recognize a 911 text as an emergency communication and as a result, none of the actions above are initiated. In addition, the vast majority of the public safety network platforms or systems (including the E911 selective router, the Automatic Location Identification (ALI) and the PSAP call handling premise equipment) are not equipped to accept and process text messages.

D. The Commission Should Allow CSRIC To Provide Recommendations On A Number Of Technically-Based Questions the FNPRM Raises.

The FNPRM asks a number of questions that require technological input from engineers and subject matter experts that will require some thoughtful deliberation and dialogue. CSRIC's

¹⁴ See *Framework for Next Generation 911 Deployment*, Notice of Inquiry, PS Docket No. 10-255 (Dec. 21, 2010) (“*NG911 NOI*”).

Group 4C, which deals with E911 location accuracy, should review the Commission's questions and provide recommendations for Commission consideration. The Commission could later seek comment on the recommendations from CSRIC, or a similar or successor technical group. The industry, through the Emergency Services Interconnection Forum (ESIF), has addressed some of the issues raised by the *FNPRM*. Most notably, the ESIF has developed accuracy testing requirements.¹⁵ This document, taken together with Office of Engineering and Technology (OET) Bulletin No. 71, provides a foundation for further development and consideration by those with the requisite expertise.

1. Compliance and Maintenance Testing Parameters Should Not Be Codified in Binding Rules.

The industry expertise that many stakeholders have on the operation, performance, and testing of E911 systems should allow an interactive exchange of ideas and information. There are many complexities to the testing process that involve an understanding of: 1) wireless E911 network infrastructure; 2) test equipment operation used to make test calls and collect ground truth; 3) RF and GPS propagation and their challenges; 3) statistical methods and procedures for designing a test plan and then evaluating data for statistical validity; and 4) PSAP systems. CSRIC Group 4C should use the ESIF document and OET Bulletin 71 as baseline documents, and the Group should be allowed to craft an appropriate testing regime, including scheduling issues. Written comments in this proceeding alone will not provide the Commission with the necessary technological foundation. Tasking CSRIC Group 4C to provide recommendations on questions raised by the *FNPRM* regarding a compliance testing regime is the right course.

¹⁵ See "High Level Requirements for Accuracy Testing Methodologies," ESIF Technical Report ATIS -0500001, <http://www.atis.org/esif/docs/Test-Methodology-Requirements-7-23-04.pdf> (2004).

Moreover, the Commission should promulgate any test regime parameters as an update to OET Bulletin No. 71 or as policy guidance, not codify them as rules. Verizon Wireless opposes the adoption of rules requiring specific testing timeframes, methods and procedures. As technology will change over time, the Commission should not lock down testing requirements, because rules will require modifications to keep up with technology changes. While a testing regime is an important part of the overall compliance effort, it only entails the demonstration of compliance, not the actual network operation and performance that underpins the provision of service.

By analogy, the Commission's numbering rules form the basic requirements for the allocation, use, and return of numbering resources to ensure conservation and optimization.¹⁶ The Industry Numbering Committee (INC) promulgates a series of guidelines, however, that underpin the numbering regime, and they are continuously updated and modified through a contribution-driven, consensus-based process. The INC guidelines provide the day-to-day details of number management, and they are an indispensable complement to the Commission's numbering rules. The INC works closely with the North American Numbering Council (NANC), a federal advisory umbrella group like CSRIC, and provides regular reports to the NANC of its activities. Similarly, Working Group 4C of the CSRIC could build upon OET Bulletin 71 and the ESIF accuracy testing guidelines.

2. New Forms of Location Accuracy Information Pose Technical Challenges That Have Not Been Solved.

The FNPRM seeks information on new forms of location accuracy like vertical location information and location accuracy while roaming. Again, Verizon Wireless is not aware of any

¹⁶ See 47 C.F.R. § 52.15 et. seq.

testing that has demonstrated that there are solutions to the technological problems these two situations pose.

While many existing location technologies calculate a measurement of altitude, the calculation's accuracy has never been verified through standards or testing, nor is it apparent how useful the information provided would be. For example, does current technology provide the exact floor of a building or only narrow down the search of a building to within ten or more floors? In addition, the usefulness of altitude depends on the elevation standard that an individual PSAP's base map uses and the accuracy of the underlying base map data. These challenges would need to be overcome.

