

FCC 9-1-1 Location Accuracy 4th Report and Order PS Docket No. 07-114 FCC 15-9

DEADLINES	REQUIREMENT	% OF CALLS	CALL TYPES	ADDITIONAL INFORMATION	Para
On Effective Date ¹ FR Published Order on 3/4/15	Phase II Rules remain in effect, and all the changes included in the R&O for Phase II will take effect on the Effective Date (see details infra). 1) 30Sec –Maximum Delay for delivery of Phase II location 2) Confidence level raised to 90% for all wireless 911 calls 3) Retain all 911 call data for 2-years 4) Remove [in current rules] testing limitation based on C/U data, and require Carriers to continue testing, including ground truth, to measure accuracy			2/10/15 – During 911.gov webinar on 911 Cases as the FCC, Tim May responded to a question that he thought the NEW confidence/uncertainly levels for 9-1-1 that were detailed in the R&O were enforceable as of the Effective Date. The last handset-based benchmark under the current Phase II requirements will occur in January 18, 2019. ² Thus, once the last Phase II benchmark has passed, we may revisit the issue of when to sunset date the current Phase II requirements and establish a unitary accuracy standard.	181.
X/XX/XX Abandoned	The parties also agree to complete (i) a study within six months to evaluate options for using barometric pressure data to obtain a z-axis, and (ii) a further study within 24 months that would include test bed evaluation of barometric and other z-axis solutions.			Roadmap Signed 11/14/14 Parties mutually agreed not to do study because FCC ordered the provision of barometric pressure anyway.	R 109.
6/14/15	Conduct a pre-standards demonstration of a dispatchable location solution (9 months from Roadmap signature)			9-months from 11/14/14, date Roadmap signed Roadmap [[2(c)]];	R
11/14/15	Develop the design, operations and maintenance requirements for the National Emergency Address Database (NEAD) (12 months)			Roadmap Signed 11/14/14 [[2(e)(ii)]];	R
11/14/15	Develop outreach program to promote the development of dispatchable location solutions (12 -24 months)			Roadmap Signed 11/14/14 [[2(e)(iv)]];	R
1/13/16	The Bureau also reminds all CMRS providers that the requirements for filing notice of Phase II geographic exclusions (Exclusion Reports), and the requirements for timely filing of updates, remain in effect. We direct CMRS providers to use the contact information provided (right). As specified in Section 20.18(h), CMRS providers must file			Copies of Exclusion Reports: CMRS providers must send copies of their Exclusion Reports to the National Emergency Number Association, the Association of Public-Safety Communications Officials-International, and the National Association of State 9-1-1 Administrators, at the contacts listed below: o The National Emergency Number Association	

¹ Effective Date: IT IS FURTHER ORDERED that Part 20 of the Commission’s Rules, 47 C.F.R. Part 20, IS AMENDED as specified in Appendix D, effective 30 days after publication in the Federal Register, except that those amendments which contain new or modified information collection requirements that require approval by the Office of Management and Budget under the Paperwork Reduction Act WILL BECOME EFFECTIVE after the Commission publishes a notice in the Federal Register announcing such approval and the relevant effective date.

² 47 C.F.R. § 20.18(h)(2)(ii).

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	<p>their Exclusion Reports and updates reflecting any changes as follows:</p> <ul style="list-style-type: none"> Electronic Filing: CMRS providers must file their Exclusion Reports electronically in PS Docket No. 07-114 by accessing the Electronic Comment Filing System: http://fjallfoss.fcc.gov/ecfs2/ or the Federal eRulemaking Portal: http://www.regulations.gov. 			<p>(NENA): Trey Forgety, Director of Government Affairs, tforgety@nena.org.</p> <ul style="list-style-type: none"> The Association of Public-Safety Communications Officials-International (APCO): Jay English, Director, Communications Center & 9-1-1 Services Department, englishj@apcointl.org. The National Association of State 9-1-1 Administrators (NASNA): Evelyn Bailey at evelyn.bailey@nasna911.org. 	
<p>3/4/16</p>	<p>Indoor location accuracy [permanent] test bed. [12 months from Roadmap signature would be 11/14/15, but item is specified in FCC Order, and could be considered the later date] CMRS providers must validate technologies intended for indoor location, including dispatchable location technologies and technologies that deliver horizontal and/or vertical coordinates, through an independently administered and transparent [open to Public Safety and other parties] test bed process, in order for such technologies to be presumed to comply with the location accuracy requirements . . .</p> <p>. . . each test bed should include dense urban, urban, suburban and rural morphologies, as defined by the ATIS-0500013 standard.³</p> <p>[Para. 130] CMRS providers must <u>certify</u> that they have deployed the technology throughout their networks in the same manner as tested. CMRS providers must also <u>update</u> their certifications whenever they introduce a new technology into their networks or otherwise modify their technology use in such a manner that previous compliance testing in the test</p>			<p>(A) include testing in representative indoor environments, including dense urban, urban, suburban and rural morphologies;</p> <p>(B) test for performance attributes including location accuracy (ground truth as measured in the test bed), latency (Time to First Fix), and reliability (yield);</p> <p>(C) For purposes of determining compliance with location accuracy and latency requirements, testing should at a minimum follow the CSRIC III test bed methodology.⁵ With respect to yield⁶, the CSRIC test bed defined the “yield of each technology . . . as the [percentage] of calls with delivered location to overall ‘call attempts’ at each test point.”⁷</p> <p>(D) require CMRS providers to show that the indoor location technology used for purposes of its compliance testing is the same technology (or technologies) that it is deploying in its network, and is being tested as it will actually be deployed in the network; and</p> <p>(E) Each test call (or equivalent) shall be independent from prior calls and accuracy will be based on the first location delivered after the call is initiated.</p>	<p>129.</p> <p>127.</p>

³ CSRIC LBS Report at 57; Indoor Location Test Bed Report at 12. [Footnote 325] Specifically, for location accuracy, the test bed must compute the error in estimating the location of the device under test by comparing each vendor’s reported horizontal position to the surveyed ground truth position of the test location (determined through a precise land survey). Each test call (or equivalent) must be independent from prior calls and accuracy will be based on the first location delivered by the vendor after he call is initiated. With regard to latency, TTFF must be calculated by establishing the precise time for call initiation (or an equivalent initiation event if the vendor’s test configuration does not support the placement of an emulated emergency test call). Specifically, latency must be measured from the time the user presses SEND after dialing 911, to the time the location fix appears at the location information center.

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	<p>bed would no longer be representative of the technology’s current use.</p> <p>Confidentiality [Para. 131] In order to protect vendors’ proprietary information, only summary data was made available to all other parties.⁴ At this time, we will not require CMRS providers to make public the details of test results for technologies that have been certified by the independent test bed administrator. We believe the test administrators’ certification is sufficient notification that a technology meets our key performance indicators.</p>			<p>[Para. 132] With regard to non-nationwide CMRS providers that cannot participate directly in the test bed, we find that the test bed administrator shall make available to them the same data available to participating CMRS providers and under the same confidentiality requirements established by the test bed administrator.</p>	
5/14/16	Promote development and approval of 3GPP standards that support the delivery of dispatchable location data (18 months)			Roadmap Signed 11/14/14 [[2(d)]	R
5/14/16	Second, they commit “to develop a specific z-axis location accuracy metric that would be used as the standard for any future deployment of z-axis solutions.” ⁸ To demonstrate progress along this path, the parties agree to “promote the development and approval of standards” for barometer-based solutions within 18 months			Roadmap Signed 11/14/14	R 109.

