



**Federal Communications Commission
Public Safety and Homeland Security Bureau**



Wireless Location Accuracy

**Michigan Emerging Technology Conference
Traverse City, Michigan
April 17, 2019**

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FCC Horizontal Accuracy Requirements



Wireless carriers must provide

- (1) x/y location within 50 meters, OR
- (2) Dispatchable Location (civic address, floor level, room/office/apartment number)

for the following percentages of wireless 911 calls:

Date	Benchmark
2017	40 percent of all wireless 911 calls
2018	50 percent of all wireless 911 calls
2020	70 percent of all wireless 911 calls
2021	80 percent of all wireless 911 calls



FCC Vertical Accuracy Requirements



Date	Requirement
2021	<p><u>First vertical accuracy benchmark:</u></p> <p>Nationwide carriers must deploy either (1) Dispatchable Location, or (2) Z-Axis technology, in the <u>top 25</u> Cellular Market Areas (CMAs):</p> <ul style="list-style-type: none">• In CMAs where Dispatchable Location is used: NEAD must contain reference points equal to 25 percent of the CMA population• In CMAs where Z-Axis is used: Carriers must deploy Z-axis technology to cover 80 percent of the CMA population
2023	<p><u>Second location accuracy benchmark:</u></p> <p>Nationwide carriers must meet the above vertical accuracy thresholds (using Dispatchable Location or Z-Axis) in <u>top 50</u> CMAs</p>
	<p>Non-nationwide carriers have one additional year (i.e., until 2022 and 2024) to meet the above requirements</p>



Z-Axis Accuracy Standard



- 2015 Wireless E911 Location Accuracy Order -- Required carriers to conduct Z-axis testing and submit a proposed metric to the Commission for approval
- Stage Z Testing (2017-2018)
 - Testing conducted in Atlanta, San Francisco, and Chicago
 - Two vendors (NextNav and Polaris) participated
 - Additional testing (Stage Za) scheduled for later this year
- August 2018: CTIA proposed Z-axis metric of +/-5 meters
- March 2019: FCC adopted NPRM (FCC 19-20) proposing Z-axis metric of +/-3 meters
 - 3-meter standard more likely to yield floor-level accuracy
 - Proposed rules require testing to validate technologies that can deliver 3-meter accuracy for 80 percent of indoor calls
 - NPRM comments due May 20; replies due June 18

