Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

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

Safer Buildings ("SBC") respectfully submits these comments in response to the *Sixth Notice of Proposed Rulemaking* (*6th FNPRM*) issued in the above-captioned proceeding.

Executive Summary

The Safer Buildings Coalition[1] ("SBC") respectfully submits these comments emphasizing that precise location accuracy remains absolutely critical for public safety. Under the rally cry of "9-1-1 Inside", SBC strongly advocates for the belief that *your ability to call for help and be quickly and accurately located should not depend on where you happen to be standing at the time*.

The Commission should recognize device-based hybrid location methodologies as the most promising approach for meeting baseline requirements while supporting market-driven enhancements. SBC supports enhanced building location information as the ultimate goal and Height Above Ground Level (AGL) as essential for emergency response, while respectfully noting that Height Above Ellipsoid (HAE) may provide limited actionable value for first responders operating in multi-story buildings. SBC recognizes that the Commission proposes AGL in addition to HAE, and not as a replacement.

Additionally, SBC urges the Commission to address "The Other Digital Divide: The one that starts at the building wall" by mandating creation of a National Indoor Wireless Coverage Map, building on the proven success of the FCC's National Broadband Map in enabling evidence-based policy and targeted infrastructure investment.

I. The Safer Buildings Coalition's Mission and Public Safety Expertise

[1] Safer Buildings DBA Safer Buildings Coalition is a 501(c)4 non-profit chartered in the State of Oregon. Visit www.saferbuildings.org for more information.

From its inception in 2012, the Safer Buildings Coalition has been at the forefront of advancing wireless technology solutions that make people inside buildings safer. Our mission encompasses ensuring that:

- **The public can use mobile phones to call for help from inside buildings**
- **Emergency personnel can be accurately located and can communicate effectively during building emergencies**
- **First responders have actionable location information to save lives in multi-story environments**

SBC is an independent 501(c)(4) non-profit supported by a diverse membership representing first responders, fire and building code officials, public safety frequency license holders, commercial real estate, higher education, healthcare, manufacturers, system integrators, and engineering professionals. Our expertise in in-building public safety communications provides unique insight into the practical challenges of emergency location accuracy.

These location accuracy recommendations align directly with SBC's longstanding advocacy for robust in-building wireless coverage for both public safety and emergency callers, integration of public safety communications systems with building infrastructure, technology-neutral approaches that leverage the best available solutions, and protection of public safety spectrum from harmful interference.

II. Device-Based Hybrid Solutions: Superior Performance for Location Accuracy

A. Network-Based Limitations Require New Approaches

Based on extensive experience with in-building communication challenges, SBC has concluded that network-based location accuracy approaches face fundamental technical limitations that prevent them from delivering the precision required for effective emergency response in complex building environments. Network-based systems struggle with:

- **Signal penetration challenges** in modern building construction featuring energy-efficient materials
- **Multipath interference** in dense urban and indoor environments with multiple signal reflections
- **Limited sensor integration** compared to the rich sensor suites available in modern devices
- **Inconsistent performance** across diverse architectural environments and building types

B. Device-Based Hybrid Methodologies Offer Proven Advantages

SBC strongly advocates for device-based hybrid location methodologies that leverage the full sensor suite available in modern smartphones, including:

- **Barometric pressure sensors** for precise vertical positioning delivered directly from devices
- **Accelerometers and gyroscopes** for indoor positioning and movement tracking
- **Wi-Fi and Bluetooth beacons** for indoor location refinement using existing building infrastructure
- **GPS/GNSS integration** where satellite signals are available for outdoor and near-window locations
- **Camera-based positioning** using visual landmark recognition and augmented reality techniques

These hybrid approaches can achieve the +/- 3-meter vertical accuracy requirement more reliably than network-based solutions while providing additional contextual information valuable for emergency response. Importantly, device-based AGL measurements using barometric sensors avoid the conversion accuracy problems associated with carrier-based HAE-to-AGL mathematical calculations, which can introduce errors due to terrain modeling limitations and local geodetic variations.

