Improving 9-1-1 Location Accuracy

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APCO International

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Overview

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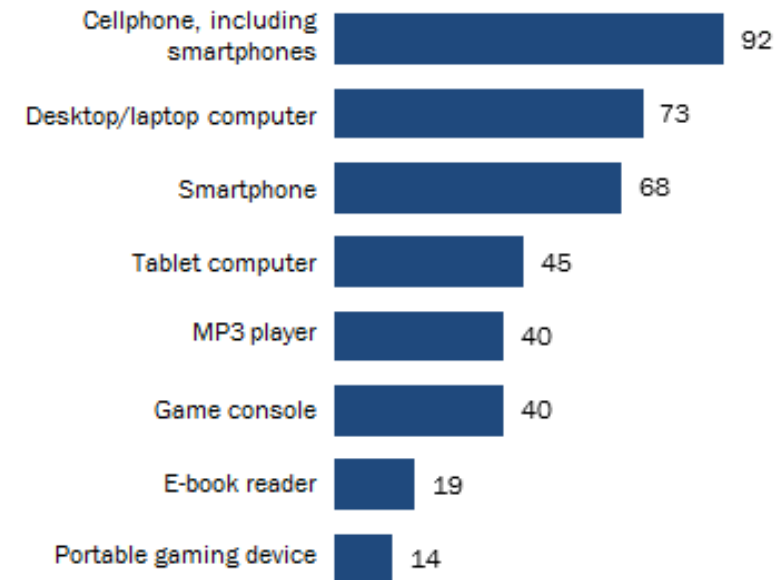- What this means for APCO members
- What to expect next
- Q&A

- 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.

Cellphones, Computers Are the Most Commonly Owned Devices

% of U.S. adults who own each of the following devices

Device	%
Cellphone, including smartphones	92
Desktop/laptop computer	73
Smartphone	68
Tablet computer	45
MP3 player	40
Game console	40
E-book reader	19
Portable gaming device	14

Source: Pew Research Center survey conducted March 17-April 12, 2015. Smartphone data based on Pew Research survey conducted June 10-July 12, 2015.

PEW RESEARCH CENTER

- 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.

- **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)
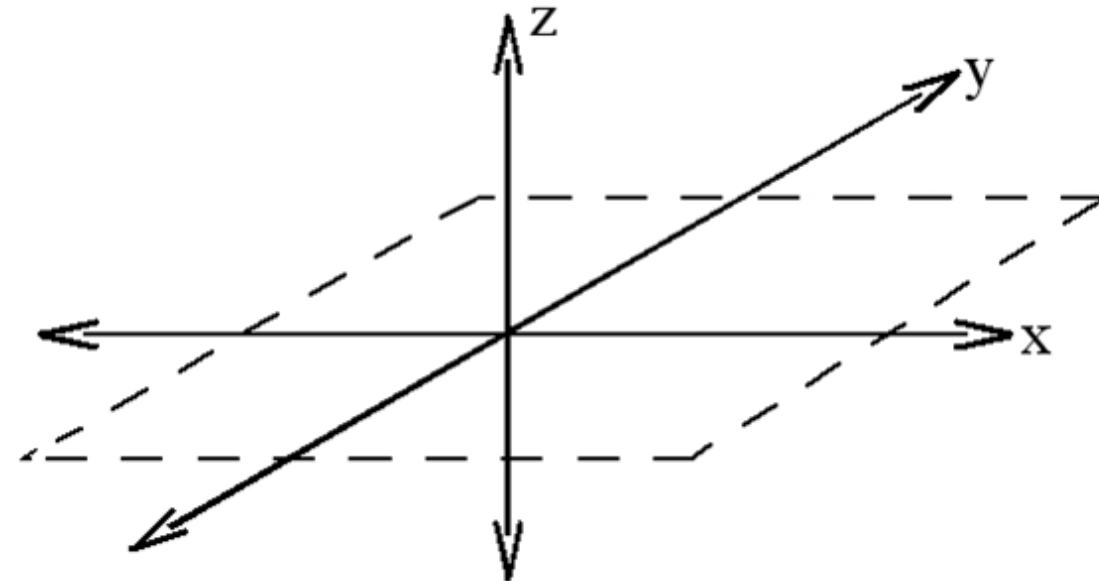- Technology-neutral

