

Improving 9-1-1 Location Accuracy

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Overview

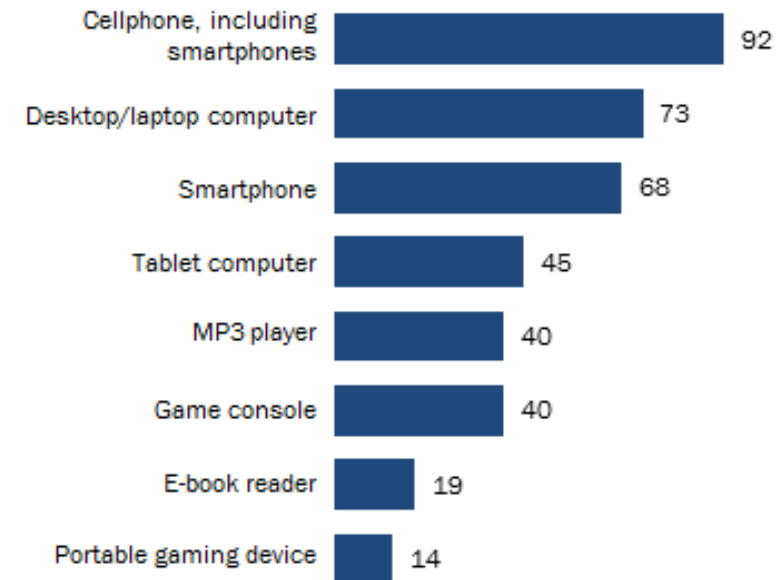
- The road to get here
- Highlights of updated FCC rules
- What this means for APCO members
- What to expect next
- Q&A

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.

Cellphones, Computers Are the Most Commonly Owned Devices

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



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

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)