C. Industry Expert Validation and OEM Coordination

As Intrado Life & Safety observes in their comments to this proceeding: "The biggest remaining challenge is inconsistency between handset OEMs with regard to location accuracy. Therefore, we recommend that the Commission encourage carriers to work with OEMs to reduce this inconsistency."[2] This expert assessment from a major emergency services provider reinforces that device-based hybrid methodologies represent the most viable path for achieving consistent, reliable location accuracy improvements across the wireless ecosystem.

The Commission should encourage coordination between carriers and device manufacturers (OEMs) to standardize location accuracy methodologies, share best practices for sensor fusion algorithms, and reduce inconsistencies in device-based hybrid location performance across different handset manufacturers and operating systems.

III. Building Location Information and Indoor Coverage: Critical Infrastructure Gaps

A. The Ultimate Goal: Comprehensive Building Location Information

[2] Intrado Comments posted 06/09/2025 ILSI Comments.Location Accuracy.2025.06.06.pdf

SBC supports providing specific building location information to first responders as the ultimate goal, while recognizing that formal dispatchable location as currently defined by the FCC presents significant technical challenges and may require interim steps and technological development. For first responders operating in multi-story buildings, tunnels, underground facilities, and complex structures, knowing the specific floor, room, or zone within a building can mean the difference between life and death.

Building location information should ultimately include:

- **Building address and entrance identification** with specific entry point information
- **Specific floor level** within multi-story structures using device-based elevation measurements
- **Room number, suite, or zone designation** where technically feasible through building integration
- **Special access requirements** including keycard access, restricted areas, and emergency procedures
- **Associated address delivery** including VoWiFi registered addresses and other caller-linked location data that can provide contextual information to first responders

While working toward this comprehensive vision, SBC recognizes that interim improvements providing enhanced floor-level and general building location information represent meaningful progress that can save lives and improve emergency response effectiveness.

B. The Other Digital Divide: Indoor Wireless Coverage Gaps

Unlike outdoor broadband coverage, no comprehensive data exists regarding the quality and quantity of indoor wireless coverage per floor, per building, per city across the United States. This represents "The Other Digital Divide: The one that starts at the building wall."

The transformative success of evidence-based broadband policy through the FCC's National Broadband Map demonstrates the value of comprehensive coverage mapping. Digital maps, particularly the **FCC's National Broadband Map**, played a crucial role in:

- Informing legislation and program implementation to establish evidence broadband priorities based on granular unserved and underserved location data
- identifying coverage gaps with the precision needed for targeted infrastructure investment, providing baseline data for state and territory broadband grant programs
- Supporting challenge processes that allow stakeholders to correct inaccuracies and ensure funding reaches truly underserved areas
- Promoting data accuracy through verification mechanisms that prevent overstatement of coverage.

Indoor wireless coverage data is available from multiple sources including carrier coverage models, crowdsourced signal strength data, building measurement campaigns, and FirstNet deployment assessments. The Commission should mandate creation of a **National Indoor Wireless Coverage Map** that would:

- **Identify buildings and floors** where reliable 9-1-1 calling is compromised
- **Guide targeted infrastructure investment** in areas with inadequate indoor coverage
- **Support location accuracy improvements** by identifying where device-based hybrid solutions are most needed
- **Enable evidence-based policy development** for in-building wireless requirements
- **Create accountability mechanisms** for indoor coverage commitments and investments

Just as the National Broadband Map transformed outdoor connectivity policy, a National Indoor Wireless Coverage Map would provide the evidence base needed to address indoor emergency communications gaps systematically and effectively.