Dispatchable Reference Points
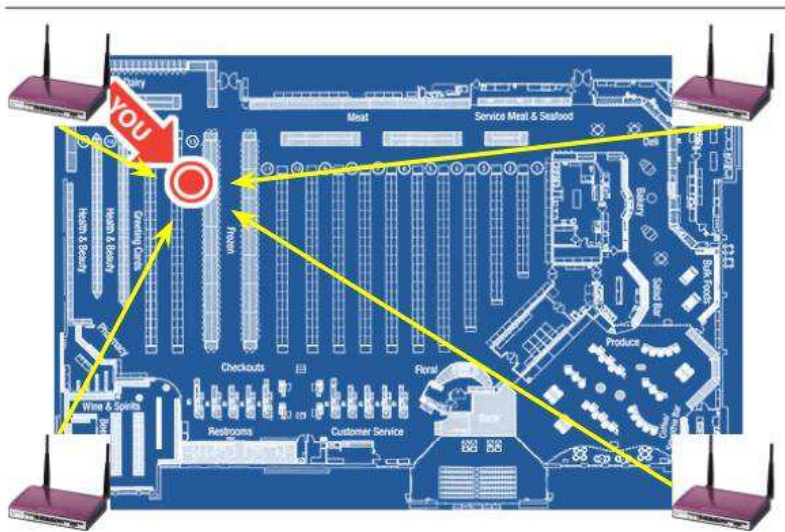
Z-Axis

- "[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.

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

- 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

- **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

- **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

- 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

- 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
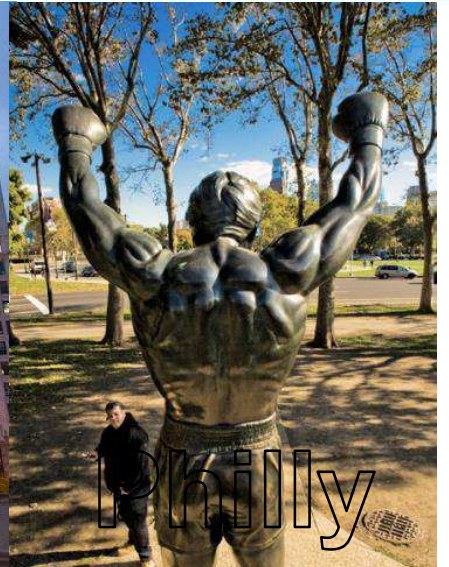
Compliance Data

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%

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

- 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

	Radial Uncertainty	Confidence
Blue	35 m	67%
Red	45 m	80%
Green	60 m	90%
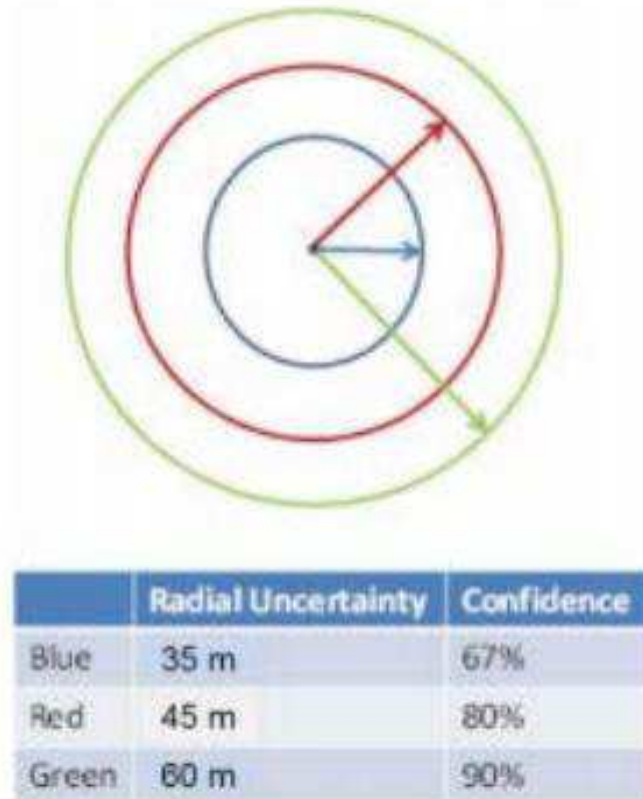
- Set confidence level at 90%, allow uncertainty to vary
- Standardize the way this information is delivered and presented to PSAPs
- Delivered for all wireless calls if requested by PSAP

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

- 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.

