

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

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

COMMENTS OF SPRINT CORPORATION

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COMMENTS OF SPRINT CORPORATION

I. INTRODUCTION AND SUMMARY

Sprint Corporation (“Sprint”) hereby submits these comments in response to the Federal Communications Commission’s (“FCC” or “Commission”) Third Further Notice of Proposed Rulemaking in the above-referenced proceeding.¹ Sprint continues to support the goal of improving 9-1-1 service for consumers, recognizes the importance of efforts to improve 9-1-1 location accuracy, and has been actively involved in industry efforts to examine this issue and evaluate technologies, including the initial test bed efforts for indoor location technologies in Communications Security, Reliability, and Interoperability Council (“CSRIC”) Working Group III (“CSRIC III”) and Working Group IV (“CSRIC IV”).

As discussed below, the Commission’s proposed indoor location accuracy requirements and proposed implementation timeline are unrealistic. While there are some emerging technologies that have shown promise, CSRIC III confirmed that there are few, if any, technologies commercially available that can meet the Commission’s proposed horizontal and

¹ Wireless E-911 Location Accuracy Requirements, *Third Further Notice of Proposed Rulemaking*, 29 FCC Rcd 2374 (2014) (“Third FNPRM”).

vertical accuracy requirements. Carriers must be given the opportunity to evaluate and test these potential solutions fully before they are deployed extensively across wireless networks.

Moreover, additional industry standards need to be developed to enable all carriers and PSAPs to employ consistent, reliable, and robust technological solutions that will serve the emergency needs of the public and survive the test of time. A sufficiently complete set of standards is not currently available that would allow carriers to begin rolling out the necessary technology for indoor location accuracy, and deploying disparate solutions that are not tied to specific standards will only create more operational confusion for PSAPs over the long-term.

The Commission's proposed indoor location accuracy compliance timeline also does not allow for enough time to resolve other key testing, technology, and building-related implementation issues. Sprint supports a test bed approach, representative of real-life call scenarios, for testing compliance with indoor location accuracy requirements. It also supports creating a safe harbor once a testing approach has been certified and recommends that the Commission allow carriers to comply with the safe harbor either through the test bed or through an alternative test methodology.

Any indoor location accuracy compliance timelines should not begin to toll until there are multiple proven, certified technologies available for deployment. Even after certified indoor location technology is available and appropriate standards are in place, however, it will take longer than two years to deploy required network upgrades and to obtain sufficient consumer adoption of new handsets.

Some of the Commission's other proposals in the Third FNPRM should also be rejected or refined. The Commission should adhere to the Office of Engineering and Technology ("OET") best practice under OET Bulletin 71, which recommends using the last fix under 30

seconds in calculating accuracy² and should refrain from imposing new confidence and uncertainty requirements. It also should not adopt a unitary 50-meter accuracy/67 percent reliability requirement for both indoor and outdoor calls at this time or require additional periodic outdoor testing and reporting until the technology is available to achieve these standards. .

II. THE COMMISSION'S PROPOSED INDOOR LOCATION ACCURACY REQUIREMENTS AND ASSOCIATED COMPLIANCE TIMEFRAMES ARE UNREALISTIC

Robust indoor location accuracy technology is still being developed, and proven technologies are not yet commercially available. The lack of available, robust indoor location accuracy technology and the recent findings of CSRIC III on indoor location accuracy make the Commission's proposed indoor location accuracy requirements and proposed implementation timeline unrealistic. As discussed below:

- The proposed two-year horizontal location accuracy requirements cannot be met without further advancements to today's technology;
- The proposed vertical location accuracy requirements cannot be met because the technology is not commercially available;
- There is no indication that appropriate standards will be finalized in time for carriers to meet the proposed deadlines;
- The deployment of network and handset upgrades will take more than two years;
- Compliance deadlines should only be initiated after multiple proven technology options have been certified;
- There are limitations associated with commercial location-based service offerings; and
- The Commission's proposed indoor location accuracy compliance timeline does not allow for enough time to resolve other key testing, technology, and building-related implementation issues.