C. Integration with Building Infrastructure and Interim Milestones

The Commission should encourage integration between wireless location systems and existing building infrastructure, including:

- **Building Information Management (BIM) systems** that contain detailed floor plans and occupancy information
- **Emergency notification systems** already required by fire codes for mass notification capabilities
- **Access control systems** that can provide precise indoor location context and entry point information
- **Digital building maps** that can be shared with emergency responders for enhanced situational awareness

This integration leverages the substantial investments already made in building safety infrastructure while enhancing location accuracy capabilities and working toward more comprehensive building location information delivery. SBC supports the development of shared repositories of building elevation and floor plan data that can be accessed by PSAPs to enhance location accuracy interpretation, particularly for complex multi-story structures.

The Commission should establish interim milestones that progress toward comprehensive building location information while allowing stakeholders time to develop the necessary technical capabilities and coordination mechanisms. These interim steps should include enhanced floor-level identification using device-based barometric sensors and AGL

measurements, building identification improvements that provide more precise address and entrance information, associated address integration with VoWiFi registered addresses and billing addresses to provide location context, voluntary integration programs with building owners to share basic floor plan and access information, pilot programs in specific building types (hospitals, schools, high-rises) to test comprehensive location delivery, and standards development for building information sharing with PSAPs and first responders.

IV. Height Above Ground Level vs. Height Above Ellipsoid

A. AGL: Essential and Actionable for Emergency Response

Height Above Ground Level (AGL) represents a critical improvement over current location accuracy capabilities because it provides information that first responders can immediately act upon. When responding to a multi-story building emergency, knowing that a caller is "85 feet above ground level" allows responders to:

- **Calculate the approximate floor level** using standard floor heights (typically 12-14 feet per floor)
- **Deploy ladder trucks and aerial equipment** to the correct elevation for rescue operations
- **Access stairwells and elevators** with appropriate floor targeting for interior search
- **Coordinate multi-agency response** with consistent elevation references across fire, EMS, and police units

AGL data provides significant advantages over HAE alone, or simple horizontal location information, because it is intuitive for first responders who think in terms of building floors and ground-level access, compatible with existing emergency response protocols and equipment, useful for both indoor and outdoor emergency scenarios, and integrates effectively with building fire department connections and access points.

SBC recognizes concerns about HAE-to-AGL conversion accuracy and supports approaches that deliver AGL measurements directly from device-based barometric sensors rather than requiring error-prone mathematical conversions by carriers. Direct device-based delivery avoids conversion errors while providing the most accurate vertical positioning information available.

Additionally, SBC notes that commercial AGL conversion solutions are becoming available to PSAPs through GIS vendors and emergency service providers, making carrier-level conversion unnecessary. Direct device-based delivery avoids conversion errors while providing the most accurate vertical positioning information available. SBC supports the idea of collaborative efforts

by all to develop and deploy open-standards, interoperable HAE to AGL conversion solutions as an adjunct to HAE solutions.

B. HAE: Limited Practical Value in Emergency Operations

Height Above Ellipsoid (HAE) alone may provide limited actionable value for emergency responders operating in real-world scenarios. HAE measurements:

- **Require complex mathematical conversion** to be useful for emergency response operations
- **Vary significantly based on local geodetic conditions** that first responders cannot readily assess without specialized equipment
- **Create potential for errors** when converting between reference systems under emergency conditions
- **Add unnecessary complexity** to time-critical emergency response operations where simplicity and clarity are essential

Rather than mandating HAE delivery, the Commission should focus regulatory requirements on location information formats that first responders can utilize in addition to HAE, including direct device-based AGL measurements, building location data, and enhanced horizontal accuracy that can pinpoint specific building entrances and access points.

V. Recommendations for Commission Action

A. Establish Performance Standards Recognizing Device-Based Hybrid Advantages

The Commission should establish technology-neutral performance standards while recognizing that device-based hybrid methodologies offer superior performance characteristics for meeting baseline location accuracy requirements. Carriers should have flexibility in implementation approaches, though the technical advantages of device sensor integration make device-based hybrid solutions the most viable path for reliable +/-3 meter vertical accuracy compliance.

