few years ago, marketers started putting tracking mechanisms in trashcans to follow smartphones. A smartphone with enabled Wi-Fi will continually broadcast known Wi-Fi networks that they have previously connected to. Embedded in this broadcast is the smartphone media access control (MAC) address.1 A MAC address is the unique identifier that is coded into every computer. If your device allows, you can go through the onerous process of changing your MAC address, but not many people do this. If you, holding your smartphone, walk past a tracking device consistently, you might receive targeted advertising. This targeted advertising would alert you (via a phone notification) of deals at nearby stores, hotels or transportation. Needless to say, commercial entities have had the ability to track cell phone caller’s location for years.

The above scenario is a rudimentary system to locate cell phones. So, if marketing companies can track cell phones why can’t emergency services have the location of callers? To start to answer that question, you must know how the emergency caller’s location is obtained today. When a caller dials 9-1-1, their location is initially based upon the cell phone tower address (Phase 1). After approximately 30 seconds, their location is “triangulated” with cell phone tower sectors. On average, this will provide the caller’s location between 50-100 meters if they are outside, and 150-300 meters (on the horizontal axis only) if they are inside.

In the United States, there are approximately 240 million 9-1-1 calls a year and around 80 percent of those calls are made from cell phones. That means that approximately 192 million phone calls per year gain location information through this method. Of course, as all public safety telecommunicators (PSTs) know, further interrogation is required in order to know where the caller is. We all know the inherent flaws that this method has and how better location information coming into the emergency communications center (ECC) would benefit public safety and the public.

FEDERAL COMMUNICATIONS COMMISSION (FCC) 4TH REPORT AND ORDER

In 2015, the FCC directed wireless carriers to address the location accuracy challenge with a goal of improving indoor and outdoor location accuracy. In this report, the FCC recognized that this was a critical
problem facing the 9-1-1 industry. Rightfully so, the FCC determined that a solution to location accuracy cannot be solved “overnight” and no single technological approach will solve this problem. The FCC also established deadlines for wireless carriers to deliver more accurate results.

Below are the horizontal location mandates:

All CMRS providers must provide (1) dispatchable location, or (2) x/y location within 50 meters, for the following percentages of wireless 911 calls within the following timeframes, measured from the effective date of rules adopted in this Order (“Effective Date”):

- Within 2 years: 40 percent of all wireless 911 calls.
- Within 3 years: 50 percent of all wireless 911 calls.
- Within 5 years: 70 percent of all wireless 911 calls.
- Within 6 years: 80 percent of all wireless 911 calls.

Below are the vertical location mandates:

All CMRS providers must also meet the following requirements for provision of vertical location information with wireless 911 calls, within the following timeframes measured from the Effective Date:

- Within 3 years: All CMRS providers must make uncompensated barometric data available to ECCs from any handset that has the capability to deliver barometric sensor data.
• Within 3 years: Nationwide CMRS providers must use an independently administered and transparent test bed process to develop a proposed z-axis accuracy metric, and must submit the proposed metric to the Commission for approval.
• Within 6 years: 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 Cellular Market Areas (CMAs):
• Where dispatchable location is used: the National Emergency Address Database (NEAD) must be populated with a total number of dispatchable location reference points in the CMA equal to 25 percent of the CMA population.
• Where z-axis technology is used: CMRS providers must deploy z-axis technology to cover 80 percent of the CMA population.
• Within 8 years: Nationwide CMRS providers must deploy dispatchable location or z-axis technology in accordance with the above 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 these benchmarks.
• Also to note, the FCC defines dispatchable location as:
  A location delivered to the ECC 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 ECC.

**STANDARDS FOR LOCATION ACCURACY TESTING**

Professional organizations, like APCO, have worked with the FCC, wireless carriers and industry vendors for years to solve this technical problem. As a member of the Alliance for Telecommunications Industry Solutions (ATIS), APCO assists in the development of E9-1-1 technical standards and industry best practices from a combination of working group efforts. Within ATIS, there is a committee titled Emergency Services Interconnection Forum (ESIF). ESIF defines the test methodologies for location accuracy. The Emergency Location Committee (ELOC) defines the technical requirements for the National Emergency Address Database (NEAD).