² OET Bulletin No. 71, Guidelines for Testing and Verifying the Accuracy of Wireless E911 Location Systems (Rel. April 2000) ("OET Bulletin No. 71").

A. The Proposed Two-Year Horizontal Location Accuracy Requirements Cannot Be Met Without Further Advancements to Today’s Technology.

In the Third FNPRM, the Commission asks whether a two-year timeframe is sufficient for CMRS providers to satisfy the horizontal (x- and y-axis) component of the indoor location accuracy requirement for 67 percent of indoor 9-1-1 calls.³ According to the Commission, the CSRIC test bed results and subsequent testing by others suggest that indoor location technology, “with further advancements,” could satisfy the proposed accuracy requirement within this timeframe.⁴

As the Third FNPRM itself recognizes, the necessary technology is not currently available to support a two-year timeframe for the 67 percent horizontal accuracy requirement – “further advancements” are needed. In addition, the data from the *CSRIC Indoor Location Test Bed Report* outlined in the Third FNPRM indicates that none of the vendors whose solutions were tested are capable of meeting the proposed requirement of 50 meters for 67 percent of all 9-1-1 calls from indoors in all four of the representative morphologies where testing was performed.⁵ In particular, “dense urban” and “urban” environments continued to be a challenge. Until such technologies become available, carriers should not be subject to an aspirational clock to meet the FCC’s requirements.

As described in more detail in Section II.D., even when proven technologies do become available, more than two years will be required for carriers to reach the benchmarks proposed in the Third FNPRM. Specifically, network infrastructure upgrades will need to occur, with some upgrades depending in part on technology vendors providing their solutions timely to all carriers.

³ *Id.* ¶ 57.

⁴ *Id.*

⁵ *Id.* ¶ 16, referencing CSRIC III WG3, Indoor Location Test Bed Report (Mar. 14, 2013), available at http://transition.fcc.gov/bureaus/pshs/advisory/csric3/CSRIC_III_WG3_Report_March_%202013_ILTest_BedReport.pdf (“*CSRIC Indoor Location Test Bed Report*”).

It will also take considerably longer than two years for any required consumer handset replacements to achieve sufficient penetration to meet the proposed rules, as the FCC experienced during the E9-1-1 Phase II handset replacement period, when carriers had approximately five years to meet the 95% penetration benchmark. As the Commission is well aware, this posed a substantial challenge to the industry and ultimately resulted in enforcement action.⁶

Moreover, of the technologies tested in the CSRIC III Indoor Location Test Bed, only two were commercially available, and, as the Commission noted, two of the three participating vendors could not test their technology as it would be deployed in a provider's network to provide an end-to-end E9-1-1 location solution.⁷ Other technologies that were initially expected to be part of the Test Bed ultimately did not participate.⁸ As a result, there is limited data available regarding these other technologies and their feasibility to meet the Commission's proposed requirements. Thus, even assuming that the vendors that participated in the CSRIC III Indoor Location Accuracy Test Bed are capable of completing further development work to meet the Commission's proposed requirements, there would likely be a very limited pool of vendors from which to choose during a two-year timeframe. This would require carriers to choose from a narrow field of proprietary solutions with higher costs being imposed on consumers.

⁶ Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems, CC Docket No. 94-102, *Fourth Memorandum Opinion and Order*, 15 FCC Rcd 17442 (2000).

⁷ Third FNPRM ¶93

⁸ *CSRIC Indoor Location Test Bed Report*, pg. 54.

B. The Proposed Vertical Location Accuracy Requirements Cannot Be Met Because the Technology is Not Commercially Available.