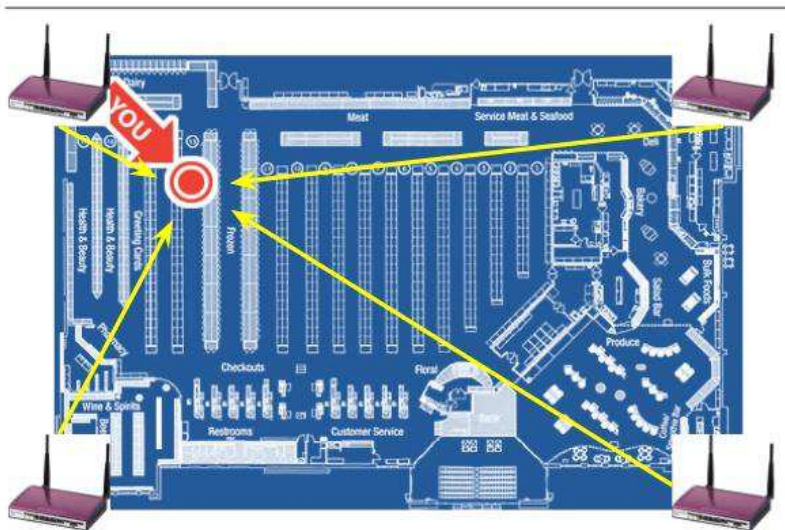
APCO Goals

- 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

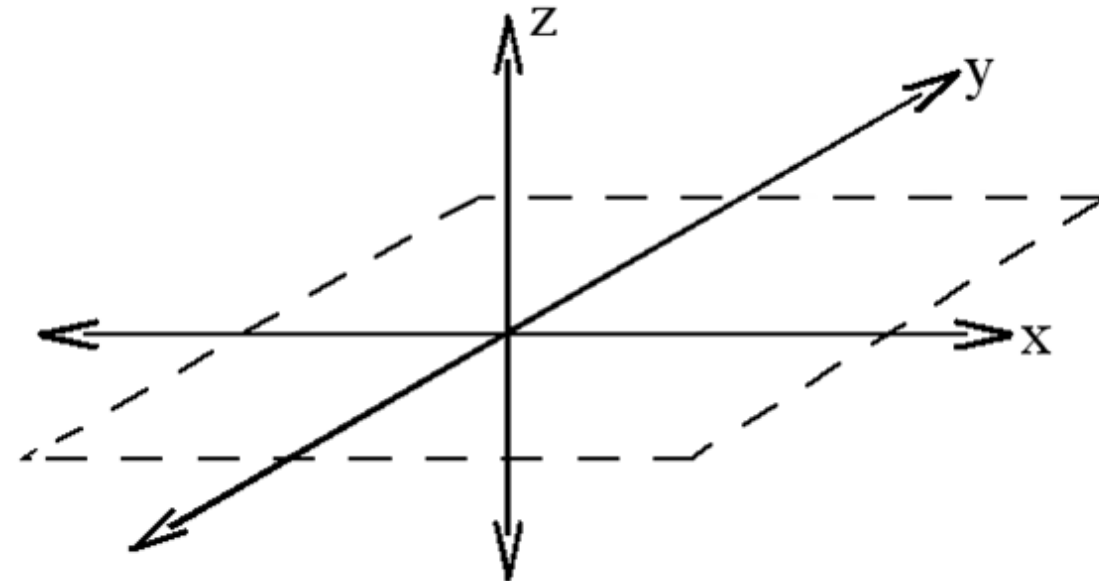
Contemplated Solutions

Dispatchable Reference Points

WIFI LOCATION



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

- 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

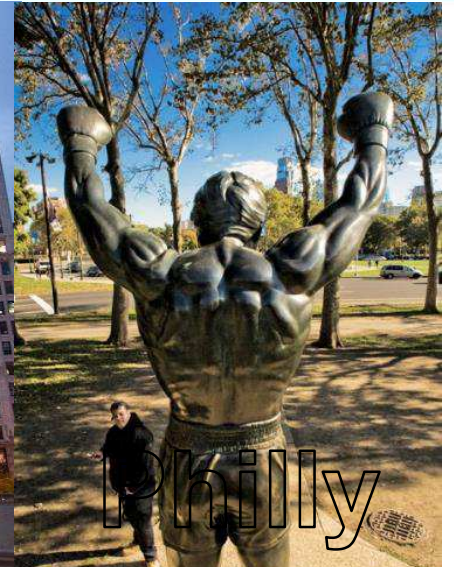
Test Bed Features

- 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
- Data collected from six test regions
- Will show percent of time each location method was used (satellite, DL, z-axis, other technologies or hybrids) to provide location estimates

Test Region Data





Reports

At 18 months (February 2017):

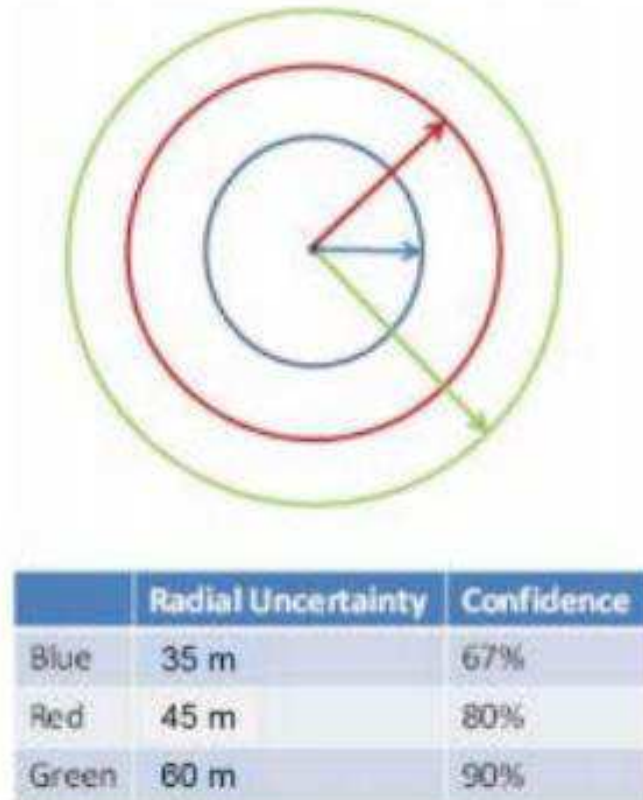
- Start reporting actual 9-1-1 data
- Initial implementation plan for meeting indoor requirements generally
- Progress report on deployment plans and implementation of indoor requirements
- NEAD privacy and security plan