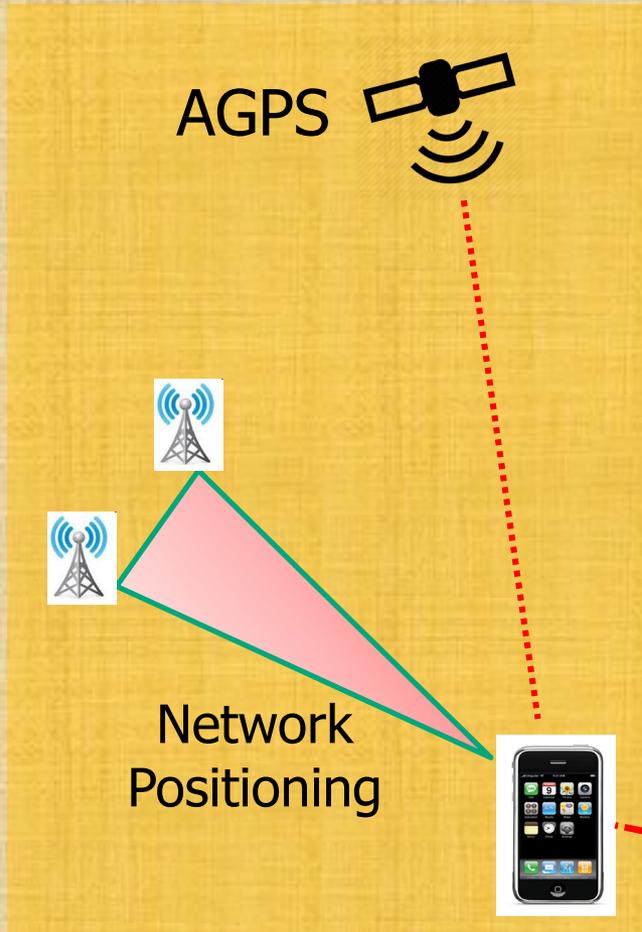


Improvements in Wireless Location Technology

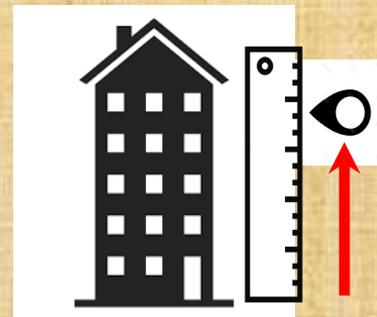


Legacy: Outdoor-focused

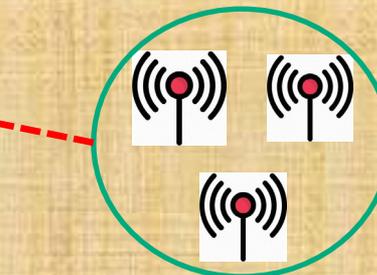
New: Indoor-focused



National
Emergency
Address
Database (NEAD)



Vertical
Location (Z-
Axis)