Working Groups:

1. Test Bed

2. NEAD

3. Z-Axis

4. Standards

5. PSAP Implementation

6. Demonstration

7. Outreach

General Parameters

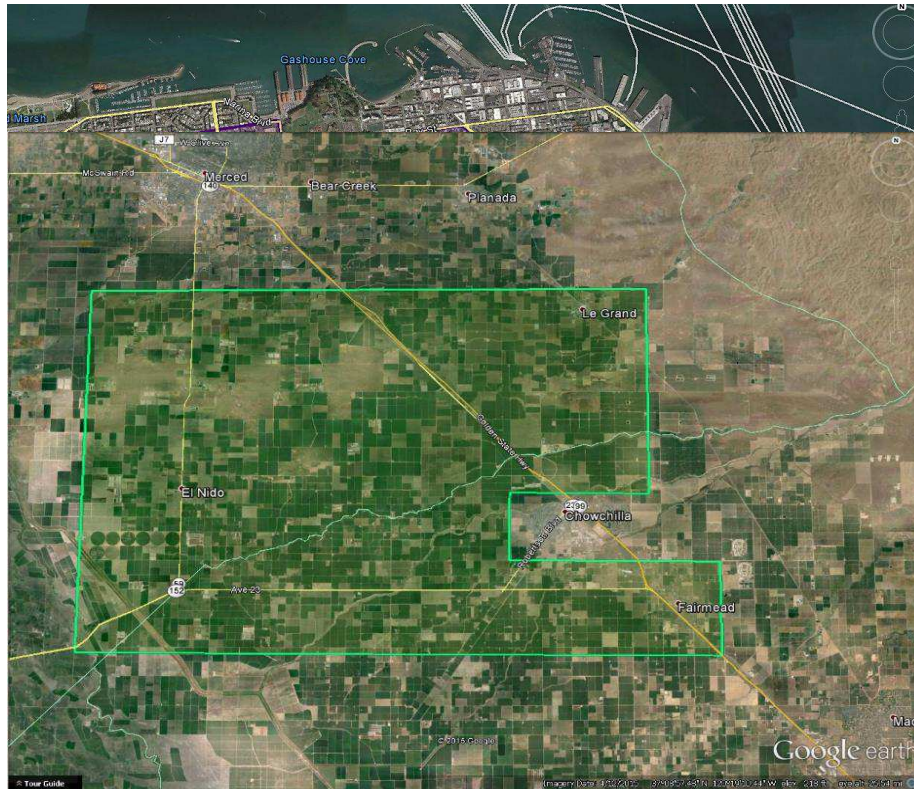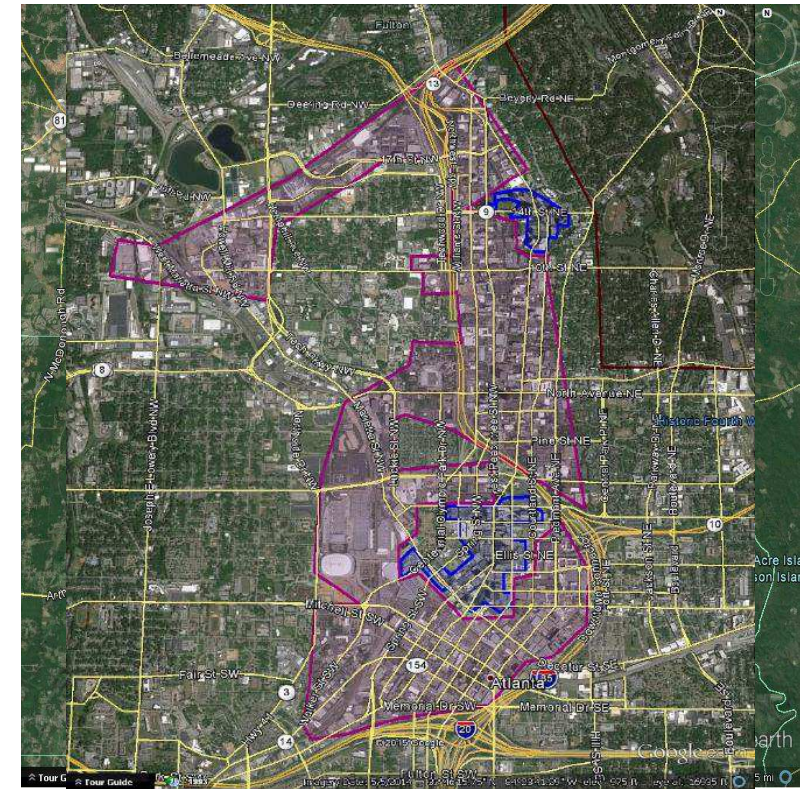| Regions	• San Francisco, CA & Atlanta, GA
Buildings	• At least 20 per test region
Morphologies	• Dense-urban, urban, suburban, rural
Indoor Test Cases	• 100 per test region
9-1-1 Test Calls	• 100 per test case, using one or more test device per technology under test as needed