At 3 years (August 2018):

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

- 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



- 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
- 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

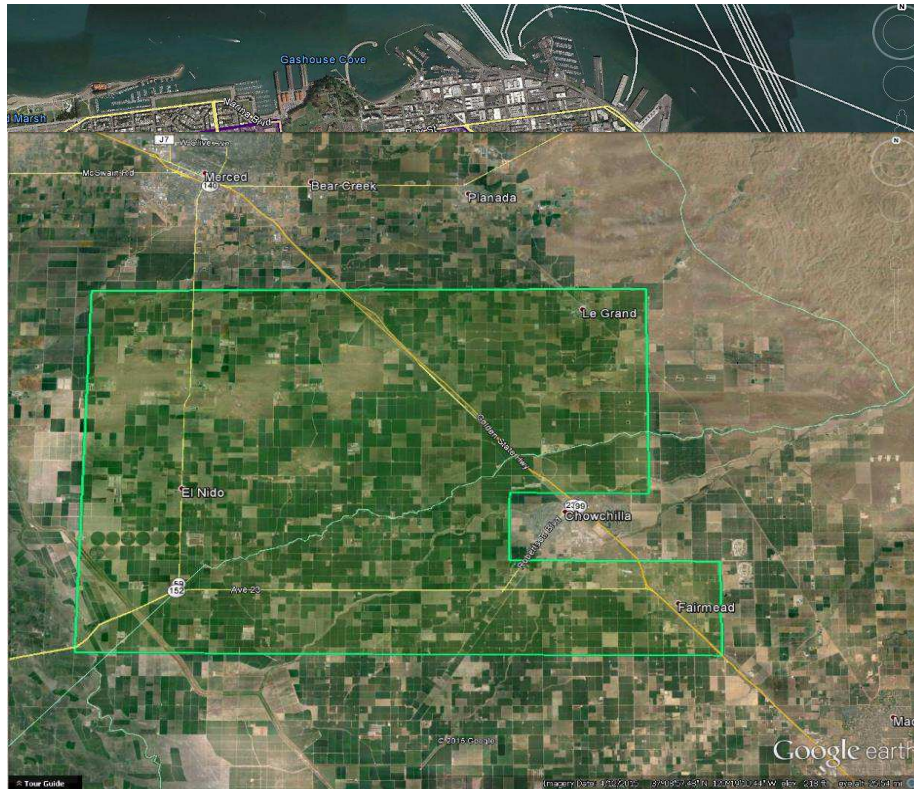
- 100 per test region

9-1-1 Test
Calls

- 100 per test case, using one or more test device per technology under test as needed

