Improving 9-1-1 Location Accuracy

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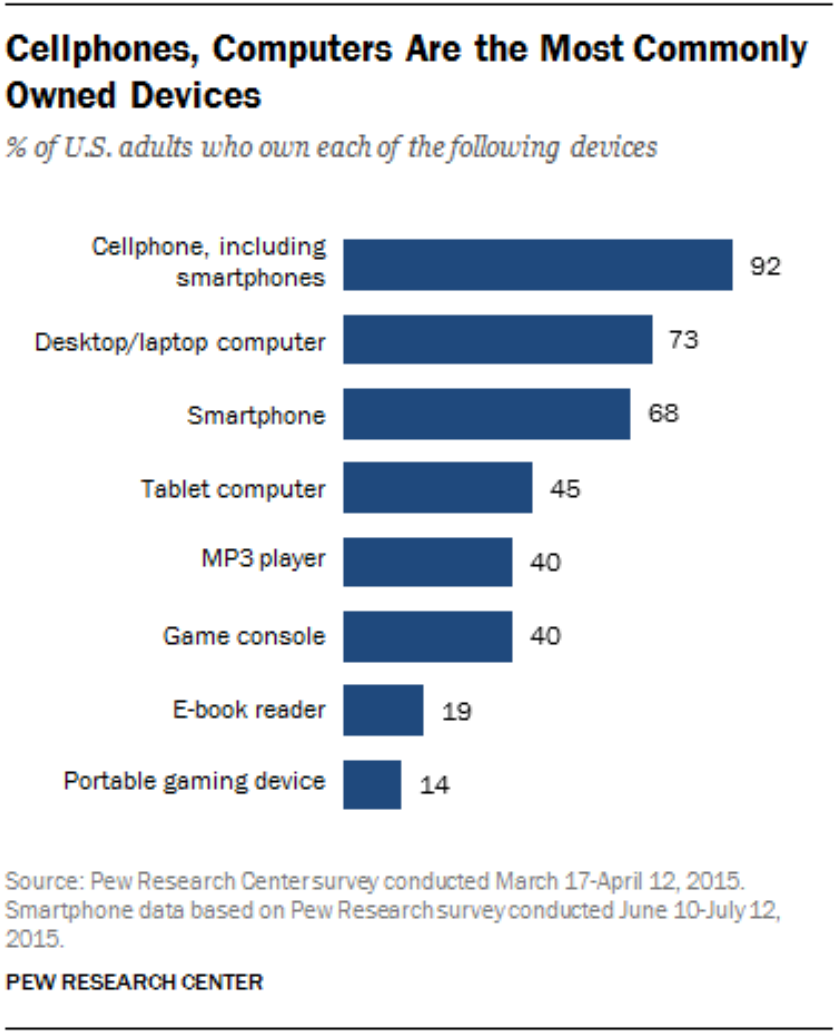
Overview

- The road to get here
- Highlights of new FCC rules
- What this means for APCO members
- What to expect next
- Q&A

Evolving 9-1-1 Calling Trends

- Consumers are replacing traditional landline phones with wireless devices, and more calls are being made while indoors.
- Even where a wireline telephone is available, the first device reached for to call 9-1-1 is often a cell phone.
- 70-80% of 9-1-1 calls are made from a cell phone.



Evolving 9-1-1 Calling Trends

- The location information currently available for wireless calls from indoor locations **lacks any of the address-specific information** provided with most wireline calls, and is **generally inferior** to location information available for outdoor wireless calls.
- Previously **no location accuracy requirements** for wireless 9-1-1 calls made indoors.