1. General Commercial and PSAP Limitations

The Commission proposes to require CMRS providers to deliver vertical (z-axis) location information within 3 meters of the caller's location, for 67 percent and 80 percent of indoor wireless 9-1-1 calls within three years and five years of the effective date of adoption of rules, respectively.⁹

There are very limited vendor technologies available to meet a vertical location information requirement¹⁰ and (as with horizontal accuracy requirements) the Commission cannot impose requirements unless they can be met with today's available technology. Specifically, any new rules must be supported by a record that establishes that the required technology is feasible and works today, not merely that it is *possibly* feasible or may work at some point in the future.¹¹

⁹ Third FNPRM ¶73

¹⁰ *CSRIC Indoor Location Test Bed Report* at pg. 36 (stating that altitude results were only provided by the NextNav technology); Third FNPRM ¶ 14 (stating of the three technologies tested in the test bed, only those from Polaris and Qualcomm are commercially available); *CSRIC Indoor Location Test Bed Report* at pg. 54-55, stating that, "As noted in the Public Safety Foreword, progress has been made in the ability to achieve significantly improved search rings in both a horizontal and vertical dimension. However, even the best location technologies tested have not proven the ability to consistently identify the specific building and floor, which represents the required performance to meet Public Safety's expressed needs. This is not likely to change over the next 12-24 months. Various technologies have projected improved performance in the future, but none of those claims have yet been proven through the test bed process." Pg. 54-55.

¹¹ *See, e.g., The Bunker Hill Co. v. EPA*, 572 F.2d 1286, 1301 (9th Cir. 1977) ("Even read in the deferential light required of a reviewing court, the record before us merely establishes that [the proposed technology] might work..., which is not enough."); *Hercules Inc. v. EPA*, 598 F.2d 91, 110 (D.C. Cir. 1978) (stating that the agency is "required to give consideration to the feasibility of achieving the standard with existing [] technology," and failed to do so adequately); *see also CTIA - The Wireless Association v. FCC*, No. 07-1475 (D.C. Cir. filed July 31, 2009) (holding the FCC's backup power rules in abeyance pending OMB review, which ultimately was denied, and later vacating the rules after the agency agreed to commence further rulemaking proceedings).

In addition, the CSRIC III Indoor Location Accuracy Test Bed only tested one technology that states it can provide a z-axis measurement, and this technology was not yet commercially available.¹² It will also take time for PSAPs to be ready to receive vertical location data. For example, even if z-axis location information could be reliably provided at some point in the near future, it is unlikely that public safety could readily convert this information into a usable format (*e.g.*, 5th floor, office 5A702).

Meeting the proposed vertical location accuracy requirements would also impose a substantial cost on consumers. For example, if carriers are required to adopt a barometric pressure solution (discussed below), there will be a unit cost to equip all future devices. There would also be additional costs associated with licensing the software that will be used to leverage the sensor properly for repeatable accuracy throughout the network. The Commission should ensure that this new and largely untested technology can provide the services it promises before imposing these costs on consumers.

2. Barometric Pressure Sensor Technology is Not Yet a Viable Solution for Vertical Location Information.

The Third FNPRM states that “a number of large mobile device vendors have started to include barometric pressure sensors in their devices, which can calculate z-axis information.”¹³ Although some handsets that are commercially available today may contain barometric pressure sensors, using this technology to provide location information as part of 9-1-1 would be a new application of this technology and there is very little, if any, data available regarding the reliability or accuracy of these sensors, especially in the broad range of environments and weather conditions in which these devices must operate. In addition, methods to calibrate or

¹² CSRIC Indoor Location Test Bed Report at pg. 24, 36 (NextNav Network Beacon Technology).

¹³ Third FNPRM ¶ 134.

differentially correct these sensor readings are not standardized for the purposes of E-9-1-1 position location. For example, barometric sensors need to be calibrated regularly for changeable local conditions if they are going to work the way they do in aviation settings.¹⁴ The method by which a mobile device might request or be instructed to request calibration information does not exist yet and should be part of a protocol stack defined in an industry specification. In addition, there can be significant pressure variability inside buildings, and barometric sensors can be inaccurate depending on the pressure characteristics within buildings.¹⁵ With a solution based on physical and environmental factors, such as a barometric pressure sensor technology, there is likely to be a lot of variability in manufactured devices, so device manufactures will need to be involved and participate in any technology certification process that occurs. Because this is a relatively new technology, more industry standards work and certification work would need to be completed before barometric pressure readings can be relied upon for accurate 9-1-1 location efforts.

C. There is No Indication that Appropriate Standards Will Be Finalized in Time for Carriers to Meet the Proposed Deadlines.