Device-Based
Hybrid (DBH)
Location



Device-Based Hybrid Location Technologies

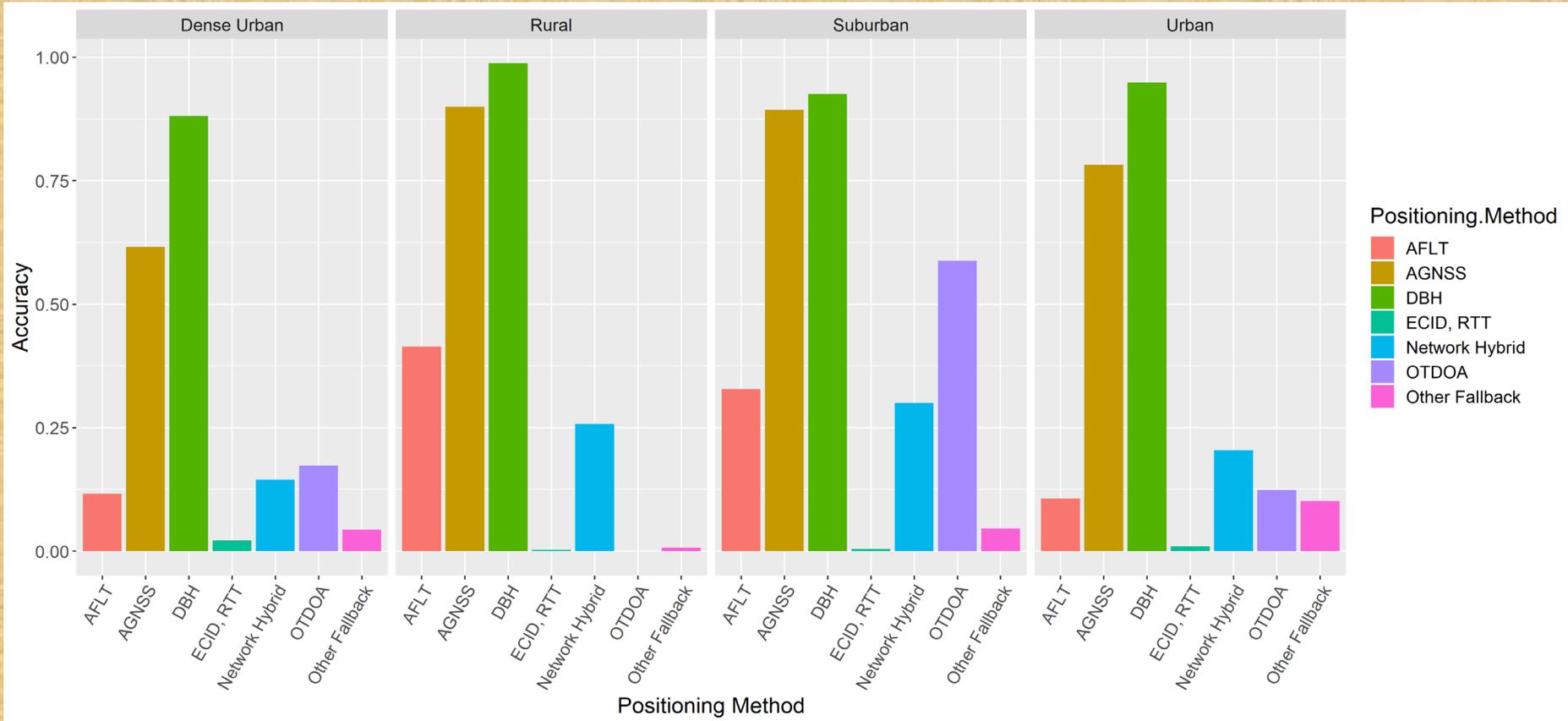


- Apple -- Hybridized Emergency Location (HELO)
 - Launched in 2015
 - Since 2016, used by AT&T and T-Mobile for location of live 911 calls from iPhone users
 - June 2018 – Partnership with RapidSOS
- Google – Emergency Location Service (ELS)
 - Launched in 2016
 - Supports emergency call location in 14 countries
 - Sept 2018 – US launch of ELS through partnerships with T-Mobile and RapidSOS



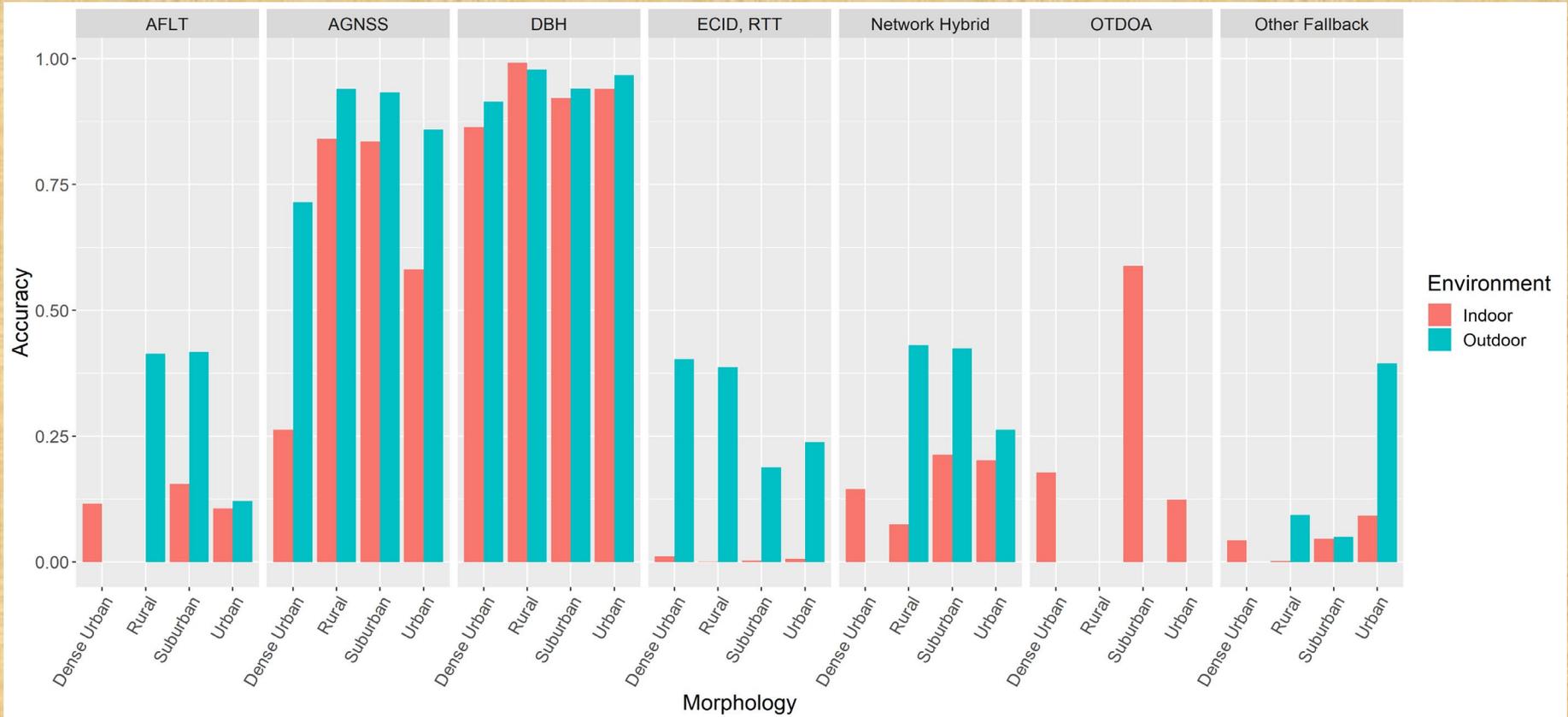
Test Performance

By Morphology and Location Technology





Indoor/Outdoor Test Performance By Location Technology and Morphology





Current Deployment of Device-Based Hybrid Location



Current Deployment of HELO and ELS by Wireless Carriers:

	AT&T	Sprint	T-Mobile	Verizon
iOS (HELO)	Yes	No	Yes	No
Android (ELS)	No	No	Yes	No

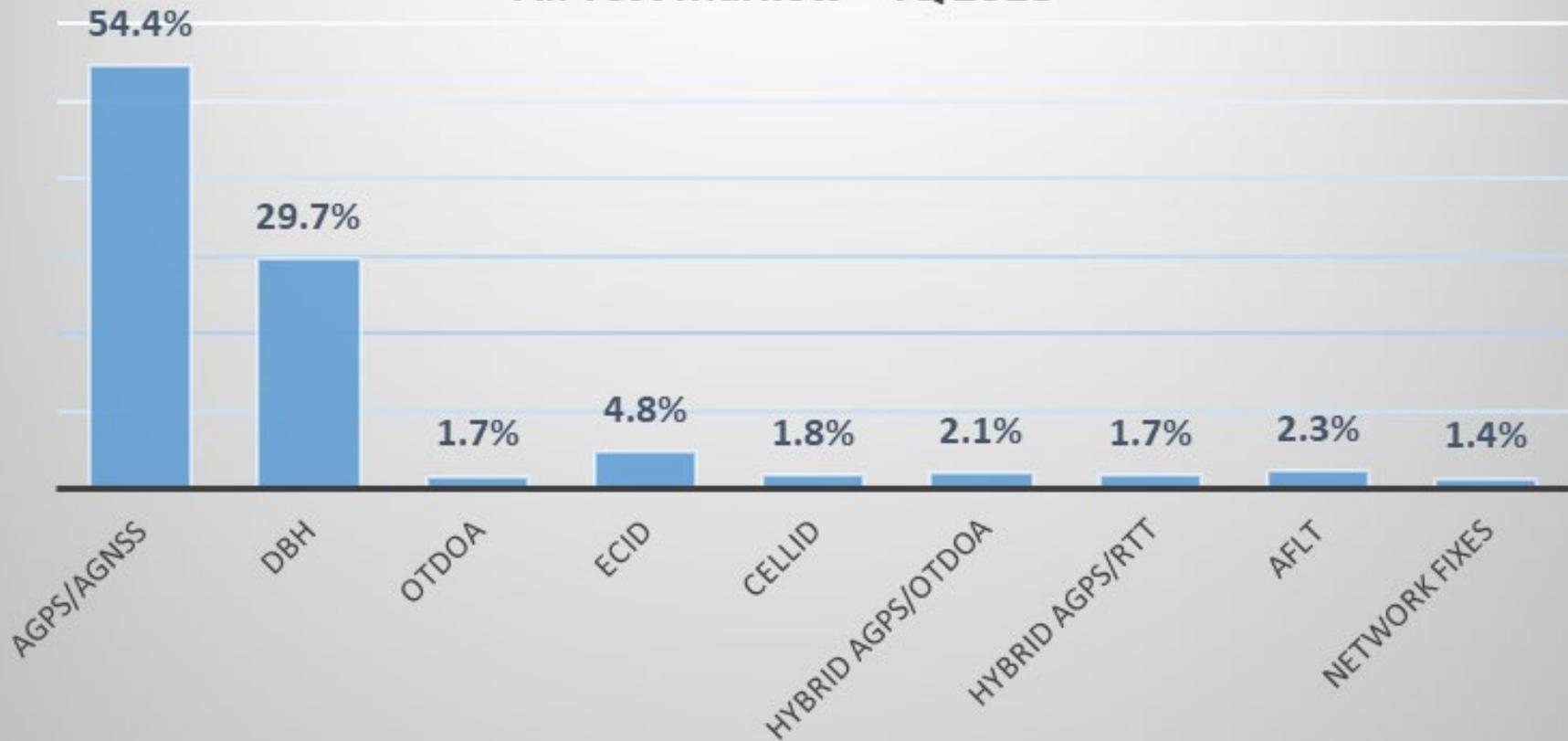
- CTIA Announcement (Sept 2018) – All four major carriers committed to integrate DBH with existing 911 location technologies in 2018
- Level of DBH integration varies by carrier; some are limiting deployment to new devices; to date, only one major carrier has fully integrated both HELO and ELS
- PSAPs also have the option of receiving supplemental DBH data from Android and iOS devices delivered by alternative path (RapidSOS approach)