⁵ Specifically, for location accuracy, the test bed must compute the error in estimating the location of the device under test by comparing each vendor’s reported horizontal position to the surveyed ground truth position of the test location (determined through a precise land survey). Each test call (or equivalent) must be independent from prior calls and accuracy will be based on the first location delivered by the vendor after the call is initiated. With regard to latency, TTFF must be calculated by establishing the precise time for call initiation (or an equivalent initiation event if the vendor’s test configuration does not support the placement of an emulated emergency test call). Specifically, latency must be measured from the time the user presses SEND after dialing 911, to the time the location fix appears at the location information center.

⁶ [Para. 129] we adopt the following definition of yield for testing purposes: the yield percentage shall be based on the number of test calls that deliver a location in compliance with any applicable indoor location accuracy requirements, compared to the total number of calls that successfully connect to the testing network. CMRS providers may exclude test calls that are dropped or otherwise disconnected in 10 seconds or less from calculation of the yield percentage (both the denominator and numerator). We require CMRS providers to measure yield separately for each individual indoor location morphology (dense urban, urban, suburban, and rural) in the test bed, and based upon the specific type of location technology that the provider intends to deploy in real-world areas represented by that particular morphology. [Check 10sec exclusion against other exclusions in rules – see ???]

⁷ Indoor Location Test Bed Report at 14.

⁴ See Presentation by CSRIC WG3, Indoor Location Accuracy – Test Bed Framework (Sept. 12, 2012), at 6, available at <http://transition.fcc.gov/pshs/advisory/csric3/3-WG%20Presentation%209-12-12.pdf> (noting agreement reached among test bed participants that CMRS providers could only view raw results if they signed a nondisclosure agreement). See also Indoor Location Test Bed Report at 12.

⁸ Id.

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9/4/16	<p>CMRS providers providing service in any of the Test Cities or portions thereof must collect and report aggregate data on the location technologies used for live 911 calls in those areas [to Commission and to Public Safety, as noted below].</p> <p>We require the nationwide CMRS providers, subject to certain confidentiality protections,⁹ to aggregate live 911 call data on a <u>quarterly basis</u> and report that data to APCO, NENA, the National Association of State 911 Administrators (NASNA), and the Commission . . . [If carrier does not serve Test Cities]¹⁰</p> <p>[Rules } Non-nationwide CMRS providers that operate in more than one Test City must report live 911 call data only in half of the regions (as selected by the provider).</p>	100%	All ¹¹ wireless 911 Calls ¹²	<p>Test Cities. The six cities¹³ (San Francisco, Chicago, Atlanta, Denver/Front Range, Philadelphia, and Manhattan Borough) and surrounding geographic areas.</p> <p>CMRS providers must retain this data for two years. The Commission will <u>not publish</u> provider-specific data, but may publish aggregate data on its website.¹⁴</p> <p>[Rules]. . . to the extent available, live call data for all providers shall delineate based on a per technology basis accumulated and so identified for: (1) each of the ATIS ESIF morphologies; (2) on a reasonable community level basis; <i>or</i> (3) by census block. In this respect, we expect that data will provide a viable, real world evaluation of particular indoor location technologies that will inform our ability to evaluate the nationwide providers' six-year bench mark proposal, and to prove</p>	35. 136. 140.

⁹ In order for this data to serve as a reasonable measure of the efficacy of indoor location solutions, it will be necessary for the Roadmap parties to make information available on the system deployment and the live 911 call data, such that smaller CMRS providers who do not cover territory in one of the six ATIS ESIF test cities could certify whether their deployments is consistent with one of the four nationwide providers in the six test cities. As such, CMRS providers may request confidential treatment of their live 911 call data reports, but the Commission reserves the right to release aggregate or anonymized data on a limited basis in order to facilitate compliance with its rules. In addition, nothing in this *Order* is intended to limit the authority of state and local 911 agencies to publish 911 call data to the extent authorized under state or local law.

¹⁰ CMRS providers that do not provide service in any of the six cities may satisfy this requirement by certifying in their 36- and 72-month certifications that (1) they have deployed technology throughout their network consistent with a technology deployment that was certified in the test bed, and (2) that their network does not cover any territory in any of the six test cities. If a CMRS provider expands its network coverage into one of the six test cities, it must re-certify the compliance of its deployed technology as well as begin reporting live call data from that portion of its network to NENA, APCO, NASNA, and the Commission.

¹¹ NOTE: rules apply uniformly to all wireless 911 calls rather than to only VoLTE calls (as was part of earlier proposals).

¹² (h)(3) *Latency (Time to First Fix)*. For purposes of measuring compliance with the location accuracy standards . . . , a call will be deemed to satisfy the standard **only if** it provides the specified degree of location accuracy within a maximum latency period of 30 seconds, as measured from the time the user initiates the 911 call to the time the location fix appears at the location information center: **Provided, however, that the CMRS provider may elect not to include for purposes of measuring compliance therewith any calls lasting less than 30 seconds.**

¹³ These cities and areas correspond to the six geographic regions specified by the February 7, 2014 ATIS Document, “Considerations in Selecting Indoor Test Regions,” for testing of indoor location technologies.

¹⁴ The Commission will not publish any personally identifiable information, such as 911 callers’ phone numbers or the locations to which first responders were dispatched. The Commission may, however, publish aggregate information on CMRS providers’ performance in a given geographic area, or on the percentage of calls using a particular positioning source method across all CMRS providers. We believe that this information will enable the Commission to better monitor location accuracy performance as a whole and will serve as a self-evaluation tool for CMRS providers.

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	<p>[Rule (E)] Non-nationwide CMRS providers that do not provide coverage in any of the Test Cities can satisfy the requirement of paragraph (i)(3)(ii) of this section by collecting and reporting data based on the largest county within its footprint. In addition, where a non-nationwide CMRS provider serves more than one of the ATIS ESIF morphologies, it must include a sufficient number of representative counties to cover each morphology.</p> <p>We modify, however, the frequency of reporting [to all the same entities, above] for non-nationwide providers to <u>every six months</u>, beginning at 18 months following the Effective Date of the reporting requirement.</p>			<p>out the various claims in the record as to technical achievability.</p> <p>[Para 147] Consistent with our existing E911 requirements, the rules we adopt today will be enforced by measuring the provider’s performance at the county or PSAP level. [?]</p>	
<p>9/4/16</p>	<p>Progress reports. . . . each CMRS provider shall file a progress report on implementation of indoor location accuracy requirements.</p> <p><u>All reports shall be in this docket – 07-114 . . .</u></p> <p>Furthermore, we encourage CMRS providers to share these reports and discuss their implementation plans with public safety, consumer, and disability groups. We incorporate these requirements into our rules.</p> <p>, in order to verify compliance based on dispatchable location, we adopt the Addendum’s proposed calculation regarding reference point “density” within a CMA.¹⁵ We require that nationwide CMRS providers include such calculation for relevant CMAs in their quarterly reporting.</p>			<p>These reports should include details as to each provider’s implementation plan to meet our requirements. For the nationwide CMRS providers, this report must also include detail as to steps taken and future plans to implement the NEAD . . . These reports will provide a baseline for measuring the subsequent progress made by each provider toward improving indoor location accuracy.</p> <p>As part of the 18-month report, at a minimum, CMRS providers must show how they are testing and developing z-axis solutions and, consistent with their commitment in the Roadmap,¹⁶ demonstrate their efforts to promote the development and approval of standards to support such solutions.</p>	<p>37. 68. 69.</p> <p>118.</p>
<p>9/4/16</p>	<p>Development of the NEAD Privacy and Security Plan. We require each of the nationwide CMRS providers to develop and submit for Commission approval a detailed Privacy and</p>			<p>Nationwide Carriers Only – Roadmap called for the “NEAD Administrator” to file the Privacy Plan, but the FCC decided that it should be the CMRS providers.</p>	<p>69.</p>

¹⁵ Addendum at 3.