As was discussed in the *CSRIC Indoor Location Test Bed Report*, “Significant standards work is required to allow practical implementation of many emerging location technologies for emergency services use.”¹⁶ At a minimum, standards work needs to progress further before

¹⁴ Federal Aviation Administration, Advisory Circular AC 91-14D – Altimeter Setting Sources, at 1-2 (April 9, 1979), *available at* http://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/23147; Federal Aviation Administration, Aeronautical Information Manual, §§ 7-2-1 and 7-2-3 (Aug. 22, 2013), *available at* http://www.faa.gov/air_traffic/publications/ATpubs/AIM/TOC.html#Chapter 7. Safety of Flight (describing the causes of and how to eliminate aviation altimeter errors).

¹⁵ See Rick Quirouette, B.Arch, Air Pressure and the Building Envelope, at 1-2 (Nov. 2004), *available at* <https://www.cmhc-schl.gc.ca/en/inpr/bude/himu/coedar/upload/Air-Pressure-and-the-Building-Envelope.pdf>

¹⁶ *CSRIC Indoor Location Test Bed Report*, pg. 54.

carriers can be expected to comply with any indoor location accuracy requirements. Additional industry standards need to be developed to enable all carriers and PSAPs to employ consistent, reliable, and robust technological solutions that will serve the emergency needs of the public and survive the test of time. A sufficiently complete set of standards that will enable carriers to begin rolling out the necessary technology simply does not exist, and deploying disparate solutions that are not tied to specific standards will only create more operational confusion for PSAPs. In addition, resources invested in deploying technologies prior to standards being established could be stranded if the originally deployed technology does not meet the standards that are ultimately adopted. Moreover, until workable standards are in place, developer activity is unlikely to reach the level where competitive choices will be available to carriers.

Sprint understands that standards are approximately two to three years away from being completed to the level where vendors can develop proof of concept technology that can then be tested. Additional development work will also be required after standards are completed. It is, therefore, unrealistic for the Commission to expect carriers to meet a proposed timeframe of two years for the initial indoor location accuracy benchmark.

The Commission seeks detailed information on all of the costs that the proposed indoor location rules would impose, including how these costs were determined.¹⁷ At this time, CMRS carriers have very limited information about the cost of potential technologies. Before CMRS carriers can begin to estimate costs accurately, standards work must be closer to completion in order to guide hardware and software development, and the field of potential solutions and vendors needs to broaden so that carriers can receive competitive pricing.

¹⁷ Third FNPRM ¶ 35.

D. The Deployment of Network and Handset Upgrades Will Take More Than Two Years.

The Commission seeks comment on how any necessary network and handset upgrades would impact the proposed timeline.¹⁸ It asks how long it would take CMRS providers to deploy location accuracy systems capable of meeting the proposed requirements throughout their networks.¹⁹ In addition, it asks how much time would be necessary for upgraded handsets to enter the marketplace to sufficiently penetrate the marketplace, such that providers could meet the proposed 67 and 80 percent reliability requirements.²⁰

Based on Sprint's experience, upgrades that require cooperation and affirmative steps from subscribers require significant time.²¹ Looking back to the original E9-1-1 location accuracy requirements, it took Sprint nearly a full year to get the network infrastructure into production to meet the original mandate, and another four to five years for sufficient handset penetration. In some cases, this involved costly incentives to get customers to give up older device models that they were content with for new ones that carried the necessary E9-1-1 upgrades. With churn rates in the range of two percent and many consumers still electing for two-year service contracts, Sprint expects that the handset upgrade alone would take several years to reach sufficient penetration.

¹⁸ *Id.* ¶ 58.

¹⁹ *Id.*

²⁰ *Id.*

²¹ This is consistent with the *CSRIC Indoor Location Test Bed Report's* findings that, "Many positioning methods require handset modifications. Integration of these modified handsets into the subscriber base, once the location technology is commercially available, will take years to complete." *CSRIC Indoor Location Test Bed Report*, Pg. 54

The current regulatory attention on mobile data privacy and security issues²² also suggests that some consumers may be more reluctant to migrate to new devices with advanced location technology than they were for the Phase II handset migration due to concerns about how location data may be collected and used. It is likely that some consumers will choose to repair and modify older devices for years rather than upgrade to new devices, and this reluctance could affect the handset penetration timeline. Moreover, compliant handsets with advanced location capabilities will need to adhere to evolving privacy principles, which could require additional development time.