The Commission also seeks comment on the provision of location accuracy for roamers.¹⁷ Verizon Wireless already attempts a Phase II location on all Code Division Multiple Access (CDMA) roamers equipped with location capable handsets who dial 911 on our network and delivers Phase II information to public safety in the same manner as for our subscribers. Public Safety will be provided with Phase I information on CDMA roamers with non-location capable phones. Providing Phase II location capability to customers without location capable handsets or customers with handsets that operate on other air interface technologies is not technologically feasible. The former is not feasible because of the absence of a GPS chipset in the phone. The latter is not feasible because just as customers cannot make non-emergency calls on an incompatible air interface network, they also cannot make 911 calls on an incompatible air interface network.

¹⁷ *FNPRM and NOI* ¶ 24.

II. COMMENTS ON THE NOTICE OF INQUIRY

Verizon has been a longtime supporter of the Commission's efforts to ensure that Voice over Internet Protocol (VoIP) customers have E911 service. The current system, in which VoIP subscribers register their location with VoIP providers and VoIP providers use this Registered Location information to route E911 calls and provide the Registered Location automatically to the PSAP, has worked well. Technologies and standards do not exist to facilitate additional ALI requirements, and instead of adopting new or additional requirements, the Commission should continue to monitor developments. Similarly, the Commission should monitor Next Generation 911 (NG911) developments, while that technology begins to take hold (the Commission has adopted a Notice of Inquiry to address how NG911 can work).¹⁸

A. The Commission Should Not Create Additional Automatic Location Information Requirements for VoIP.

As a direct result of the Commission's June 2005 *VoIP 911 Order*,¹⁹ the industry worked hard to develop and deploy an E911 system for interconnected VoIP that relies upon the VoIP subscriber's input. The system routes E911 calls through the E911 network to the appropriate PSAP and automatically provides the PSAP with the caller's street, or civic, address, as registered by the VoIP customer.

As early as 2005, and as recently as in the current NOI, the Commission has asked whether it should establish additional ALI requirements for interconnected VoIP service. From the outset, the Commission recognized that technical differences between plain old telephone service and VoIP presented challenges to developing an ALI solution for VoIP that does not depend upon subscriber input, or a registered location. VoIP calls typically do not include the

¹⁸ See *NG911 NOI*.

¹⁹ *IP-Enabled Services; E911 Requirements for IP-Enabled Service Providers*, First Report and Order and Notice of Proposed Rulemaking, 20 FCC Rcd 10245 (2005) ("*VoIP 911 Order*").

ALI information in the signaling that an ordinary telephone call would. This is why the Commission mandated the current Registered Location system in 2005.

Without a Registered Location, VoIP calls would typically lack reliable ALI information, for a variety of reasons. Many VoIP services – particularly, over-the-top VoIP services marketed to consumers and other softphone applications popular with business travelers and other users – are considered nomadic, because they are designed to be used wherever a broadband connection is available and are not designed to be used at one, single location. Other VoIP services that are considered fixed can also present ALI challenges. These fixed VoIP services offer customers a suite of advanced features not available on a traditional telephone service, including in many cases the ability to obtain a telephone number with the area code of the end user’s choice. A fixed VoIP customer in New York, for example, can have a 312 area code, traditionally, associated with Chicago, or any other area code they choose. These numbering offerings are popular with customers but present challenges that make ALI for interconnected VoIP that does not depend upon subscriber input unrealistic at this time.

Furthermore, there have been enormous changes in the VoIP market over the past several years that present exciting new products and services to consumers but also present ALI challenges. The proliferation of tablet computers, smart phones, smaller computers, and other popular new products have created many more mobile computing users. These customers have the ability to make VoIP calls on these devices over wireless broadband connections wherever they find them, whether it is their home, their hotel, the local coffee shop, or myriad other WiFi-enabled hotspots.

The industry standards bodies are working to keep up with these developments, and they have made progress. For example, there are now some preliminary standards and protocols for

terrestrial VoIP, which could facilitate integration of address information into a VoIP E911 call similar to the way that information is included in a traditional wireline call. But this is just one piece of the puzzle, and there are no technologies or commercially available or viable means to support ALI for interconnected VoIP today that do not rely upon subscriber input. If a caller were to make an E911 call on a soft phone application running on an iPad over a café's open WiFi network, for example, there are no standards today that would enable the network providers to deliver to the PSAPs automatic information about where that device is, except for the Registered Location. The best course the Commission can follow is to continue to rely on the Registered Location process, and to encourage and monitor the standards development process, rather than mandating a requirement that is not technically viable today and that necessarily would not be able to keep up with the rapidly changing marketplace.