A Brief History

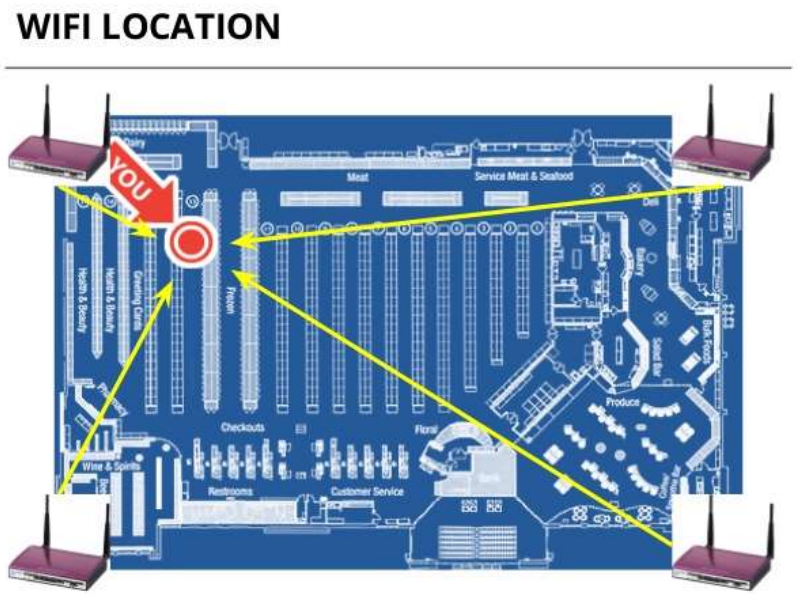
- **FCC *Notice of Proposed Rulemaking*** (Feb. 2014)
  - Addressing both outdoor and indoor calls.
  - Built on existing regulatory/technical models (outdoor tech producing estimates in horizontal plane only).
  - Invited public safety/others to develop alternate proposals.
- **APCO, NENA, & Major Carriers Roadmap for Improving 911 Location Accuracy** (Nov. 2014)
  - Responding to FCC invitation for alternate proposals.
  - Additional assurances in December.
- **FCC *Order*** (Jan. 2015)

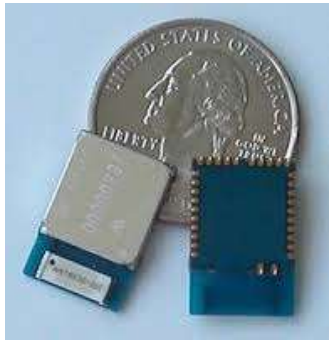
APCO Goals

- Meaningful, dispatchable location information for wireless 9-1-1 calls
- Objective testing in realistic environments (Test Bed)
- Verifiable with real world performance monitoring (Actual 9-1-1 call data)
- Take advantage of technology and innovation available in the consumer marketplace (vs. specialized, proprietary)
- Technology-neutral

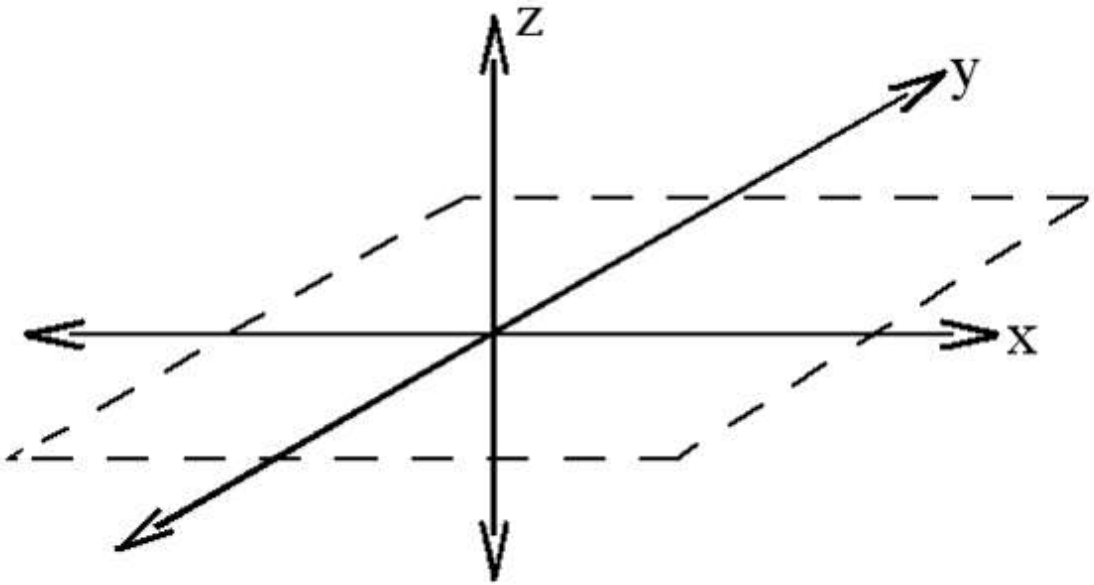
Contemplated Solutions

Dispatchable Reference Points





Z-Axis



What is a "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"
  - Example - 100 Main Street, Apt. 504
  - (Preferable to a position estimate of: 38.80489, -77.05631, + 10m above sea level)

Equivalent to wireline location information.