Dense Urban and Urban:

Rural:

San Francisco Test Region

Atlanta Test Region

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| 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**
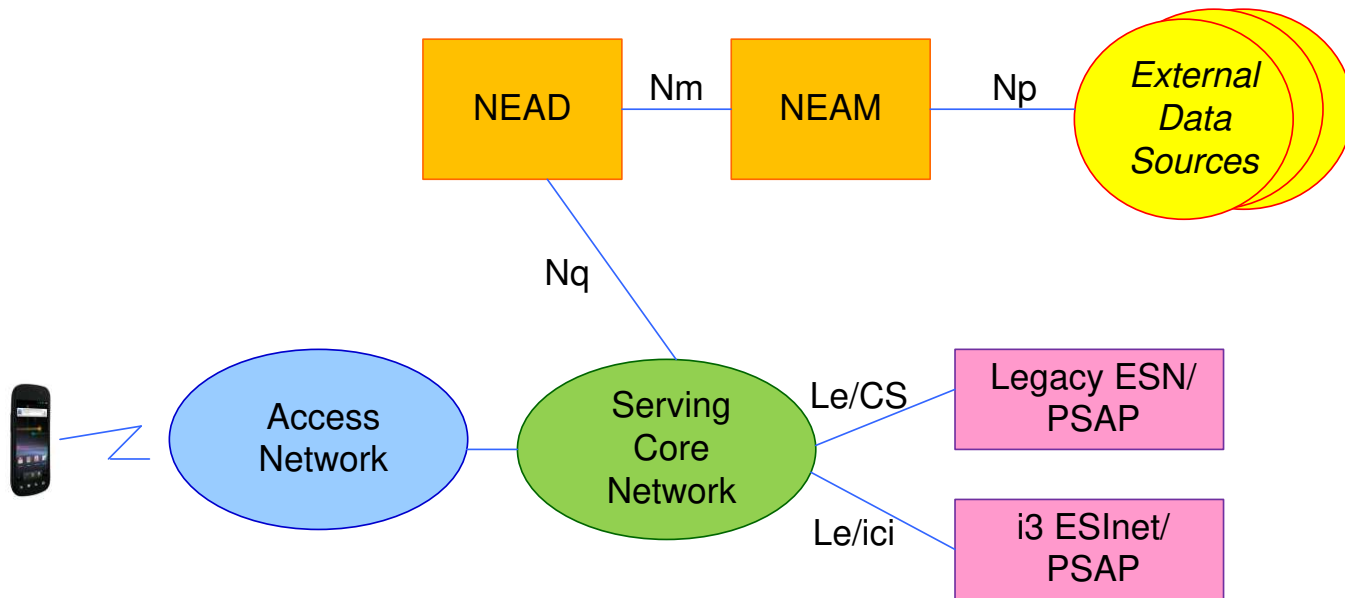
- Delivers Beacon Location(s) to service providers to enable delivery of 9-1-1 location information to the PSAP
- Core Functions:
  1. Receives, accepts, and stores verified information
  2. Responds in real-time to 9-1-1 call-related requests

- RFP issued October 30, 2015
  - Solicited 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
- West Safety Services was selected as the vendor for the NEAD on October 4, 2016

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

- 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

- Establishing the Test Bed
  - Testing started in 2016 and is occurring in multiple phases
- Selecting the NEAD vendor
- Further defining dispatchable location
  - Context-driven
  - Confidence level for a single family residence compared to confidence for a multi-floor office suite
  - DL 1: civic address, +/- floor, building quadrant, within 50 m
  - DL 2: civic address, floor, room/suite

- Upcoming milestones and reports
  - By February 3, 2017, nationwide providers must submit:
    - First reports on aggregate live 9-1-1 call location data to the FCC, NENA, APCO, and NASNA
    - Initial plans for meeting the indoor location accuracy requirements
    - First progress reports on implementation of indoor location accuracy requirements
    - A privacy and security plan for the NEAD
    - By April 3, 2017, all providers must achieve 50-meter horizontal accuracy or provide dispatchable location for 40 percent of all wireless 9-1-1 calls
- Dispatchable location testing is expected to take place in 2017 once Test Bed methodology is developed