¹⁶ Roadmap at Section 5(a).

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	Security Plan for the NEAD, to be submitted with the interim progress reports discussed above. . . ¹⁷ we expect the providers to develop the plan in close collaboration with a broad range of relevant stakeholders, including network security and reliability experts, equipment manufacturers (including device, software and network manufacturers), public interest advocacy groups (including privacy advocates, and consumer and disabilities rights groups), and other, non-nationwide communications service providers. ¹⁸				
11/14/16	The parties also agree to complete (i) a study within six months to evaluate options for using barometric pressure data to obtain a z-axis [idea abandoned], and (ii) a further study within 24 months that would include test bed evaluation of barometric and other z-axis solutions.			[Six months Study abandoned] Amended Roadmap Signed 11/14/14	R 109
3/4/17	Progress reports. Each non-nationwide CMRS providers shall file a progress report on implementation of indoor location accuracy requirements.			Same content / requirements as for Nationwide CMRS carriers. Furthermore, we encourage CMRS providers to share these reports and discuss their implementation plans with public safety, consumer, and disability groups. We incorporate these requirements into our rules.	37.
3/4/17	All CMRS providers must provide (1) dispatchable location, ¹⁹ or (2) x/y location within 50 meters, for the following -	40%	All Wireless 911 Calls	All technologies must be validated via test bed that is independently administered.	
3/4/18	All CMRS providers must provide (1) dispatchable location, or (2) x/y location within 50 meters, for the following -	50%	All Wireless 911	[3 year Deadline] CMRS providers must then <u>certify to the Commission</u> that they have deployed the tested technology throughout their service areas in a manner	137

¹⁷ We emphasize that the development of the Privacy and Security Plan should not delay or otherwise affect the development and prototyping of the NEAD. The development of the NEAD should be pursued in parallel with the development of the Privacy and Security Plan, in order to ensure the NEAD is ready and operational in a timeframe consistent with the deadlines set forth herein.

¹⁸ See *New America et al.* January 22, 2015 *Ex Parte* at 5 (“The Commission should encourage carriers to consult with privacy and consumer organizations as they develop E911 technology and privacy and security plans.”)

¹⁹ **Dispatchable location:** A location delivered to the PSAP by the CMRS provider with a 911 call that consists of the street address of the calling party, plus additional information such as suite, apartment or similar information necessary to adequately identify the location of the calling party. **The street address of the calling party must be validated and, to the extent possible, corroborated against other location information prior to delivery of dispatchable location information by the CMRS provider to the PSAP.**

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	The certification will establish a <i>presumption</i> that 911 location performance results derived from live call data from the six ATIS ESIF test cities are representative of the CMRS provider's E911 location performance throughout in areas outside the reporting areas.		Calls	that is consistent with the deployment of that technology in the test bed, ²⁰ such that the test bed results can be reasonably relied upon as representative of the technology's real-world performance.	
3/4/18	All CMRS providers must make uncompensated barometric data available to PSAPs	100%	All Wireless 911 Calls	Only from handsets that are capable of such a measurement, [but applies to ALL carriers]. The rule we adopt today applies only to devices with barometric sensors and delivery capability that the CMRS provider may choose to offer to consumers and does <u>not</u> require any CMRS provider to make such devices available to subscribers.	115.
3/4/18	Carriers agree to test delivery of crowd-sourced latitude/longitude from WiFi beacons once the capability becomes available			Roadmap (estimated to be 30-36 months from the date of the Agreement). 11/14/14 was date Roadmap was signed.	R
3/4/18	Nationwide CMRS providers must use an independently administered and transparent test bed process to develop <u>one or more</u> proposed z-axis accuracy metrics, and must submit the proposed metrics to the Commission for <u>approval</u> .			We intend that the proposal will be placed out for public comment. Any such z-axis metric approved, and, if adopted by the Commission, will serve as an alternate six- and eight-year benchmark for vertical location should dispatchable location not be utilized by a CMRS provider for compliance.	116. Rii B
3/4/18	Progress Report. All CMRS providers shall provide reports [to the Commission] indicating what progress the provider has made consistent with its implementation plan, and the nationwide CMRS providers shall include an assessment of their deployment of dispatchable location solutions. Furthermore, we encourage CMRS providers to share these reports and discuss their implementation plans with public safety, consumer, and disability groups. We incorporate these requirements into our rules.			CMRS providers must submit aggregated live 911 call data from the six cities recommended for indoor testing by the Alliance for Telecommunications Industry Solutions Emergency Services Interconnection Forum (ATIS ESIF). ²¹ Nationwide CMRS providers shall include in their 36-month reports an assessment of their deployment of dispatchable location solutions. For any CMRS provider participating in the development of the NEAD	21. 37.

²⁰ For nationwide carriers, this will include the six test regions. For non-nationwide carriers, this will include the appropriate test region, county or other test area in accordance with the Parallel Path as adopted herein.

²¹ ATIS Reply Comments at 4 n. 6. See also Letter from Thomas Goode, General Counsel, Alliance for Telecommunications Industry Solutions, to David DeLorenzo, Chairman, CSRIC IV Working Group 1, Task Group 3 (dated Feb. 7, 2014), at 3-4, available at http://www.atis.org/legal/Docs/ESIF%20DOCS/ESIF_Letter_DeLorenzo_Feb2014.pdf (last visited Jan, 8, 2015).

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				database, this progress report must include detail as to the implementation of the NEAD database	
3/4/20	Nationwide CMRS providers must provide (1) dispatchable location, or (2) x/y location within 50 meters, for the following percentage	70%	All Wireless 911 Calls		74
≥ 3/4/20	Non-nationwide CMRS providers must provide (1) dispatchable location, or (2) x/y location within 50 meters, for the following percentage	70%	All Wireless 911 Calls	. . . within the <i>later of</i> five years from the Effective Date or six months of having an operational VoLTE platform ²² in their network [All 911 calls includes VoLTE 911 calls]	74.
3/4/21	All CMRS providers must provide (1) dispatchable location, or (2) x/y location within 50 meters, for the following percentage	80%	All Wireless 911 Calls	[6 Year Deadline] CMRS providers must then <u>certify to the Commission</u> that they have deployed the tested technology throughout their service areas in a manner that is consistent with the deployment of that technology in the test bed, ²³ such that the test bed results can be reasonably relied upon as representative of the technology's real-world performance.	74. 137.
≥ 3/4/21	Non-nationwide CMRS providers must provide (1) dispatchable location, or (2) x/y location within 50 meters, for the following percentage	80%	All Wireless 911 Calls	. . . within the <i>later of</i> six years from the Effective Date or six months of having an operational VoLTE platform in their network [All 911 calls includes VoLTE 911 calls]	74.
3/4/21	Nationwide CMRS providers must deploy <u>either</u> (1) dispatchable location, <u>or</u> (2) z-axis technology that achieves the Commission-approved z-axis metric, in each of the <u>top 25</u> CMAs ²⁴ :			[<i>May be discrepancy between Para. 117 explanation and final Commission Rule in Appendix</i>] 1) The NEAD must be populated with a total number of dispatchable location reference points in the CMA equal to 25 percent of the CMA population if dispatchable location is used. OR 2) CMRS providers must deploy z-axis technology	117.