What's In and What's Out

IN

- Dispatchable location solution for indoor 9-1-1 calls
- Setting PSAPs on tech-neutral path using competitive sources
- Fully transparent test bed
- Compliance measure with actual 9-1-1 data

- Indoor problem not yet solved
- Specialized, static, single-source proprietary solutions
- Limited test bed
- Compliance measure by carrier drive-testing

OUT

New Rules

- Benchmarks
- Indoor Performance:
  - Test bed
  - Test regions
  - Actual 9-1-1 call data
- Solutions: DL (NEAD) & Z-Axis
- Reports and certifications
- Confidence and uncertainty information

Benchmarks

- **Horizontal**
  - 50m (x, y), or a Dispatchable Location for:
    - 40% of calls within 2 years (April 2017)
    - 50% of calls within 3 years (April 2018)
    - 70% of calls within 5 years (April 2020)
    - 80% of calls within 6 years (April 2021)
  - Non-nationwide carriers have more time at years 5 and 6 tied to VoLTE deployment

Benchmarks

- **Z-Axis**
  - Uncompensated barometric within 3 years (Aug. 2018)
  - Develop z-axis metric within 3 years (Aug. 2018)
- **Deployment**
  - In top 25 CMAs within 6 years (April 2021) and top 50 CMAs in 8 years (April 2023):
    - Populate NEAD with ref points = 25% of population of CMA,

      OR
    - Deploy z-axis technology to cover 80% of population of CMA

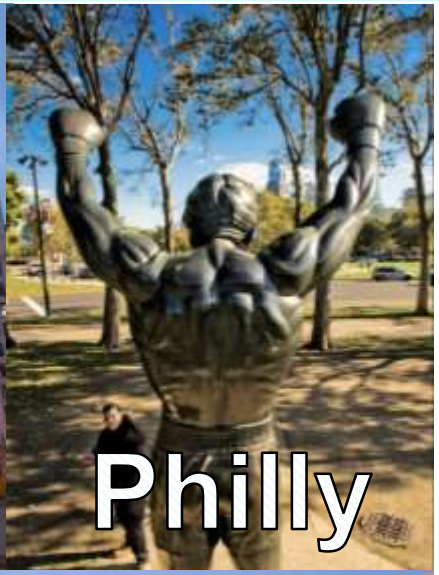
Test Bed Features

- Open, transparent, competitive, and technology-neutral
- Real world environments/all morphologies
- Managed by non-governmental entity
- Will demonstrate and characterize performance for existing and new tech
- Launch by August 2016 and subject to various FCC requirements

Actual 9-1-1 Call Data

- Beginning in February 2017, aggregate data reported quarterly
- Will show percent of time each location method was used (satellite, DL, z-axis, other technologies or hybrids) to meet accuracy requirements

Test Region Data



Compliance Data

Technology	Test Bed Performance	Delivery with Actual 9-1-1 Calls	Carrier Performance	FCC Requirements
A	<50m for 90% of tests	Technology A was delivered for 50%	90% x 50% = 45%	
B	<50m for 100% of tests	Technology B was delivered for 20%	100% x 20% = 20%	
			45% + 20% = 65%	2 Year Benchmark: 40% 3 Year Benchmark: 50% 5 Year Benchmark: 70% 6 Year Benchmark: 80%

Reports

At 18 months (February 2017):

- Start reporting actual 9-1-1 data
- Initial implementation plan for meeting indoor requirements generally
- Progress report on deployment plans and implementation of indoor requirements
- NEAD privacy and security plan