Live 911 Call Data – 4Q 2018



**Aggregate 911 Call Volumes
by Location Technology
All Test Markets - 4Q 2018**





911 Accuracy Data Indicators



- Most wireless 911 calls originate in suburban areas, with smaller percentages coming from urban, dense urban, and rural areas
- AGPS remains the most common technology used for 911 call location
- AGPS performs well for outdoor calls and in suburban and rural areas, but performs less well for indoor calls in urban and dense urban areas
- Device-based hybrid (DBH) location is being used for a low but increasing percentage of live 911 calls
- DBH produces the highest accuracy in all morphologies (dense urban, urban, suburban, rural) for both indoor and outdoor calls



National Emergency Address Database (NEAD)



- National database being developed by the nationwide wireless carriers to support provision of dispatchable location with 911 calls
- Database will be populated with media access control (MAC) addresses of wireless access points, such as Wi-Fi and Bluetooth nodes
 - 20 million access points already have been loaded in the NEAD
- NEAD is still in developing and testing stage – it is not currently being used for 911 call location
 - NEAD performance testing is under way in the industry test bed
- Once the NEAD is activated, when a wireless caller dials 911 in a building with NEAD-registered access points, the carrier will deliver dispatchable location information (street address, floor, room number) rather than x/y/z coordinates to the PSAP
- NEAD can only be used for emergency location purposes and must protect consumer privacy
 - As required by 2015 order, CTIA submitted a NEAD privacy plan to FCC, which was approved in November 2017



RAY BAUM's Act – Dispatchable Location



- Part of Consolidated Appropriations Act of 2018, Pub. L. 115-141, enacted March 23, 2018
- Section 506: within 18 months (by September 2019), the Commission must *“conclude a proceeding to consider adopting rules to ensure that the dispatchable location is conveyed with a 9-1-1 call, regardless of the technological platform used and including with calls from multi-line telephone systems”*
 - “Dispatchable location” is defined as “the street address of the calling party, and additional information such as room number, floor number, or similar information necessary to adequately identify the location of the calling party”
 - “911 call” is defined to include voice calls or messages sent by other means
- Safe harbor for pre-existing location accuracy rules: FCC can consider information from prior location accuracy proceedings but is not required to reconsider conclusions from such proceedings



Implementing Kari's Law and RAY BAUM's Act



- Notice of Proposed Rulemaking adopted September 2018 (FCC 18-132)
- Proposes to implement Kari's Law (911 direct dial and notification rules for MLTS) and RAY BAUM'S Act Section 506
- Seeks comment on requiring dispatchable location for MLTS 911 calls and adding dispatchable location requirements for fixed telephony, interconnected Voice over Internet Protocol (VoIP), and Internet-based Telecommunications Relay Services (TRS)
- Does not propose changes to wireless location accuracy rules already in place



FCC Resources



FCC Website	https://www.fcc.gov
Indoor Location Accuracy Benchmarks	https://www.fcc.gov/public-safety-and-homeland-security/policy-and-licensing-division/911-services/general/location-accuracy-indoor-benchmarks
FCC Master PSAP Registry	https://www.fcc.gov/general/9-1-1-master-psap-registry
FCC Text-to-911 PSAP Registry	https://www.fcc.gov/files/text-911-master-psap-registryxlsx
Text-to-911 FAQs	https://www.fcc.gov/consumers/guides/text-911-quick-facts-faqs
911 Fee Reports	https://www.fcc.gov/general/911-fee-reports
Task Force on Optimal PSAP Architecture	https://www.fcc.gov/about-fcc/advisory-committees/general/task-force-optimal-public-safety-answering-point
CSRIC	https://www.fcc.gov/about-fcc/advisory-committees/communications-security-reliability-and-interoperability-council-0
Emergency Alerts	https://www.fcc.gov/how-public-safety-officials-can-issue-emergency-alerts
Public Safety Support Center	https://www.fcc.gov/general/public-safety-support-center