E. Compliance Deadlines Should Only Be Initiated After Multiple Proven Technology Options Have Been Certified.

The Commission seeks alternatives to using the effective date of rules as the trigger for the timeline to comply with indoor location accuracy requirements and asks whether, for example, it should initiate the compliance timeline only *after* the test bed administrator certifies that a technology has met the proposed accuracy standards in the test bed.²³ The Commission also asks whether, if technology certification is the timeline trigger, it should require availability of competitive technology options.²⁴

²² See, e.g., *Federal Trade Commission Invites Further Public Comment on Mobile Security*, Press Release (Apr. 17, 2014), at <http://www.ftc.gov/news-events/press-releases/2014/04/ftc-invites-further-public-comment-mobile-security>; *Federal Trade Commission Spring Privacy Series: Mobile Device Tracking* (Feb. 19, 2014), at <http://www.ftc.gov/news-events/events-calendar/2014/02/spring-privacy-series-mobile-device-tracking>; *Mobile Privacy Disclosures: Building Trust Through Transparency: A Federal Trade Commission Staff Report* (Feb. 2013), at <http://www.ftc.gov/reports/mobile-privacy-disclosures-building-trust-through-transparency-federal-trade-commission>; *Location-Based Services: An Overview of Opportunities and Other Considerations*, Federal Communications Commission Wireless Telecommunications Bureau (May 2012), at http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-314283A1.pdf.

²³ Third FNPRM ¶ 60.

²⁴ *Id.* ¶ 60.

Sprint strongly supports initiating a compliance timeline only after the test bed administrator has certified multiple vendors that meet any proposed location accuracy standards. Compliance timelines should not begin to toll until there are legitimate, proven and certified vendor technologies available for deployment that will allow carriers to comply with the FCC's location accuracy rules. As Commissioner Pai has observed, "Carriers cannot begin to deploy a technology solution that does not yet exist. And the public should not be led to rely on a promise that cannot be kept."²⁵

Sprint also supports use of a permanent test bed to evaluate potential technologies, and such a test bed could also be used to certify technology. As discussed below, Sprint supports the concept of a test bed for purposes of testing compliance. A test bed is also needed to evaluate all prospective technologies and examine their ability to meet the Commission's proposed indoor location accuracy benchmarks, operating in the same way the CSRIC III Test Bed operated. The initial testing to evaluate potential technologies would be, in effect, "Phase I." Then a technology could move on to the next step, or "Phase II," which would entail full testing for compliance and, ultimately, certification of a technology. Requiring the availability of competitive technology options is also critical. Absent a sufficient pool of available, proven solutions from which to choose, new location requirements cannot be technology-neutral and may limit carriers in their deployment of innovative technologies in the future. Moreover, if only one or two solutions are available, vendors may be able to charge higher prices knowing that carriers have no other options to comply with the FCC's requirements.

²⁵ *Id.* at Statement of Commissioner Ajit Pai, Approving in Part and Concurring in Part.

F. There Are Limitations Associated With Commercial Location-Based Service Offerings.

The Commission seeks comment on the degree to which commercial location development – unrelated to any Commission indoor location capability requirement – could be leveraged to mitigate the costs of compliance.²⁶ In addition, the Commission seeks comment on how providers could use commercial location-based services (“cLBS”) to provide or enhance E9-1-1 location information.²⁷

As Sprint discussed in recent Comments submitted in the text-to-911 docket, proposals to use commercial location services for purposes of emergency communications raise a number of notable concerns.²⁸ For example, the quality, reliability and redundancy built into the existing voice 9-1-1 service model for location information was not built into commercial location services, and attempting to impose the same level of quality, reliability and redundancy standards on commercial location services would be a time-consuming and costly endeavor. In addition, with current commercial location services, a user is capable of disabling GPS location services on the device and there is currently no “override” that exists on most carrier handsets.