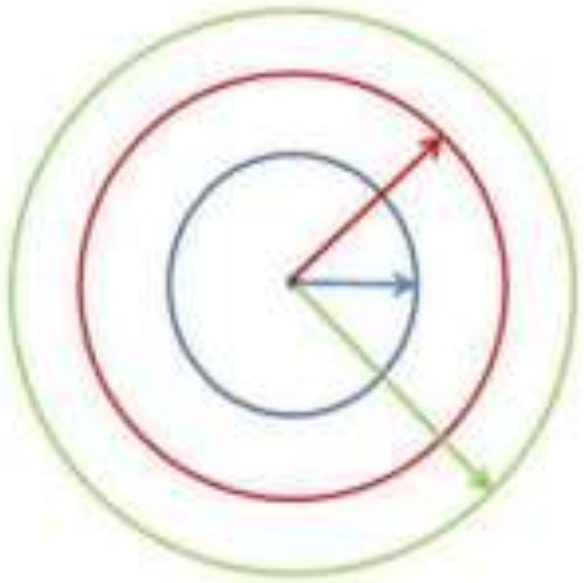
At 3 years (August 2018):

- Progress report on implementation plan and assessment of DL deployment efforts
- Submit z-axis metric

Certifications

- Compliance
  - Within 60 days of each horizontal & vertical location benchmark
- Deployment
  - Technology deployed across carriers' networks is consistent with test bed deployments AND deployments in test cities for actual 9-1-1 data
- NEAD
  - Prior to use of the database, CMRS providers must certify they will only use NEAD for purpose of responding to 9-1-1 calls

Confidence and Uncertainty



	Radial Uncertainty	Confidence
Blue	35 m	67%

- Set confidence level at 90%, allow uncertainty to vary
- Standardize the way this information is delivered and presented to PSAPs
- Delivered for all wireless calls if requested by PSAP

APCO's Role

- Assist with development of the test bed and NEAD
- Participate in standards development
- Stakeholder outreach
- Assessment of z-axis and dispatchable location solutions
- Assess location accuracy based on actual 9-1-1 call data and test bed performance
- Participate in the Advisory Group and Working Groups

CTIA Advisory Group

- Mission:
  - Provide advice and input from a diverse body of interested stakeholders to assist the activities of the Working Groups
- Participants include:
  - APCO, NASNA, IACP, IAFC, NSA, NASEMSO, PCIA, TDI, NCSL, NGA, Natl League of Cities, CEA, CCA, American Foundation for the Blind, and others.

CTIA Working Groups

Working Groups:

1. Test Bed
2. NEAD
3. Z-Axis
4. Standards
5. PSAP Implementation
6. Demonstration
7. Outreach

Test Bed RFP

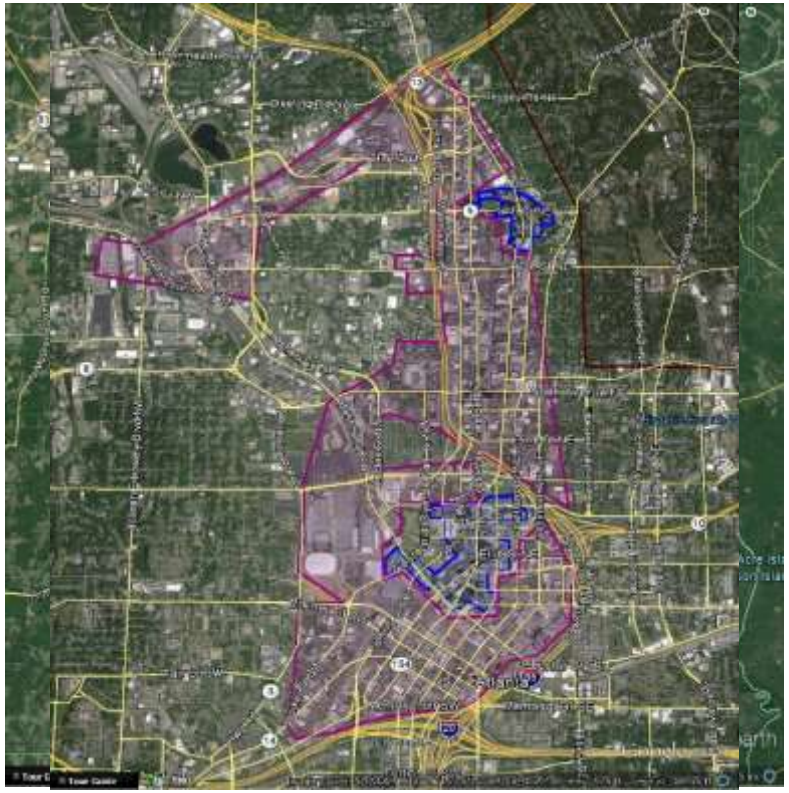
General Parameters

Regions	• San Francisco, CA & Atlanta, GA
Buildings	• At least 20 per test region
Morphologies	• Dense-urban, urban, suburban, rural
Indoor Test Cases	• 100 per test region
9-1-1 Test Calls	• 100 per test case, using one or more test device per technology under test as needed