²² CCA describes a commercially-operating VoLTE platform “as the point in time when a non-nationwide carrier is commercially offering VoLTE service to any subscriber in any portion of its service footprint.” See CCA Jan. 23, 2015 *Ex Parte* at 3, n.22, citing Parallel Path at Section 5(b).

²³ For nationwide carriers, this will include the six test regions. For non-nationwide carriers, this will include the appropriate test region, county or other test area in accordance with the Parallel Path as adopted herein.

²⁴ Cellular Market Areas (CMAs) consist of both Metropolitan Statistical Areas (MSAs) and Rural Service Areas (RSAs). The commitments in the Roadmap Addendum were based on CMAs as defined by 2010 census data. For purposes of this *Report and Order*, CMAs will be delineated based on information from the 2010 Census. See *Order at Appendix B* for a list of the top 50 CMAs.

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				to cover 80 percent of the CMA population if z-axis technology is used.	
3/4/22	Non-nationwide CMRS providers must deploy either (1) dispatchable location, or (2) z-axis technology that achieves the Commission-approved z-axis metric , in each of the top 25 CMAs that they may serve .			Same rule requirements apply as for Nationwide Carriers.	
3/4/23	Nationwide CMRS providers must deploy dispatchable location or z-axis technology [in accordance with the 6-year benchmarks] in each of the top 50 CMAs.	?	?	Non-nationwide carriers that serve any of the top 25 or 50 CMAs will have an additional year to meet the latter two benchmarks (<i>i.e.</i> , relating to years 6 and 8).	
SEE LAST PAGE	2/10/15 FCC Presentation on 911.gov provided additional information and a graphic chart of the process for calculating horizontal call accuracy reports [test and actual data].			See Chart on Last Page.	
Dispatchable Location – Definition Validation	For the purposes of this rulemaking, we define “dispatchable location” as the verified or corroborated street address of the calling party plus additional information such as floor, suite, apartment or similar information that may be needed to adequately identify the location of the calling party. Accordingly, we adopt a definition similar to the one offered in the Roadmap, but substitute the term “street address” to provide clarity and ensure that dispatchers are not sent to addresses which may not be street addresses, and therefore, may not be “dispatchable.”			We note that while all dispatchable addresses are necessarily civic addresses, not all civic addresses are “dispatchable,” <i>e.g.</i> , P.O. Boxes, diplomatic or armed forces pouch addresses, <i>etc.</i> ²⁵ [There is an expectation that Beacon, WiFi, and other addresses will be validated via MSAG/LVF. However, this process is only discussed in the footnote, above, in the Order.]	44.
PSAP Use of Dispatchable Location – both X/Y and	Second, under the approach we adopt today, PSAPs retain the choice of whether to accept dispatchable location information (where available) or to request that the CMRS provider provide only geodetic coordinates to that PSAP. ²⁶			Even where PSAPs choose to accept dispatchable location information with 911 calls, CMRS providers should also make coordinate information for such calls available to the PSAP whenever feasible. ²⁷	72. 74.

²⁵ See NENA, NENA NG911 United States Civic Location Data Exchange Format (CLDXF) Standard (Mar. 23, 2014) at Introductory Note to Section 3.2, *available at* https://c.ymcdn.com/sites/www.nena.org/resource/resmgr/Standards/NENA-STA-004.1-2014_CLDXF.pdf (last visited Dec. 30, 2014) (describing legislative, postal, and unofficial place names and how they impact addressing). See also Addressing Guidelines, Canada Post, *available at* <http://www.canadapost.ca/tools/pg/manual/PGaddress-e.asp?ecid=murl10006450#1417752> (last visited Dec. 30, 2014) (distinguishing civic address from other types of postal addresses).

²⁶ While the record indicates that PSAPs should be able to receive dispatchable location information as well as geodetic coordinates, some PSAPs may prefer some current call processing systems that may not enable PSAPs to receive both sets of information simultaneously. See Verizon Roadmap Reply Comments at 12.

²⁷ Providing coordinate information in addition to dispatchable location information will enable PSAPs to continue using coordinates as part of their emergency response data set and to corroborate the validity of the dispatchable location information. However, where the CMRS provider provides dispatchable location information, the corroborating coordinate information associated with the call need not meet coordinate-based accuracy thresholds and will not be considered for compliance purposes.

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DL	<p>Providing coordinate information in addition to dispatchable location information will enable PSAPs to continue using coordinates as part of their emergency response data set and to corroborate the validity of the dispatchable location information.</p> <p>Therefore, while 911 calls that provide dispatchable location information, . . . , will count towards the vertical location accuracy requirement, the vertical location rules adopted herein are also designed to provide for a potential alternative to the Road Map parties’ preferred solution.</p>			<p>Footnote 177 - However, where the CMRS provider provides dispatchable location information, the corroborating coordinate information associated with the call need not meet coordinate-based accuracy thresholds and will not be considered for compliance purposes.</p> <p>To the extent that CMRS providers choose to move forward with dispatchable location, . . . any dispatchable location solution will count towards the horizontal benchmark at the appropriate thresholds. In addition, CMRS providers have the option of leveraging indoor infrastructure such as small cells and Wi-Fi hotspots to provide x/y location within 50 meters as opposed to dispatchable location. Similarly, providers may use OTDOA to comply with the horizontal benchmark to the extent that OTDOA is determined through testing to meet the 50-meter standard. [more discussion in next paragraphs]</p>	177 95. 112.
Phase II Reporting Remains in Effect	<p>The major CMRS providers that either have initiated VoLTE service or plan to deploy it in 2015 <u>must also continue</u> to comply with the benchmarks under the Commission’s rules for measuring the accuracy of outdoor calls. Thus, the additional location accuracy requirements we adopt in this order, which focus on improving indoor location accuracy, will serve to complement rather than replace the existing Phase II rules based on outdoor testing measurements.</p>			<p>Changes to Phase II Location Data Requirements are in addition to other Location Accuracy rules and are EFFECTIVE ON THE EFFECTIVE DATE OF THE ORDER.</p>	180
Phase II Location Fix – Deadline Per Call	<p>[This is a NEW Rule for Phase II] We adopt a 30-second [maximum] limit on the time period allowed for a CMRS provider to generate a location fix in order for the 911 call [as measured from the start of the call to when the information is delivered to the location information center] to be <u>counted towards compliance with existing Phase II location accuracy</u></p>			<p>In calculating percentages of Phase II-compliant calls, CMRS providers must include calls lasting 30 seconds or more for which they are unable to deliver a Phase II location fix.²⁸ We apply this requirement only to our existing E911 regime, which determines compliance based on outdoor measurements only. Thus, compliance</p>	181. 174.

²⁸ For example, in a calculation of the yield percentage, all 911 calls with compliant location fixes within 30 seconds would be included in the numerator, and calls with a non-compliant TTFF would be in the total of all 911 calls in the denominator.