The *CSRIC LBS Report* made note of similar concerns, explaining that cLBS “have not been subjected to mandated accuracy levels and rigorous compliance testing and evaluation to ensure that database integrity and peak accuracy levels are maintained.”²⁹ A number of other concerns related to the use of commercial location offerings were outlined in the *CSRIC LBS Report*, including:

²⁶ *Id.* ¶ 37.

²⁷ *Id.* ¶ 135.

²⁸ See Comments of Sprint Corporation, PS Docket Nos. 11-153 and 10-255, at 10 (filed April 4, 2014).

²⁹ CSRIC III WG3, Leveraging LBS and Emerging Location Technologies for Indoor Wireless E911, at 17 (Mar. 14, 2013), available at http://transition.fcc.gov/bureaus/pshs/advisory/csric3/CSRIC_III_WG3_Report_March_%202013_LeveragingLBS.pdf (“*CSRIC LBS Report*”).

- “[N]ot all customers subscribe to cLBS, and even those who do may not have the service or their location privacy setting turned on at the moment they make a 9-1-1 call. Moreover, not all [user equipment] will support cLBS applications;”
- “The [user interface] must handle simultaneous voice and data. This is a limitation for devices and network configurations that do not support simultaneous voice and data; thus a significant proportion of the cell phone users would still be affected for an extended period of time, until their devices are replaced;” and,
- “Even more problematic would be the use of over-the-top (OTT) commercial location applications that use the carrier networks or Wi-Fi for data transport. In this open access environment, the wireless broadband service providers have no visibility or control in the accuracy, integrity, and reliability of the location provided by these OTT applications.”³⁰

Finally, Sprint notes that even though commercial location capabilities may be installed on mobile devices, many cLBS services are provided directly to consumers by OTT applications instead of carriers. Therefore, the Commission should consider applying any E9-1-1 cLBS requirements directly to the OTT cLBS providers as appropriate.

G. The Commission’s Proposed Indoor Location Accuracy Compliance Timeline Does Not Allow for Enough Time to Resolve Key Testing, Technology, and Building-Related Implementation Issues.

1. Test Bed and Alternate Compliance Testing Options

The Commission proposes that a test bed approach, representative of real-life call scenarios, would be the most practical and cost-effective method for testing compliance with indoor location accuracy requirements.³¹ Sprint supports a test bed approach in concept but recommends considering whether multiple test bed locations may be needed to provide an accurate sampling of real-life scenarios. Different building environments at different elevations and diverse locations should be included in this sampling. Ultimately, standards groups should take the lead in developing this test bed methodology.

³⁰ *Id.*

³¹ Third FNPRM ¶ 84.

In addition, the Commission proposes to require CMRS providers to participate in an independently administered test bed program but also proposes that, as an alternative, CMRS providers may use other testing methods that may better suit their particular business plans or practices.³² The Commission’s proposal to allow CMRS providers to use alternative testing methods is a positive recommendation to the extent it provides carriers with the flexibility to determine the best approach for their individual needs. Carriers already have experience with testing based on the Commission’s existing E9-1-1 Phase II accuracy requirements, and this experience can be leveraged by carriers to develop an appropriate testing methodology.

According to the Commission, “[c]ertification under either the proposed test bed or an alternative test methodology (of equivalent reliability) would provide a safe harbor to demonstrate that the CMRS provider meets the indoor location accuracy requirement.”³³ Sprint supports creating a safe harbor once an approach has been certified, and recommends that the Commission allow carriers to comply with the safe harbor either through the test bed or through an alternative test methodology.

The test bed administrator should also be required to provide a carrier with its individual results for analysis separate from any overall technology report. For example, both Sprint and Verizon Wireless provided coverage data for Qualcomm’s use in the CSRIC III Test Bed. An overall technology report was provided at the end of the test, and each carrier was provided with its own results for review. The Commission should adopt a similar protocol for the proposed location accuracy test bed.