Test Bed Regions

Dense Urban: Suburban Urban:

San Francisco Test Region



Atlanta Test Region

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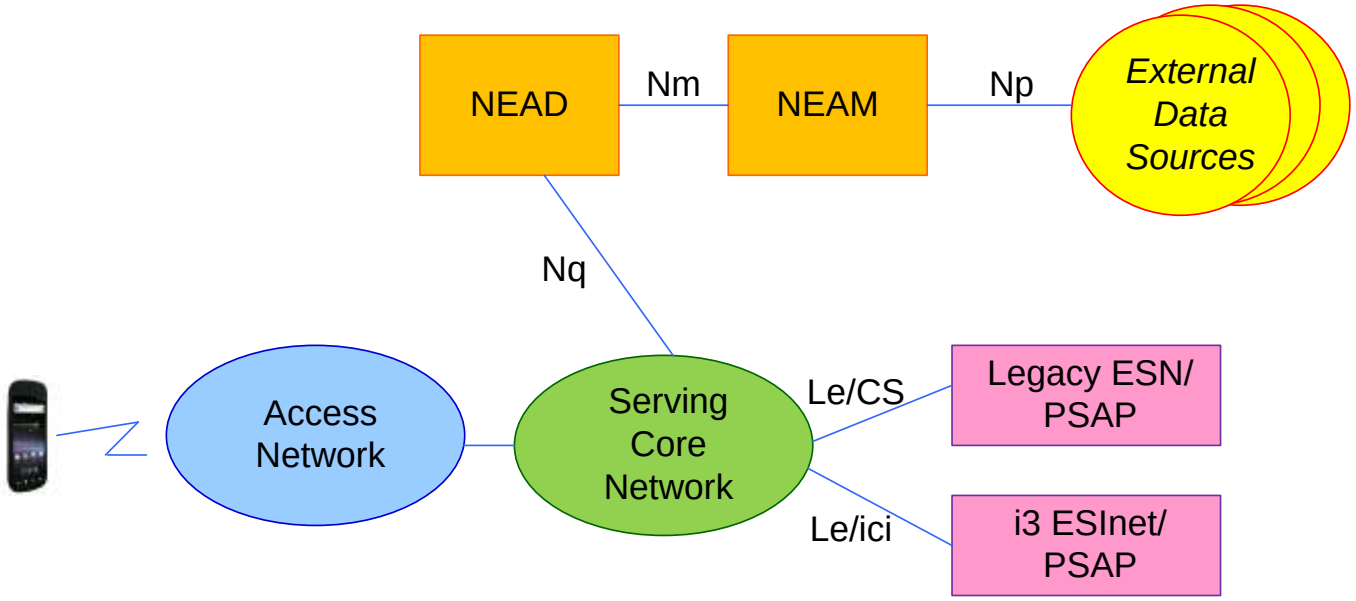
Test Bed Timeline

Schedule	Date
Stage 1 and 2 Application Instructions Available	May 2, 2016
Stage 1 and 2 Application Questions Due	May 13, 2016
Stage 1 and 2 Response to Application Questions	May 27, 2016
Stage 1 and 2 Applications Due (for 2016)	June 10, 2016
Stage 1 Non-Nationwide Wireless Carriers and Stage 2 New and Emergency Location Information Technology Vendors Testing Begins	October 3, 2016

- **Stage 1**:
  - Testing of **horizontal** location technologies **currently deployed**
- **Stage 2**:
  - Testing of near-term **emerging horizontal and vertical** location technologies (e.g., z-axis) that are **not currently deployed.**

National Emergency Address Database (NEAD)



- Delivers a Beacon Location to participating service providers to enable delivery of available location information of 9-1-1 communication to an appropriate PSAP
- Core Functions:
  1. Receives, accepts, and stores verified information
  2. Responds in real-time to 9-1-1 call-related requests