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	<p>requirements that rely on outdoor testing, but we do not extend this provision to the new indoor-focused requirements adopted in this order [decision deferred until more data available on TTFB latency of new technologies].</p> <p>[Para 177] Therefore, we will allow CMRS providers to <u>exclude</u> from their compliance calculation any wireless 911 call lasting less than 30 seconds for which the provider is unable to deliver a Phase II-compliant fix. On the other hand, to provide an incentive for CMRS providers to reduce latency below 30 seconds, CMRS providers <u>may count</u> any Phase II-compliant call in which the location fix is delivered in less than 30 seconds, regardless of the duration of the call.</p>			<p>with our TTFB requirement will be based on the results of outdoor testing, and will not be measured from the live 911 call data from the six test cities.</p> <p>[Rules (3)i(D)] CMRS providers may exclude <u>test calls</u> that are dropped or otherwise disconnected in 10 seconds or less from calculation of the yield percentage (both the denominator and numerator).</p>	
Phase II Reporting – to Requesting PSAP	<p>We require CMRS providers to provide 911 call data, including (1) the percentage of wireless 911 calls to the PSAP that include Phase II location information, <u>and</u> (2) per-call identification of the positioning source method or methods used to derive location coordinates and/or dispatchable location, to any requesting PSAP.</p>			<p>Compliance with the 30-second time limit will also be measured from this data. [See Location Fix – above]</p>	
Non-US GPS / GLONASS	<p>Non-US GPS – Order does not give carriers authorization to utilize signals from non-U.S. satellite systems, such as GLONASS, the Russian satellite navigation system. If any carriers want to use signals from non-U.S.-licensed satellite systems, the Commission would review such a request. We believe that CMRS providers seeking to use non-U.S. satellites should also conduct testing to ensure that operation with these signals does not inadvertently introduce vulnerabilities to the devices that could impair E911 performance or compromise data integrity.</p>			<p>Thus, the parties to the Roadmap and other CMRS providers must comply with the location accuracy requirements established by this order regardless of the disposition of any future request they may make under FCC rules to operate with any non-U.S. satellite systems in support of E911 location.²⁹ Moreover, any such request will be subject to a full review and federal inter-agency coordination of all relevant issues, including technical, economic, national security, and foreign policy implications. Before incorporating foreign A-GNSS into E911, CMRS providers must coordinate</p>	39. 40.

²⁹ We note that manufacturers are already mass producing chipsets that are capable of receiving simultaneous signals from multiple RNSS systems, including GPS, GLONASS, the Chinese COMPASS, and European Galileo systems, and the global availability of such capabilities is anticipated and likely to become standard in most future handsets. See Frank Van Diggelen, Charlie Abraham, Javier de Salas, Randy Silva, “GNSS Inside Mobile Phones,” INSIDE GNSS (Mar. & Apr. 2011), available at <http://www.insidegnss.com/node/2507>. Some receiver equipment in use today includes un-activated GLONASS chipsets. The capability to operate with foreign satellite signals presents regulatory concerns of unauthorized use if that capability can be activated either intentionally or unintentionally by end users prior to FCC authorization. We encourage CMRS providers seeking to employ foreign satellite navigation systems to begin the approval process as soon as possible.

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				plans for foreign A-GNSS signal integration with the Public Safety and Homeland Security Bureau to confirm that signals are interoperable with GPS and that measures to prevent interference are appropriate. Furthermore, CMRS providers are expected to certify that the devices have been tested to determine their ability to detect and mitigate the effects of harmful interference.	
Enforcement by PSAP	PSAPs may seek Commission enforcement within their geographic service area of the requirements of . . . (location accuracy) . . . , but only so long as they have implemented policies that are designed to obtain all location information made available by CMRS providers when initiating and delivering 911 calls to the PSAP.			Prior to seeking Commission enforcement, a PSAP must provide the CMRS provider with 30 days written notice (which shall include all of the documentation upon which the PSAP intends to rely in demonstrating the CMRS provider’s noncompliance to the Commission), and the CMRS provider shall have an opportunity to address the issue informally. If the issue has not been addressed to the PSAP’s satisfaction within 90 days, the PSAP may seek enforcement relief.	148.
Data Retention, Tracking, and Reporting	<p>CMRS providers shall retain testing and live call data gathered . . . for a period of 2 years.</p> <p><u>Aside from those quarterly aggregate reporting requirements, we do not require CMRS providers to report general call tracking data.</u> However, <u>upon request of a PSAP</u> within a CMRS provider’s service area, the CMRS provider must provide the PSAP with call tracking data for all 911 calls delivered to that PSAP.³⁰ The call tracking data should include, but need not be limited to: (1) the date, time, and length of each call; (2) the class of service of the call (<i>i.e.</i>, whether a call was delivered with Phase I or Phase II information, or other type of information); (3) the percentage of calls lasting 30 seconds or more that achieved a Phase II-compliant fix;³¹ (4) confidence and uncertainty data for each</p>			<p>This information must be made available to PSAPs upon request, and shall be retained for a period of two years.</p> <p>This requirement is separate from, and in addition to, the provisions for quarterly reporting of live call data by CMRS providers in the six test cities as discussed in Section Error! Reference source not found. above, though for CMRS providers in the six test cities, some of the data will overlap.</p> <p>In order to comply with this requirement and to be able to provide such data upon individual PSAP request, CMRS providers must collect data on all 911 calls throughout their service area.</p>	191

³⁰ In light of differing PSAP capabilities, a PSAP may request that the CMRS provider make this information available to the PSAP in the aggregate or in real time. CMRS providers should accommodate such requests, in order to allow PSAPs access to call tracking information in whatever format best suits their needs and capabilities.

³¹ This percentage would compare the number of calls that generate requisite location information within the required TTFF of 30 seconds to the total number of 911 calls lasting 30 seconds or more.

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	call; and (5) the positioning source method used for determining a location fix. ³²				
Location Accuracy Testing – Ongoing Testing Required	<p>Because CMRS providers will blend all 911 call data, CMRS providers should incorporate an approach to test for compliance with the current outdoor-based location accuracy standards. For instance, CMRS providers may need to undertake drive testing in certain counties or PSAP service areas where they have migrated to VoLTE and that are outside the six test regions.³³</p> <p>Finally, consistent with our views on KPI testing, we are revising the Commission’s outdoor requirement for C/U data, which currently specifies that “[o]nce a carrier has established baseline confidence and uncertainty levels in a county or PSAP service area . . . additional testing shall not be required.”³⁴ We remove the language excluding additional testing.</p>			<p>While we do not codify any particular approach, we find that the ongoing maintenance testing framework set forth in the CSRIC III WG3 and CSRIC IV WG1 recommendations provides a reasonable and adequate basis for ensuring continued compliance with our E911 location accuracy requirements. We urge CMRS providers to undertake periodic testing to ensure continued compliance accordingly.</p> <p>Note changes to ongoing testing – ground truth testing is brought back to replace confidence and uncertainty.</p>	196. 197. 198
Provision of live 911 call data for PSAPs.	Notwithstanding other 911 call data collection and reporting requirements . . . , CMRS providers must record information on all live 911 calls, including, but not limited to, the positioning source method used to provide a location fix associated with the call. CMRS providers must also record the confidence and uncertainty data that they provide . . .			All stakeholders must collaborate to ensure the delivery of accurate location information, as well as the delivery of associated data to help PSAPs interpret location information, such as confidence and uncertainty data. In the event any party in the end-to-end delivery of location information fails to satisfy its obligation under our E911 location accuracy requirements, we reserve the right to pursue enforcement action or take other measures as appropriate.	150.
Confidence and Uncertainty	CMRS providers . . . shall provide for all wireless 911 calls, whether from outdoor or indoor locations, x- and y-axis (latitude, longitude) confidence and uncertainty information			We therefore require that C/U data for all wireless 911 calls – whether placed from indoors or outdoors – be delivered on a per-call basis at the request of a PSAP,	184

³² As new technologies enter the E911 ecosystem, we recognize that it may not be immediately feasible to incorporate the new technology into the call tracking system. See Verizon Comments at 31 (contending that identifying the location technology “is a more appropriate subject for standards or best practices . . . , given rapidly evolving wireless technology”). We do not require CMRS providers to deliver information on the type of location technology used to provide a location fix with active 911 calls unless (1) a PSAP specifically requests this data, and (2) it is technically feasible to do so.