³² *Id.* ¶ 84.

³³ *Id.* ¶ 85.

2. Applicability of Indoor Location Accuracy Requirements

According to the Commission, because most CMRS providers are already using handset-based solutions, and A-GPS performs well across a large number of indoor environments, only a limited number of environments would require additional infrastructure for CMRS providers to comply with the proposed indoor accuracy requirements.³⁴ These statements fail to take into account the numerous variables that affect the performance of A-GPS. For example, there are numerous temporal factors that affect the performance of A-GPS, such as satellite geometry, atmospheric conditions and sources of interference. In addition, building materials impact the performance of A-GPS, and building renovations can occur between test cycles, which can impact performance. New windows that block GPS signals could be installed in a building without a carrier being aware of this change. There are also seasonal conditions that may affect GPS propagation into buildings including snow cover, foliage growth and dense cloud formations.

The Commission's statements also seem to suggest that carriers will be expected to use different indoor location accuracy solutions depending on morphology. Indoor location accuracy will be required at the county or PSAP level, but the Third FNPRM does not explain how the specific morphology associated with a particular county or PSAP will be defined (*e.g.*, based on census bureau data, based on information provided by the PSAP). There will be PSAPs and counties that contain multiple different morphologies, which will make it more difficult to assess overall compliance. Sprint recommends that building morphology districts be identified within PSAP jurisdictions. Within each morphology district, the various building use types and any exempt spaces within a specific building should be identified. The Commission's proposed

³⁴ *Id.* ¶ 105.

indoor location accuracy requirements should also consider building-specific attributes that may modify any test bed results (*e.g.*, propagation differences).

3. Building-Specific Concerns

Sprint also encourages the Commission to involve the building industry in this proceeding due to the important role building owners inevitably play when it comes to the issue of indoor location accuracy. Carriers will have to work with building owners to obtain permission and any required permits to install indoor location accuracy infrastructure. The Commission's requirements need to address what a carrier should do if it does not receive the permission of the building owner to install indoor location accuracy infrastructure, or if the building owner wants to charge the carrier a monthly or one-time fee for the infrastructure that is only used for indoor location accuracy, not commercial service. The Commission should also address what carriers should do if a building is abandoned, a new building is constructed, if there are any changes in building usage, or if a building will be undergoing a modification, refurbishment or remodel. There are also other issues associated with carrier-deployed infrastructure that should be considered. For example, where indoor location accuracy infrastructure needs to be installed, and another carrier has already deployed infrastructure in a building, carriers should be given the opportunity to share infrastructure and the Commission should consider what can help facilitate such arrangements between carriers.

In particular, the building industry and building owners could provide valuable insight on issues relevant to providing z-axis information (especially as buildings change over time) or, ultimately, a “dispatchable address.”³⁵ PSAPs currently maintain a civic address in the Master Street Address Guide (“MSAG”), but there is no process for collecting and maintaining the

³⁵ *Id.* ¶ 118.

equivalent for suite or apartment level information (or who would be responsible for doing so). Ultimately, building owners will need to be involved in efforts to catalog this information. Changes to building codes could help to facilitate more accurate indoor location information. For example, Bluetooth beacons/chips could be required on “Exit” signs that contain floor level, quadrant/cube details that could be sent with a 9-1-1 call, regardless of the consumer’s device carrier.

The Commission asks whether it should apply the proposed indoor location accuracy requirement in a more targeted fashion, and if so, how.³⁶ A phased implementation timeline for indoor location accuracy is an option and it may make sense to target urban areas specifically, particularly in locations where it is possible to draw clear lines between urban and non-urban morphologies. Again, however, as discussed above, it is important to take into account the role that the building industry and building owners may need to play to further this effort.

The Commission also asks whether, rather than excluding certain areas from indoor location requirements, it would be more appropriate to apply a different accuracy threshold (for example, 100 meters instead of 50 meters) in certain indoor environments.³⁷ This proposal has merit and should be considered to address specific buildings or sections of buildings that, due to unique aspects such as unusual construction materials, and use, the location accuracy thresholds cannot be met. A more granular system for classifying the characteristics of buildings, taking into account their morphology, building materials and other factors (surrounding foliage, proximity to other buildings, use etc.) that affect signal propagation, may need to be devised. Also classification of the use of various spaces within a building may be needed such as building

³⁶ *Id.* ¶ 106.