In order to ensure that location accuracy testing is performed in a systematic way, ATIS is charged with creating consensus-based standards that thoroughly examine testing methodology. Test Bed LLC was established and through an agreement with ATIS a Test Bed Program Manager was contracted to oversee the testing process. APCO, NENA, the four national wireless CMRS providers, and industry partners are actively involved in the development of the above mentioned documents.

When the testing methodologies are complete, CTIA directs the Test Best LLC, Program Manager, and Administrator to execute the test plan.

**CTIA WORKING GROUPS**

CTIA working groups identify gaps between standards and implementation, and support activities to meet the roadmap commitments and FCC requirements, including a recommended Z-axis metric, dispatchable location demonstration and NEAD privacy and security. To assist with these efforts, CTIA established two LLC programs. In addition to the Test Bed LLC mentioned earlier, the NEAD LLC was established to operationalize activities, including funding, vendor selection, and adherence to ATIS standards. Both LLCs have a technical advisory committee (TAC) and steering committee made up of carriers and public safety representatives.

As noted above, the Test Bed Program Manager oversees the testing for location accuracy technologies. Test Bed and NEAD goals are to enhance location accuracy in accordance with the FCC requirements.

**NEAD**

The NEAD LLC was established to launch the NEAD platform. This platform is comprised of two interfaces:
• National Emergency Address Database (NEAD) — The interface that a wireless carrier location server uses to query the NEAD to obtain civic addresses which the location server can then use to determine the dispatchable location to forward to the ECC in response to 9-1-1 calls.
• National Emergency Address Manager (NEAM) — The provisioning interface which is used by providers to load and validate reference points to the NEAD to be used in providing civic addresses to carrier location server in response to an NEAD query.

In the projected call flow process that utilizes the NEAD, the call would start with a wireless 9-1-1 call. This call would go to the ECC and congruently enter an access network. This access network then queries a serving core network. The serving core network interfaces with the NEAD platform and delivers a location to PSTs.

**TEST BED**

Test Bed LLC was established to test and evaluate existing and emerging location technologies. These tests are conducted in a variety of morphologies: dense urban, urban, suburban and rural. Though APCO serves on the Test Bed LLC TAC, the information obtained in this LLC is confidential and proprietary.

**CLASS OF SERVICE**

To operationalize the new location information that ECCs will see in the future, three new classes of services will be utilized.
• WCVC – Civic oriented data (address) in addition to traditional WPH2 geodetic X, Y and uncertainty data associated with the caller’s location (where available).
• WDL1 – The civic oriented data is expected to meet the medium-quality level criteria to be “dispatchable” by building zone quadrant but also indicates a less detailed location than WDL2.
• WDL2 – The civic oriented data is expected to meet the highest quality level criteria to be “dispatchable”, and indicates that the sub-address location within the building address (i.e., a street address plus sufficient information, such as floor and
The FCC 4th Report and Order seeks to increase location accuracy for indoor emergency calls only.

a. True  

b. False

2. Today, location accuracy is approximately 50–100 meters if the caller is outside.

a. True  

b. False

3. WDL1 is expected to meet the highest quality level criteria to be dispatchable.

a. True  

b. False

4. The three new classes of service will be:

a. WCVC  

b. WDL1  

c. WDL2  

d. All of the Above

5. What does the NEAM stand for?

a. National Emergency Address Manager  

b. Number for Emergency Address Manager  

c. National Emergency Address MSAG  

d. National Emergency Services Address Manager

6. What does NEAD stand for?

a. National Emergency Number Database  

b. National Emergency Address Database  

c. National Emergency Address Directory  

d. Number for Emergency Address Directory

7. What platform is utilized to load and validate reference points into the NEAD?

a. NEAM  

b. MSAG  

c. CPE  

d. CAD

8. Phase 1 location is initially based upon the cell phone device.

a. True  

b. False

9. The Test Bed Program Manager develops the testing methodology independently.

a. True  

b. False

10. APCO and NENA actively work with the four national wireless CMRS providers, and industry partners to achieve location accuracy.

a. True  

b. False

References
1. https://www.forbes.com/sites/jameslyne/2013/08/13/is-your-trash-can-spying-on-your-phone/#568ef75d263b
2. Insert 4th R&O footnote. Page 4
3. Insert FCC 4th R&O footnote page 4 and 5

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