³³ The Roadmap indicates that the available data used for blending indoor and outdoor calls will come “from a test bed and/or drive test performance.” See Roadmap at Section 4(c).

³⁴ 47 C.F.R. § 20.18(h)(3) (stating that “ongoing accuracy shall be monitored based on trending of uncertainty data...”).

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	<p>(C/U data) on a per-call basis upon the request of a PSAP. The data shall specify (1) the caller’s location with a uniform confidence level of 90 percent, and (2) the radius in meters from the reported position at that same confidence level.</p> <p>We therefore urge stakeholders to work together to develop a consistent format for the delivery of C/U data that considers the different capabilities of PSAPs to receive both geodetic and dispatchable location information.³⁵</p>			<p>with a uniform confidence level of 90 percent.</p> <p>All entities responsible for transporting confidence and uncertainty between CMRS providers and PSAPs, including LECs, CLECs, owners of E911 networks, and emergency service providers, must enable the transmission of confidence and uncertainty data provided by CMRS providers to the requesting PSAP.</p>	
Waiver / Exclusions	The Commission may grant relief pursuant to the waiver standards set forth in Sections 1.3 and 1.925 of its rules, and we believe these provisions are sufficient to address any requests for relief of the indoor location accuracy requirements...			Moreover, our existing E911 exclusions apply only to outdoor areas in which naturally-formed physical characteristics of the area prevent the CMRS provider from obtaining accurate location information on the 911 caller. Because the rules we adopt today are focused on indoor 911 calls – which are not hindered by naturally-formed physical characteristics – there is no need to adopt similar exclusions here.	102.
Roaming	After considering the views of the commenters, we refrain from taking action with respect to roaming at this time. We believe the better course is to monitor progress on the roaming issue as CMRS providers fully deploy VoLTE, and to examine any problems that may arise during this implementation process.			We reserve the right to take action in the future, if necessary, to ensure that accurate location information is provided for wireless calls to 911 while roaming.	200.
After EACH Deadline - Reporting and Compliance	<u>Within 60 days after each benchmark date specified</u> . . . , CMRS providers must certify that they are in compliance with the location accuracy requirements applicable to them as of that date. CMRS providers shall be presumed to be in compliance by certifying that they have complied with the test bed and live call data provisions described in paragraph (i)(3) of this section.			(A) All CMRS providers must certify that the indoor location technology (or technologies) used in their networks are deployed consistently with the manner in which they have been tested in the test bed. A CMRS provider must update certification whenever it introduces a new technology into its network or otherwise modifies its network, such that previous performance in the test bed would no longer be consistent with the technology’s modified deployment.	

³⁵ See, e.g., Roadmap, at 5, Sec. 2(d)(iii) (concerning “standards activities to operationalize the display of dispatchable location in pre NG-911 PSAPs”). Similarly, we encourage stakeholders to develop a consistent format and approach for the delivery of C/U data for vertical location information. See T-Mobile Reply Comments at 15 (concerning the possibility that vertical location information may have an independent uncertainty value, “[a]ll PSAP interfaces and PSAP operational procedures may not support presentation of vertical location uncertainty information”).

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				<p>(B) CMRS providers that provide quarterly reports of live call data in one or more of the six test cities specified in paragraph (i)(1)(vi) of this section must certify that their deployment of location technologies throughout their coverage area is consistent with their deployment of the same technologies in the areas that are used for live call data reporting.</p> <p>(C) Non-nationwide CMRS providers that do not provide service or report quarterly live call data in any of the six test cities specified in paragraph (i)(1)(vi) must certify that they have verified based on their own live call data that they are in compliance with the requirements of paragraphs (i)(2)(i)(B) and (ii) of this section.</p>	
Discussion of the NEAD	The Roadmap addresses the database issue by proposing a plan for the implementation of a National Emergency Address Database (NEAD). ³⁶ As envisioned in the Roadmap, the NEAD will contain media access control (MAC) address information of fixed indoor access points, which a device would “see” upon initiating a wireless 911 call. ³⁷			The parties also agree to “work together to establish a database owner, funding mechanisms, provisions for defining security/privacy, performance, and management aspects, and to launch the initial database within 12-24 months after the development of the design requirements.” ³⁸	55. 68. 69.
NEAD Privacy Issues and Development of a Privacy Plan	[Plan must be available for public comment and FCC review] We emphasize that privacy and security concerns must be addressed during the design and development of the NEAD from its earliest stages. We will hold the NEAD administrator , as well as individual CMRS providers that utilize the NEAD, accountable for protecting the privacy and security of consumers’ location information.			We will make the NEAD Privacy and Security Plan available for public notice and comment to promote openness and transparency, ³⁹ and to ensure that the plan addresses the full range of security and privacy concerns that must be resolved prior to use of the database. Upon review of the plan and the record generated in	69. 70. 71.

³⁶ Roadmap at Section 2(e).

³⁷ *Id.* at Section 2(e)(i).

³⁸ Roadmap at Section 2(e)(iii); *see also* Parallel Path at Section 2(c)(ii).

³⁹ TDI requests that “[t]he Commission should encourage further effort by having appropriate open and transparent bodies (e.g., CSRIC) study elements of the Roadmap,” including the privacy and reliability of the NEAD. *See* Letter from Claude L. Stout, Executive Director, TDI, to Marlene H. Dortch, Secretary, Federal Communications Commission (filed Jan. 22, 2015) at 2. We expect the providers to consult with relevant stakeholders, **including members of the CSRIC**, and emphasize the importance of an open and transparent process throughout the development of the NEAD Privacy and Security Plan.

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CMRS Commitments to Privacy Required	<p>The plan should appoint an administrator for the NEAD, prior to the database’s activation, who will serve as a single point of contact for the Commission on the security, privacy, and resiliency measures that will be implemented in the NEAD. We require that, as a condition of using the NEAD or any information contained therein to meet our 911 location requirements, and prior to use of the NEAD, CMRS providers must certify that they will not use the NEAD or associated data for any purpose other than for the purpose of responding to 911 calls, except as required by law.</p> <p>Additionally, should aspects of a CMRS provider’s dispatchable location operations not be covered by the NEAD privacy and security plan, the provider should file an addendum to ensure that the protections outlined in the NEAD plan will cover the provider’s dispatchable location transactions end-to-end.</p>			<p>response, we will evaluate the need to take any additional measures to protect the privacy, security, and resiliency of the NEAD and any associated data.</p> <p>To the extent location information (by itself or in conjunction with other data concerning the customer) constitutes proprietary information protected under Section 222 of the Communications Act,⁴⁰ we note that Section 222 expressly allows for the provision of a user’s call location information to certain emergency response providers, in order to respond to the user’s call for emergency services.⁴¹</p> <p>... nothing in this <i>Fourth Report and Order</i> should be construed to permit any use of customer or location information stored in the NEAD in any other context.</p>	
In-building Location Technologies - Discussion	<p>Commenters confirm that the feasibility of dispatchable location is linked to the proliferation of indoor, infrastructure-based technologies, including small cell technology,⁴² distributed antenna systems (DAS),⁴³ Wi-Fi access points,⁴⁴</p>			<p>Nearly all wireless phones are now equipped with Bluetooth and Wi-Fi capabilities, though some standardization work remains.⁵⁰ For example, TCS estimates that there are more than 126 million Wi-Fi</p>	46. 47.