NEAD RFP

- RFP issued October 30, 2015
  - Solicits potential vendor to design, develop, build, deliver, and operate the NEAD
  - List of technical requirements/standards
    - Real-time access for 9-1-1
    - Networks must flag suspicious locations and respond for verification
    - Focus on resiliency and redundancy
    - Entry/access requirements
    - New additions posted within 24 hours and audit process to validate
    - ATIS standards
  - ATIS selected as Project Manager

Schedule	Date
RFP available for release	October 30, 2015
Email confirmation of "Intention To Submit" a Proposal	November 16 , 2015
"Last Day For Questions" and comments related to RFP	November 30, 2015
Response to questions/comments due	December 11 , 2015
Proposal Due Date	December 18, 2015
Selection of one or more Vendors to present their solution	January 18 , 2016
Selected Vendor Notification	No later than February 19, 2016

NEAD RFP Use Cases

- Beacon Location Request
- Batch Data Entry
- Data Integrity & Reporting
- Real-Time Data Entry

Beacon Location Request Use Case

NEAD Platform Users	NEAM	NEAD	Comments
① A wireless carrier sends a Beacon Location request over the Nq connection. The request includes a single MAC address.	The NEAM is not involved with this transaction.	②The NEAD looks up a record (in real-time) that matches the MAC address field, and returns the information in the street address field of that same record.	Only authorized entities can request a Beacon Location from the NEAD Platform.