B. The Commission Should Monitor the Development of NG911.

Next Generation 911 services, or NG911, offer the potential to provide customers with many new methods to access emergency services. While these developments are exciting and will enhance public safety, they are much newer than VoIP, and the industry is only beginning to examine standards and other requirements. As the Commission notes, the deployment of NG911 has been limited to date. For those PSAPs that are now served by IP trunks, the call flow for a typical E911 call from a typical VoIP customer remains the same, only the call traverses the IP-based facilities instead of the older facilities they replaced. But for other means to use NG911 to contact the PSAPs in an emergency, like text messaging, instant messaging, and video calls, the technologies are just in their beginnings. It would be premature, at best, for the Commission to do anything other than monitor its development. The Commission has initiated a comprehensive proceeding to look at NG911, and how it can provide the public with additional, advanced means

to obtain emergency assistance. The Commission recently released a Notice of Inquiry in that proceeding, and that proceeding presents the appropriate arena to review the opportunities and challenges NG911 presents.²⁰

C. The Commission Should Allow Wireless Carriers to Leverage GPS To Provide Automated E911 Solutions For Consumers Of Mobile VoIP Products.

The NOI asks whether Commercial Mobile Radio Service (CMRS) operators providing interconnected VoIP services may deliver location information to a PSAP in the same manner as CMRS location services are provided under Section 20.18 of the Commission's rules.²¹ In the absence of existing requirements regarding mobile VoIP, Verizon Wireless is pursuing automated E911 solutions grounded in GPS technology akin to, but using different technology than, the AGPS/AFLT technology it provides for its core CMRS service.

The Commission should recognize that mobile VoIP networks will employ different GPS technology, however, that will not operate exactly the same as existing AGPS/AFLT networks. Because mobile IP location technologies are in the concept and development phase, it is too soon to mandate specific accuracy requirements. Once these new location technologies are standardized, developed, and deployed, Verizon Wireless can evaluate their performance in real world commercial networks and make determinations on needed enhancements to the location finding ability.

D. So-Called Emerging Network Devices Have Not Provided Enhanced Location Accuracy.

Lastly, the NOI posits that so-called emerging network devices used to enhance coverage, capacity and spectrum efficiency, like femtocells, picocells, microcells, and distributed antenna

²⁰ See *NG911 NOI*.

²¹ *FNPRM and NOI* ¶ 38.

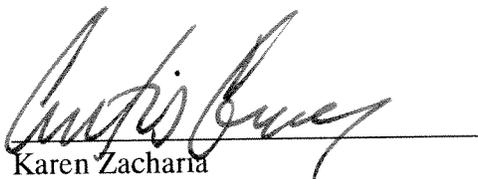
systems, could potentially be leveraged to enhance location accuracy.²² Verizon Wireless has not found that these network components provide enhanced location accuracy. Network-based location accuracy depends upon the number of uniquely identifiable reference points, which this idea is designed to address, but also the configuration of those points to allow triangulation and the absence of terrain or man-made obstructions. In general, picocells, microcells and DAS systems are installed in venues to improve network coverage, sometimes on a temporary or transient basis, and may or may not result in a configuration that improves location accuracy. A study would need to be done to assess the usefulness of these network components, if engineered to work with the macro network, under various circumstances and topologies. Location improvement therefore will depend upon the number of cells used, the geometry of their deployment within the venue, the venue size, and venue characteristics. In addition, each cell or antenna must be identified uniquely in the network and have RF characteristics that distinguish it from the surrounding cells in order to provide benefit in location calculation.

²² See *FNPRM and NOI* ¶¶ 40-41.

III. CONCLUSION

In both wireless and VoIP, the industry is working to develop more solutions to provide customers with access to E911 capabilities. The Commission can best facilitate the industry's efforts by continuing to work with industry forums and remaining fully informed of developments while not imposing requirements that are technically infeasible and do not bring additional benefits to consumers, or whose costs outweigh the benefits. And where the Commission does take steps to modify its existing rules, it should, among other things, move to uniform accuracy standards for wireless carriers.

Respectfully Submitted,



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