⁴⁰ 47 U.S.C. § 222.

⁴¹ See 47 U.S.C. § 222(d)(4)(A) (providing that a telecommunications carrier may provide call location information concerning the user of a commercial mobile service or IP-enabled voice service “to a public safety answering point, emergency medical service provider or emergency dispatch provider, public safety, fire service, or law enforcement official, or hospital emergency or trauma care facility, in order to respond to the user’s call for emergency services”).

⁴² Rx Networks at 5; Qualcomm Comments at 5; iPosi Comments at 6; CTIA Comments at 22; TCS Comments at 19-20; 4G Americas Reply Comments at 2; AT&T Comments at 24; Rx Networks Comments at 5. *But see* TruePosition Reply Comments at 44 (arguing that small cells are not well-suited for dispatchable location, because handsets today are not equipped to communicate with small cells in the control plane layer, something it describes as “the very essence of E911.”).

⁴³ A DAS is “[a] network of spatially separated antenna nodes connected to a common source via transport medium that provides wireless service within a geographic area or structure.” DAS Forum, “Distributed Antenna Systems (DAS) and Small Cell Technologies Distinguished,” available at http://www.thedasforum.org/wp-content/uploads/2014/07/DAS-and-Small-Cell-Technologies-Distinguished_HNForum.pdf (last visited Jan. 21, 2015). Most commenters argue that DAS is not well suited for E911 purposes. See Rx Networks Comments at 6; Transit Wireless Comments at 3; TCS Comments at 20. *But see* Polaris Wireless Comments at 3; Rx Networks Comments at 6; Sprint Reply Comments at 8.

⁴⁴ Cisco already utilizes Wi-Fi access points to provide indoor location data, and is in discussions with competitors Aruba and Ruckus on how all three vendors – which comprise nearly 80 percent of the Wi-Fi market – can work together to provide a robust indoor location solution using Wi-Fi access points. See Cisco/TCS Sept. 12, 2014 *ex parte* at 17.

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	beacons, ⁴⁵ commercial location-based services (cLBS), ⁴⁶ institutional and enterprise location systems, ⁴⁷ and smart building technology. ⁴⁸ These technologies can be used in a location system information “stack” that would allow a CMRS provider’s location server to compile and compare location fixes from multiple sources, to identify and disregard inaccurate fixes, and otherwise synthesize available location data. ⁴⁹			access points nationwide, with approximately 40 million in commercial settings and 86 million in residential settings. ⁵¹ Cisco and TCS assert that, using Cisco’s wireless local area network and TCS’s gateway client technology for commercial location solutions, they can already provide a “dispatchable” location – indicating street address, building identifier, floor number, and suite number – along with a floor plan ... showing the location of the phone,” with accuracy between five and ten meters. ⁵²	

⁵⁰ See *CSRIC LBS Report* at 34; Galbraith, Craig, “Number of Wi-Fi Access Points Growing Quickly,” BILLING AND OSS WORLD (Sept. 6, 2013), available at <http://www.billingworld.com/news/2013/09/number-of-wi-fi-access-points-growing-quickly.aspx> (last visited Jan. 21, 2015); Apple, iPhone Tech Specs, available at <http://www.apple.com/iphone/specs.html> (last visited Jan. 21, 2015); Android, Developers, Connectivity, available at <http://developer.android.com/guide/topics/connectivity/bluetooth.html> (last visited Jan. 21, 2015); Bluetooth, “Mobile Telephony Market” (2014), available at <http://www.bluetooth.com/Pages/Mobile-Telephony-Market.aspx> (last visited Jan. 21, 2015). See also Panzarino, Michael, “The Open Secret Of iBeacon: Apple Could Have 250M Potential Units In The Wild By 2014,” TECHCRUNCH (Dec. 7, 2013), available at <http://techcrunch.com/2013/12/07/the-open-secret-of-ibeacon-apple-could-have-250m-units-in-the-wild-by-2014/> (last visited Jan. 21, 2015).

⁴⁵ See e.g., AT&T Comments at 3-4. Beacons are Bluetooth hardware devices that can be detected by and wirelessly exchange data with other Bluetooth-enabled devices, all of which are part of a Bluetooth network “stack.” See Android, “Bluetooth,” available at <http://developer.android.com/guide/topics/connectivity/bluetooth.html> (last visited Jan. 21, 2015).

⁴⁶ Commercial location-based services (cLBS) are applications that providers load, or consumers download, onto their phones to provide location services. *Third Further Notice*, 29 FCC Rcd at 2320-21 ¶ 127. cLBS are currently implemented in all major commercial mobile operating systems with multiple independent Wi-Fi access location databases, maintained by Google, Apple, and Skyhook, among others. See, e.g., Google, “Configure access points with Google Location Service,” available at <https://support.google.com/maps/answer/1725632?hl=en> (last visited Jan. 21, 2015); Cox, John, “Apple Leverages Wi-Fi location with latest acquisition,” NETWORK WORLD, Mar. 25, 2013, available at <http://www.networkworld.com/news/2013/032513-apple-wifislam-268054.html> (last visited Jan. 21, 2015); Skyhook, Coverage Area, available at <http://www.skyhookwireless.com/location-technology/coverage.php> (last visited Jan. 21, 2015).

⁴⁷ Cisco submits that it would not be difficult to leverage its existing location systems for E911 indoor location accuracy use, and that doing so would not raise the kind of security concerns associated with using crowdsourced Wi-Fi data. See Cisco/TCS Sept. 12, 2014 *ex parte* at 11 (“Enterprises deploying [local area] networks do so for their own benefit” and “Enterprises manage and maintain their location infrastructure as it’s \$\$ to them.”) and 15 (ranking information from enterprise-based networks as more trustworthy than crowdsourced location information); Cisco Comments at 15 (“Although these consumer systems historically were viewed as untrustworthy, they can allow PSAPs unprecedented location accuracy when coupled with currently deployed CMRS E911 location technologies and trustworthy location information from Enterprise Wi-Fi.”).

⁴⁸ “Smart buildings” integrate hardware like Wi-Fi antennas, beacons, motion and light sensors, and corresponding wiring into a building’s infrastructure, and shares information from each source to optimize building system function with respect to, *inter alia*, heating and ventilation, power consumption, equipment maintenance, and security. See Institute for Building Efficiency, “What is a Smart Building?,” available at <http://www.institutebe.com/smart-grid-smart-building/What-is-a-Smart-Building.aspx> (last visited Jan. 21, 2015).

⁴⁹ See, e.g., Polaris Wireless Comments (corrected) at 3-4 (stating that its “hybrid model includes additional layers above the base layer, such as location data derived from [DAS], metro cells and pico cells, data derived from WiFi access points, and finally data derived from sensors,” and that this “stack of location” would enable it to achieve compliance with the Commission’s proposed requirements).

⁵¹ Letter from H. Russell Frisby, Counsel, TeleCommunication Systems, Inc., to Marlene H. Dortch, Secretary, Federal Communications Commission (filed Jan. 16, 2015), Attachment at 28 (TCS Jan. 16 *Ex Parte*).