The Commission should encourage coordination between carriers and device manufacturers (OEMs) to standardize location accuracy methodologies, share best practices for sensor fusion algorithms, and reduce inconsistencies in device-based hybrid location performance across different handset manufacturers and operating systems.

B. Encourage and advance AGL solutions

SBC urges the Commission to advance Height Above Ground Level measurements using commercially available solutions, recognizing that device-based AGL provides immediate operational value for emergency responders while avoiding conversion accuracy problems. This

approach leverages the proven accuracy of barometric pressure sensors in modern smartphones while delivering information in a format that first responders can immediately utilize.

C. Create Building Location Information Deployment Framework

Create regulatory incentives for enhanced building location capability deployment rather than relying solely on mandates, encouraging innovation and market-driven solutions that serve public safety needs. The Commission should support interim milestones that make meaningful progress toward comprehensive building location information while allowing time for technical development and industry coordination.

Prioritize coordination between wireless location accuracy systems and existing building safety infrastructure to leverage investments already made in fire safety, security, and emergency notification systems. This integration approach maximizes the value of existing building infrastructure while enhancing emergency response capabilities.

D. Ensure PSAP Compatibility and Support Market Innovation

Require that all location accuracy solutions be compatible with existing 911 dispatch centers and Public Safety Answering Points (PSAPs) while aligning with Next Generation 911 (NG911) best practices and applicable standards. Location data must be deliverable in formats that PSAPs can readily receive, process, and utilize without requiring costly system upgrades or specialized technical expertise.

The Commission should encourage specialized providers to offer enhanced location services that exceed baseline requirements for PSAPs seeking premium capabilities. This market-driven approach allows innovation in location accuracy while ensuring that baseline public safety requirements are met through proven device-based hybrid methodologies.

E. Mandate Creation of a National Indoor Wireless Coverage Map

Building on the transformative success of the FCC's National Broadband Map in enabling evidence-based broadband policy, the Commission should mandate creation of a **National Indoor Wireless Coverage Map** to address "The Other Digital Divide: The one that starts at the building wall." This comprehensive mapping initiative would:

- **Systematically identify indoor coverage gaps** that compromise 9-1-1 calling capability
- **Guide infrastructure investment** toward buildings and areas with the greatest emergency communications needs
- **Support location accuracy policy** by identifying where device-based hybrid solutions are most critical
- **Enable targeted building safety requirements** based on actual coverage data rather than assumptions

- **Create accountability mechanisms** for indoor coverage commitments and deployment verification

Just as the National Broadband Map provided the evidence base for broadband policy, a National Indoor Wireless Coverage Map would enable systematic, data-driven approaches to ensuring that every building occupant can reliably call for help and be accurately located during emergencies.

VI. Conclusion

The Safer Buildings Coalition appreciates the Commission's continued focus on improving wireless 9-1-1 location accuracy, which represents a critical public safety priority. However, technical reality demands that the Commission recognize device-based hybrid methodologies as the most promising approach for meeting baseline requirements while supporting market-driven enhancements to achieve meaningful improvements in emergency response effectiveness.

Enhanced building location information and Height Above Ground Level measurements represent achievable goals that will immediately improve first responder capabilities. SBC supports a graduated approach that makes interim progress toward comprehensive building location information while avoiding the technical challenges associated with formal dispatchable location requirements as currently defined.

SBC respectfully urges the Commission to adopt location accuracy requirements that:

- **Emphasize practical, actionable information for first responders**
- **Leverage device-based hybrid technologies** proven superior in complex building environments
- **Integrate with existing building safety infrastructure** to maximize effectiveness
- **Support continued innovation** in location accuracy technologies
- **Allow market-driven enhancement services** beyond baseline regulatory requirements

These approaches will save lives by providing first responders with the precise, actionable location information they need to effectively respond to emergencies in our increasingly complex built environment, ensuring that every person's ability to call for help and be quickly located does not depend on where they happen to be standing at the time.

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