³⁷ *Id.* ¶ 107.

support equipment space (HVAC, electrical, storage), heavy manufacturing, parking, unused, etc.

The Commission also seeks comment on any other alternative approaches that would enable it to focus the application of indoor location requirements in the most effective and cost-efficient way possible.³⁸ The Commission should focus on the capabilities of available location technologies that have been tested and confirmed to be accurate and reliable on a long-term basis in a variety of real-world settings, rather than requiring compliance by carriers on a location-specific basis.

III. SOME OF THE COMMISSION'S ADDITIONAL PROPOSALS TO IMPROVE THE DELIVERY OF PHASE II INFORMATION SHOULD BE REJECTED OR REFINED

A. Time-to-First Fix

Although the Commission proposes to give carriers 30 seconds to generate and deliver the first 9-1-1 location fix, the Commission also proposes to include all calls lasting 10 seconds or more in determining the yield and accuracy of a location technology.³⁹ These proposals are in conflict, however, because carriers have 30 seconds, not 10 seconds, to generate and deliver the first 9-1-1 location fix. For purposes of evaluating compliance, the Commission should be consistent with the OET's best practices outlined in OET Bulletin No. 71, which states, "An acceptable time limit for such testing is 30 seconds after the call is sent. Multiple attempts to determine location may be made within that period and the latest location data based upon these attempts within the period may be used in calculating accuracy."⁴⁰

³⁸ *Id.* ¶109.

³⁹ *Id.* ¶ 90.

⁴⁰ OET Bulletin, pg 4.

B. Confidence and Uncertainty Data

The Commission asks whether it is important that all CMRS providers subject to Commission's E9-1-1 requirements use the same confidence level when calculating confidence and uncertainty data.⁴¹ Sprint is aware that this is a concern that has been raised by public safety. Sprint currently comports with industry standards for calculating confidence and uncertainty data and no new regulations are needed. It may be appropriate, however, to work toward standardizing the delivery of confidence and uncertainty data so that it is delivered in a consistent format. In order to accomplish this, the Commission should seek input and conduct further study so that it is aware of the possible methodologies for delivering this data and so that it can recommend the best possible methodology that should be used by all carriers. Sprint also notes that PSAPs may not be receiving confidence and uncertainty data because the LEC S/R may be truncating it or the PSAP may have turned off such functionality.

C. Updating the E9-1-1 Phase II Requirements Based on Outdoor Measurements

The Commission seeks comment on whether, in light of any recent improvements or advancements in A-GPS technology, all CMRS providers reasonably could comply with a 50-meter accuracy/67 percent reliability requirement within two years, such that it could adopt a unitary requirement for both indoor and outdoor calls.⁴² The Commission should not modify its requirements to create a unitary standard. The Commission only recently modified the outdoor standard, and it is not appropriate to change this requirement yet again – especially considering that it will take more than two years for CMRS carriers to be able to meet the proposed indoor location accuracy requirements.

⁴¹ Third FNPRM . ¶ 57.

⁴² *Id.* ¶ 166.

D. Periodic Outdoor Compliance Testing and Reporting

At this time, the Commission should not impose a requirement that carriers conduct periodic testing and submit reports regarding outdoor location accuracy compliance. Carriers already have an obligation to meet the Commission's E9-1-1 location accuracy rules. Imposing an additional mandate associated with testing and reporting would further constrain limited resources at a time when carriers are focused on other important public safety initiatives, including text-to-911 and Next Generation 9-1-1.

III. CONCLUSION

Sprint continues to support the goal of improving 9-1-1 services for consumers. However, robust indoor location accuracy technology is still being developed and proven technologies are not yet commercially available. Considering the current technology limitations and the recent findings of CSRIC III, Sprint urges the Commission not to adopt unrealistic indoor location accuracy requirements.

Respectfully submitted,

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