⁵² Cisco/TCS Sept. 12, 2014 *ex parte* at 2

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Work by Standards Groups	The 3 rd Generation Partnership Project (3GPP) and Open Mobile Alliance (OMA) have been in cooperative efforts to enhance LTE to meet public safety application requirements, and 3GPP has been prioritizing indoor positioning in developing its most recent release for LTE. ⁵³ In addition, CSRIC IV Working Group 1 was charged to examine whether CMRS providers transitioning to VoLTE platforms should still heed recommendations from an earlier CSRIC report on testing methodology and parameters as they began “blending” GPS handset-based location data with network-based data, per Section 20.18(h) of the Commission’s rules. ⁵⁴			The parties also agree to sponsor standards activities to operationalize the display of dispatchable location in pre-NG911 PSAPs. ⁵⁵	52. 53
“Floor not Ceiling”	We encourage CMRS providers to take advantage of the potential of rapidly-developing location technology to exceed the thresholds and timelines established by this order. In addition, we encourage CMRS providers to work with public safety organizations and consumer organizations, including disability organizations, to develop new and innovative solutions that will make all Americans safer.			Terms: the Roadmap ⁵⁶ Parallel Path ⁵⁷	8.
Published in the Federal Register	<p align="center">Section 20.18(i)(2)(ii)(A) rule requires that, within three years of the effective date of rules, CMRS providers shall deliver to uncompensated barometric pressure data from any device capable of delivering such data to PSAPs.</p> <p align="center">Section 20.18(i)(2)(ii)(B) requires that the four</p>			The amendments to 47 CFR 20.18(i)(2)(ii)(A) and (B); 20.18(i)(2)(iii) and (iv); 20.18(i)(3)(i), (ii), and (iii); 20.18(i)(4)(i), (ii), (iii) and (iv); 20.18(j)(2) and (3), published at 80 FR 11806, March 4, 2015, are effective August 3, 2015.	

⁵³ See Flore, Dino, 3GPP RAN Chairman, “Initial priorities for the evolution of LTE in Release-13” (Sept. 20, 2014), available at <http://www.3gpp.org/news-events/3gpp-news/1628-rel13> (last visited Dec. 29, 2014). See also Korinek, Frank and Vadalà, Francesco, “Mobile Network Operators Can Offer Strong Services for Public Safety Networks with the Help of OMA Standards,” 911 MAGAZINE (May 12, 2014), available at <http://openmobilealliance.org/mobile-network-operators-can-offer-strong-services-for-public-safety-networks-with-the-help-of-oma-standards/> (last visited Dec. 29, 2014) (OMA 911 Article).

⁵⁴ See CSRIC IV, Working Group 1, Final Report – Location Accuracy and Testing for Voice-over-LTE Networks (Sept. 2014) at 3, available at <http://transition.fcc.gov/pshs/advisory/csric4/CSRIC%20IV%20WG1%20TG2%20Report.pdf> (last visited Jan. 29, 2015) (CSRIC VoLTE Report).

⁵⁵ Roadmap at Section 2(d)(iii). [Voluntary part of Roadmap]

⁵⁶ On November 18, 2014, APCO, NENA, AT&T Mobility, Sprint Corporation, T-Mobile USA, Inc., and Verizon Wireless (collectively, “Roadmap Parties”) submitted the Roadmap. On November 20, 2014, we sought expedited comment on the Roadmap.⁵⁶ We received extensive comment in response, both supportive and critical of the Roadmap.

⁵⁷ See Competitive Carrier Association *Ex Parte* Letter (filed Jan. 23, 2015) (Parallel Path Cover Letter), and Competitive Carrier Association *Ex Parte* Letter, Attachment “Parallel Path” (filed Jan. 16, 2015) (Parallel Path).

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DEADLINES	REQUIREMENT	% OF CALLS	CALL TYPES	ADDITIONAL INFORMATION	Para
	<p>nationwide providers submit to the Commission for review and approval a reasonable metric for z-axis (vertical) location accuracy no later than 3 years from the effective date of rules.</p> <p>Section 20.18(i)(2)(iii) requires CMRS providers to certify compliance with the Commission's rules at various benchmarks throughout implementation of improved location accuracy.</p> <p>Section 20.18(i)(2)(iv) provides that PSAPs may seek Commission enforcement of the location accuracy requirements within their geographic service area, as long as they have implemented policies that are designed to obtain all location information made available by CMRS providers when initiating and delivering 911 calls to the PSAP, and, prior to seeking Commission enforcement, a PSAP must provide the CMRS provider with 30 days written notice, and the CMRS provider shall have an opportunity to address the issue informally.</p> <p>Section 20.18(i)(3)(i) requires that within 12 months of the effective date, the four nationwide CMRS providers must establish the test bed described in the Fourth Report and Order, which will validate technologies intended for indoor location.</p> <p>Section 20.18(i)(3)(ii) requires that beginning 18 months from effective date of rules, nationwide CMRS providers providing service in any of the six Test Cities identified by ATIS (Atlanta, Denver/Front Range, San Francisco, Philadelphia, Chicago, and Manhattan Borough of New York City) must collect and report aggregate data on the location technologies used for live 911 calls.</p> <p>Section 20.18(i)(3)(iii) requires that CMRS providers shall retain testing and live call data gathered pursuant to this section for a period of 2 years.</p> <p>Section 20.18(i)(4)(i) and (ii) require that no later</p>				

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	<p>than 18 months from the effective date, each CMRS provider shall submit to the Commission its plan for implementing improved indoor location accuracy and a report on its progress toward doing so. Non-nationwide CMRS providers will have an additional 6 months to submit their progress reports. All CMRS providers shall provide an additional progress report no later than 36 months from the effective date of the adoption of this rule. The 36-month reports shall indicate what progress the provider has made consistent with its implementation plan.</p> <p>Section 20.18(i)(4)(iii) requires that prior to activation of the NEAD but no later than 18 months from the effective date of the adoption of this rule, the nationwide CMRS providers shall file with the Commission and request approval for a security and privacy plan for the administration and operation of the NEAD. This requirement is necessary to ensure that the four nationwide CMRS providers are building in privacy and security measures to the NEAD from its inception.</p> <p>Section 20.18(i)(4)(iv) requires that before use of the NEAD or any information contained therein, CMRS providers must certify that they will not use the NEAD or associated data for any non-911 purpose, except as otherwise required by law.</p> <p>Section 20.18(j) requires CMRS providers to provide standardized confidence and uncertainty (C/U) data for all wireless 911 calls, whether from outdoor or indoor locations, on a per-call basis upon the request of a PSAP.</p> <p>Section 20.18(k) requires that CMRS providers must record information on all live 911 calls, including, but not limited to, the positioning source method used to provide a location fix associated with the call, as well as confidence and uncertainty data. This information must be made available to PSAPs upon request, as a measure to promote transparency and accountability for this set of rules.</p>				

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Q: NENA, etc, get data from Live Calls in the 6 cities – is that all they get? PSAPs get live call data for their entire service area. 148.?

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Technology	Test Bed Call Performance	Actual 911 Call Performance	Carrier Performance	
Technology A	<50 m for 90% of test calls	<50 m for 50% of live calls	$90\% * 50\% = 45\%$	$45\% + 20\% = 65\%$
Technology B	<50 m for 100% of test calls	<50 m for 20% of live calls	$100\% * 20\% = 20\%$	

- *Technologies should perform at an ideal level in the test bed*
- *Performance in the test bed will be certified by the provider and will serve as a baseline against which the live call performance of that technology will be*

Carrier Performance	Year	FCC Benchmark
65%	2	40%
	3	50%
	5	70%
	6	80%