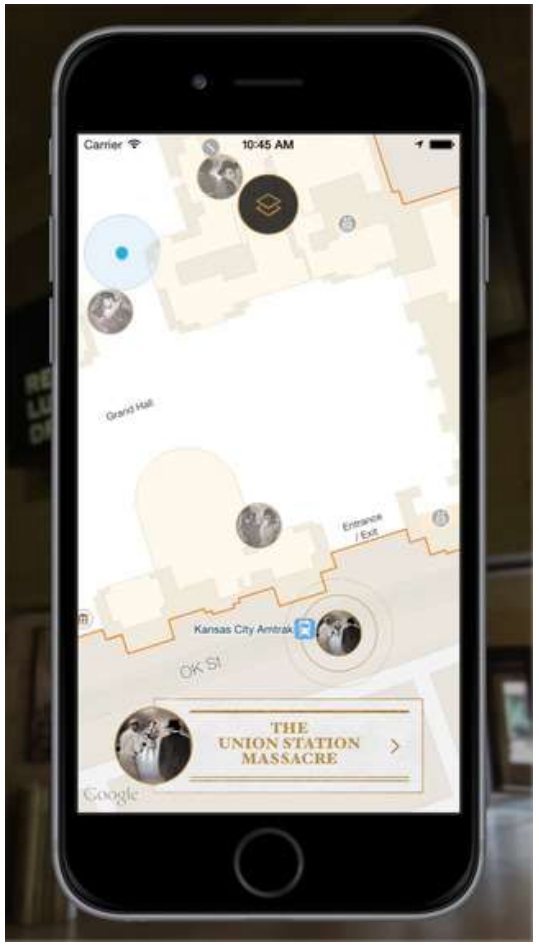
Other WGs

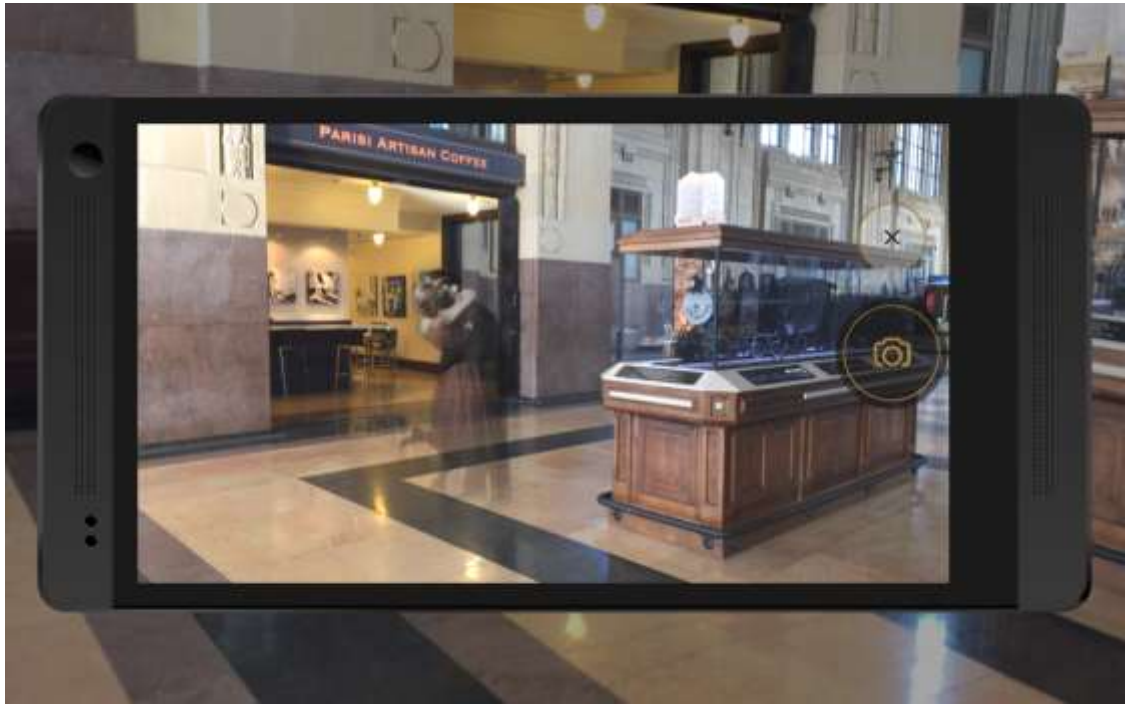
- Z-Axis
  - Requirements analysis for uncompensated barometric pressure to PSAPs
- PSAP Implementation
  - Requirements analysis for additional location data to PSAPs
  - Using confidence and uncertainty data
- Standards
  - Coordinate with ATIS Emergency Location Task Force (ELOC)
- Demonstration
  - APCO 2015
  - Illinois Institute of Technology
- Outreach
  - Develop educational materials for stakeholders

Standards Development

Food for Thought

Location-Based Augmented Reality at Union Station





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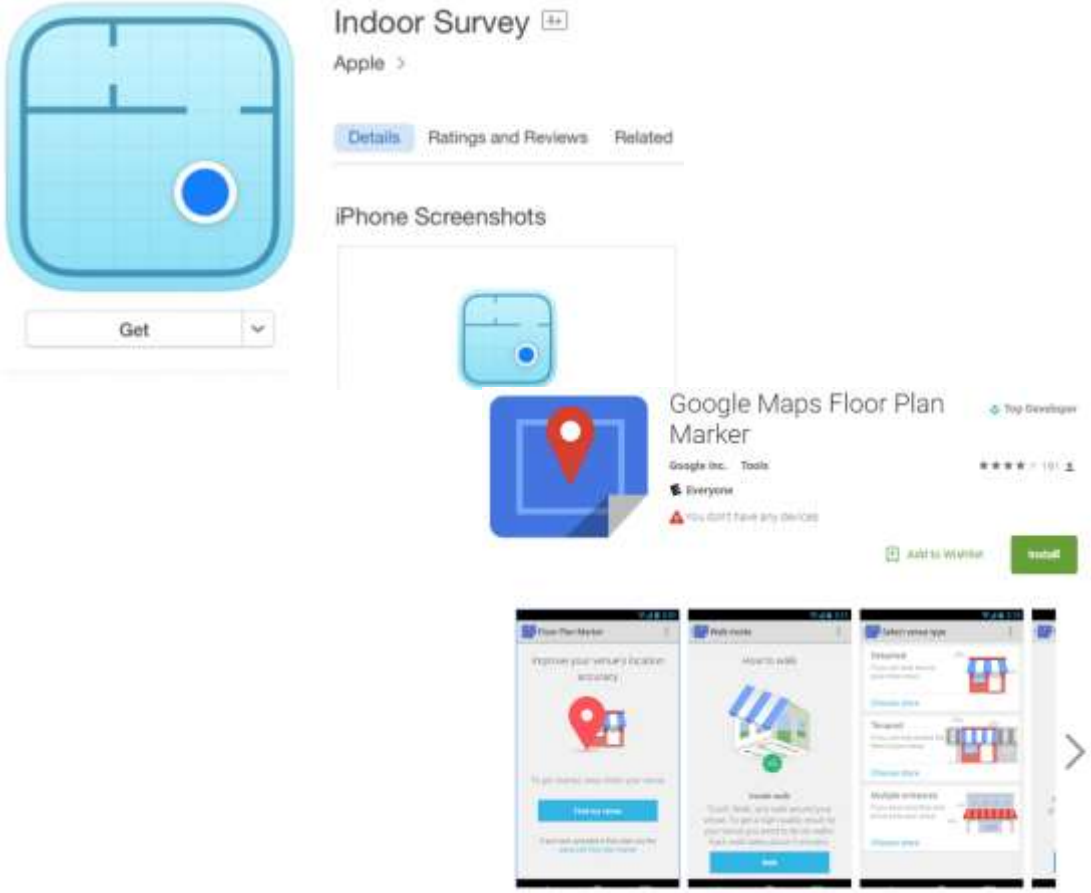