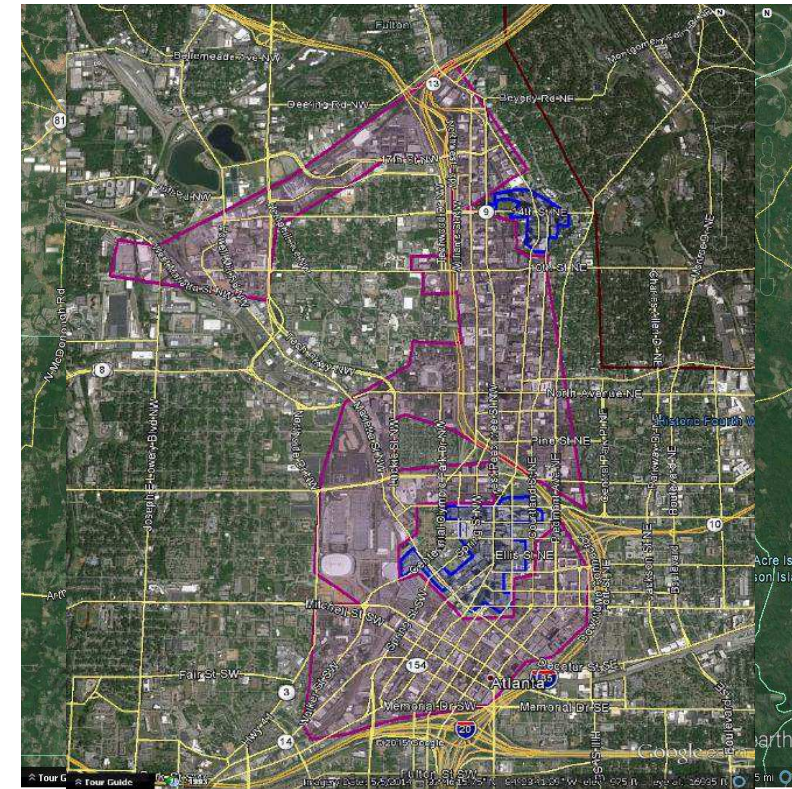
Test Bed Regions

Dense Urban and Urban:



San Francisco Test Region

Rural:

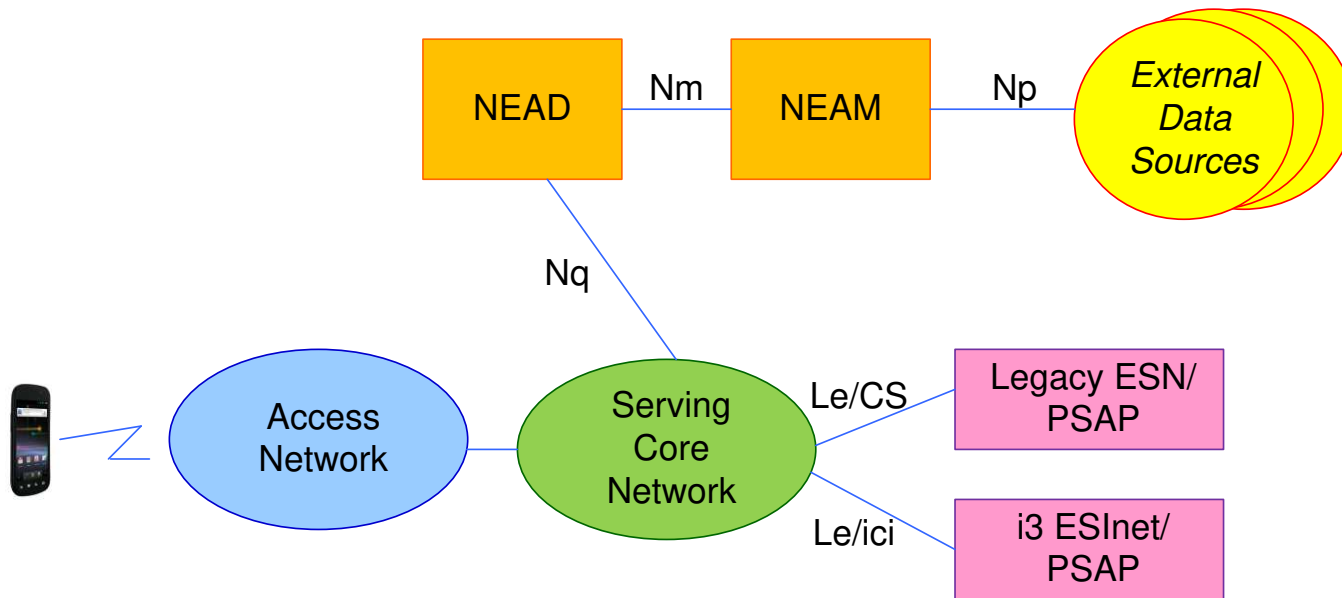


Atlanta Test Region

Test Bed Timeline

- Stage 1: carrier compliance for currently deployed horizontal technologies completed (2016) – A-GPS, AFLT (CDMA), OTDOA (LTE), DBH
- Stage 2: new and emerging technologies, including z-axis, completed (2016) - NextNav; Polaris; Nokia HERE; and TruePosition/ SkyHook
- Stage 3: localized deployment technologies, such as in-building DAS, uniquely equipped small cells or WiFi access points (2nd, 3rd Q 2017)
- Stage 4: dispatchable location technologies (4th Q 2017)