Food for Thought

Food for Thought
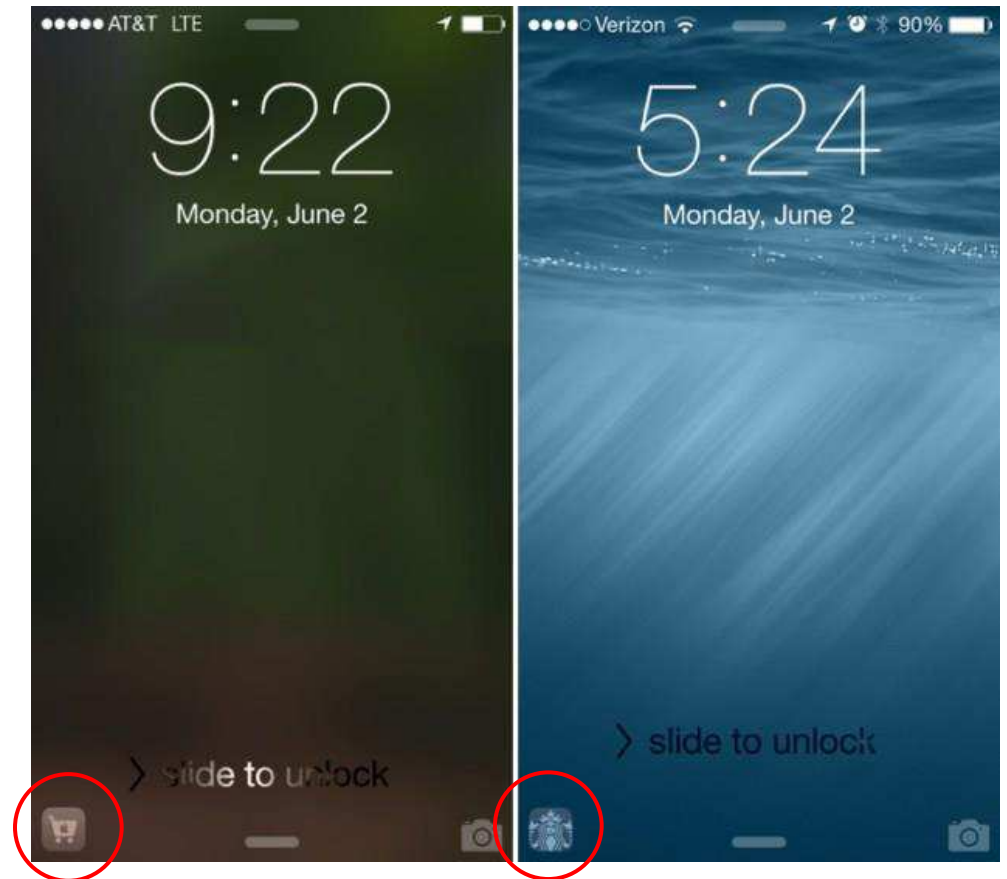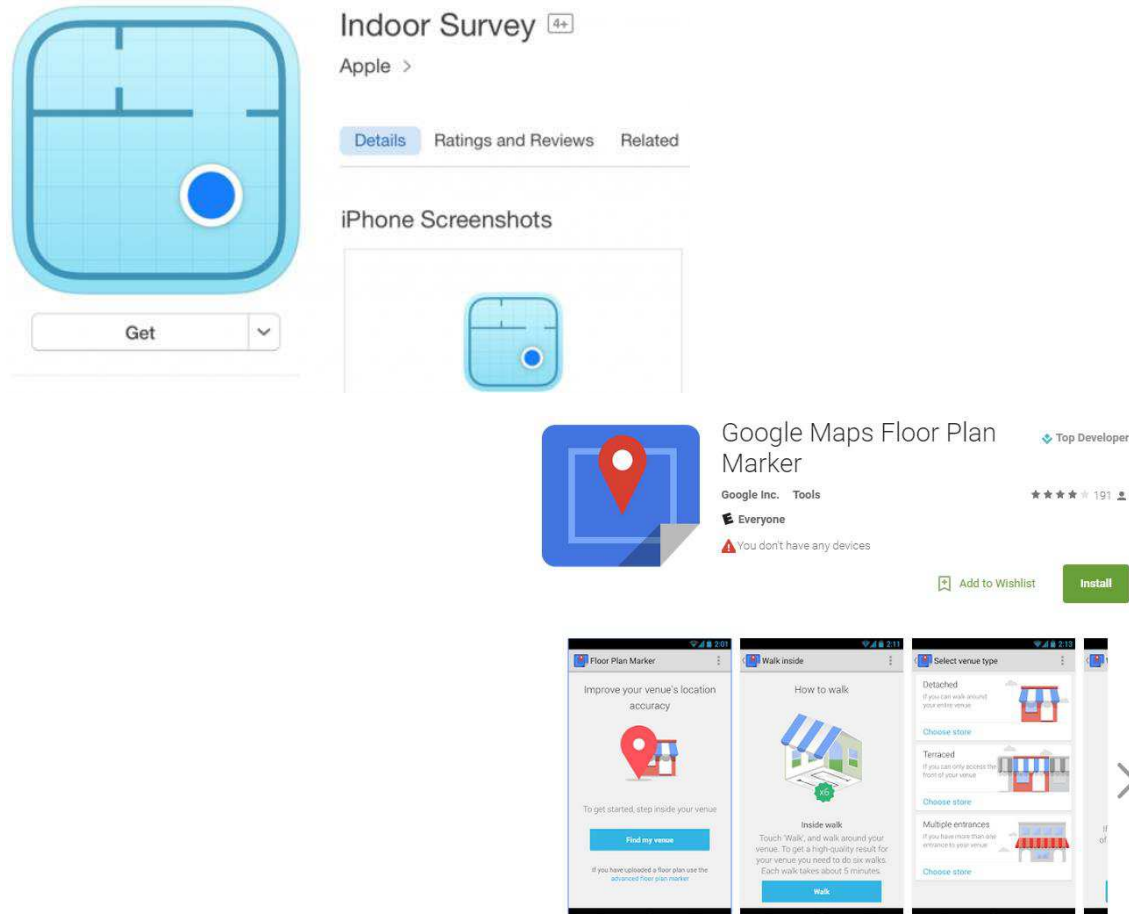
Device-Based Emergency Location Services
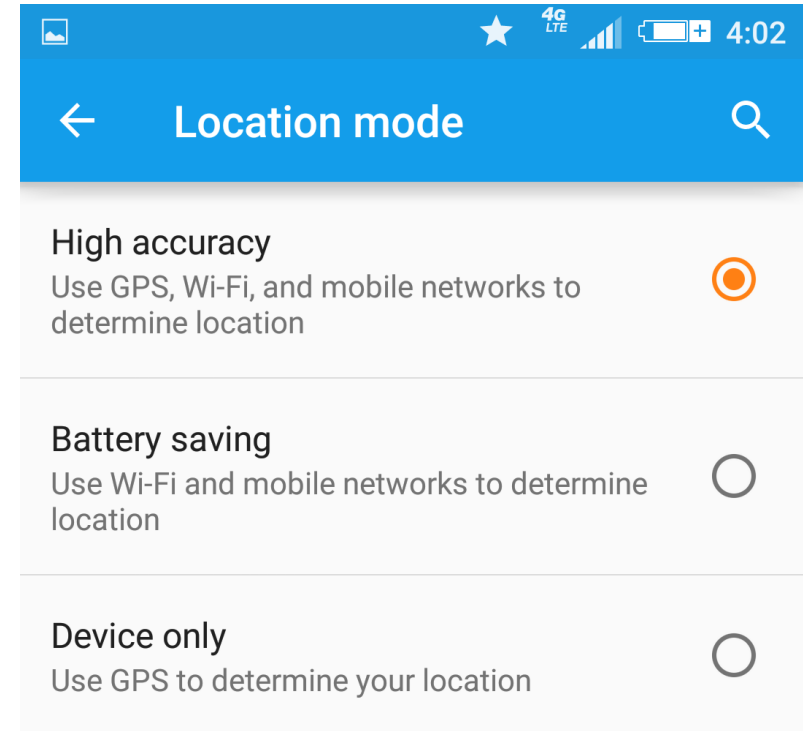
Questions?

- APCO website: www.apcointl.org
- GRO website: https://www.apcointl.org/advocacy.html
- Twitter: @GRO_APCO

- APCO events: www.apcointl.org/events.html
  – February 28 – March 1: Emerging Tech Forum in Raleigh
  – May 16-17: Broadband Summit in DC
  – August 13-16: APCO's Annual Conference in Denver