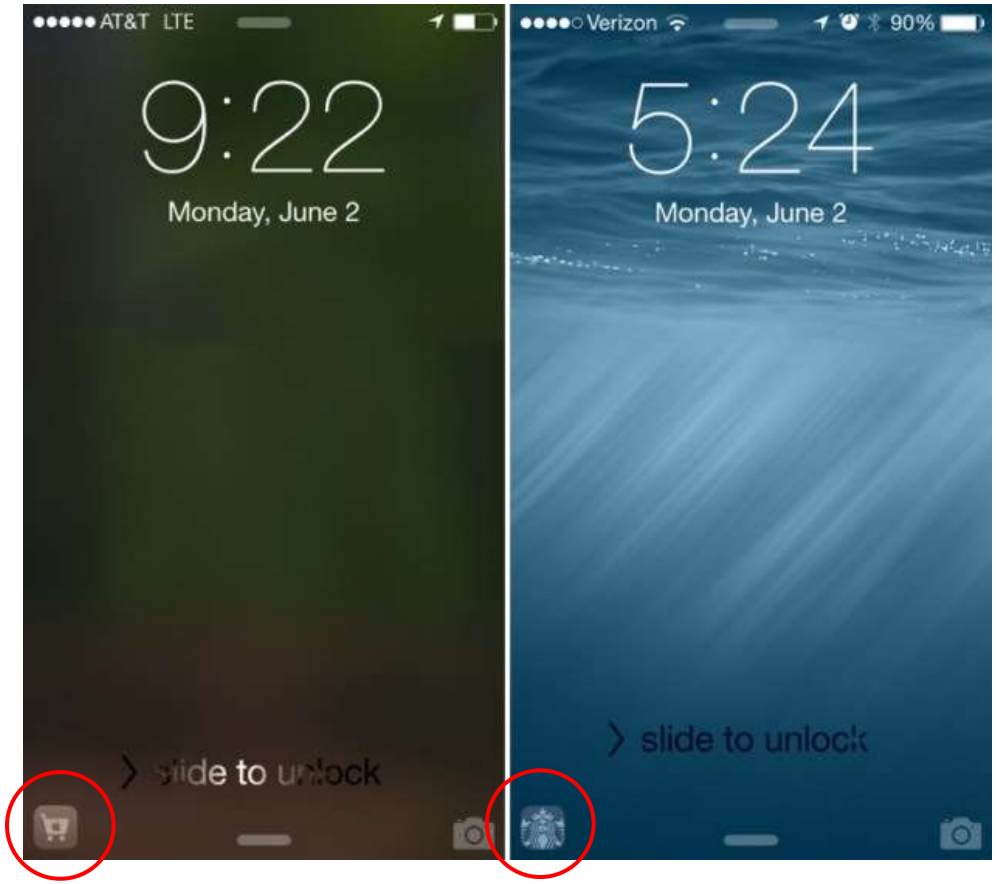

Questions?

- APCO website: www.apcointl.org
- GRO Location Accuracy: https://www.apcointl.org/advocacy/topics/911-location-accuracy.html
- AppComm: www.appcomm.org
- Twitter: @GRO_APCO

- APCO events: www.apcointl.org/events.html
  - May 16-17: Broadband Summit in DC
  - August 14-17: APCO's Annual Conference in Orlando
  - November 1-2: Seattle Emerging Tech Forum

APCO GRO