National Emergency Address Database (NEAD)



- Contains and delivers verified wireless access point and beacon locations to service providers to enable delivery of dispatchable location information to the PSAP
- Core Functions:
 1. Receives, accepts, and stores verified information
 2. During a 9-1-1 call, carriers share ID #s of detected Wi-Fi APs & Bluetooth beacons

- Issued Nov. 2015, solicited vendor to design, develop, build, deliver, and operate the NEAD
- Sample requirements:
 - Real-time access for 9-1-1
 - Flag suspicious locations and verify
 - Resiliency and redundancy
 - Secure entry/access
 - New additions posted within 24 hours

NEAD Progress

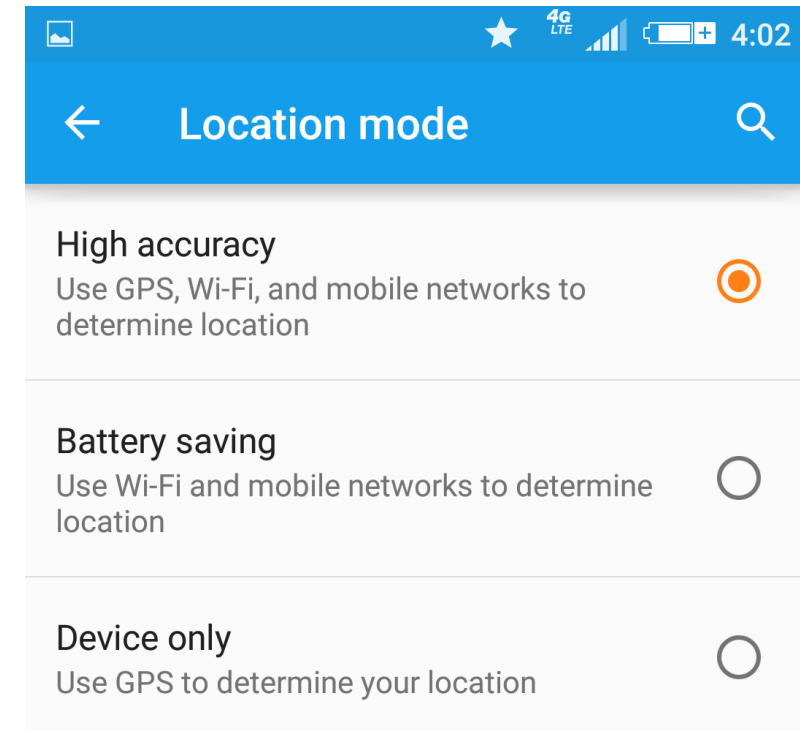
- West Safety Services selected as vendor Oct. 2016
- ATIS standards finalized in Nov. 2016
- Privacy and Security Plan submitted Feb. 3, 2017
 - The NEAD Platform incorporates privacy and security by design
 - 9-1-1 caller name and number not shared with NEAD
 - Info will not be used for comm'l purposes or disclosed to 3rd parties
 - Administrative, physical, & technical controls will protect against unauthorized access, use, & disclosure, and to maintain availability & integrity
 - Ongoing privacy and security training, assessment, and audit
- Testing methodology being developed
- Targeted operational date: Jan. 2018

Recent Activity

- On February 3, 2017, nationwide providers submitted:
 - 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
- Carriers are updating their wireless 911 location servers to interact with the NEAD, developing related handset specs, prepping to populate NEAD with managed access points, planning consumer home/office products and small cell DL solutions, developing crowd-sourced Wi-Fi positioning methods, assessing other non-U.S. A-GNSS options,
- 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

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](https://twitter.com/GRO_APCO)
- APCO events: www.apcointl.org/events.html
 - May 16-17: Broadband Summit in DC
 - May 17: Public Safety Communications Leadership in Policy Awards Dinner in DC
 - August 13-16: APCO's Annual Conference in Denver