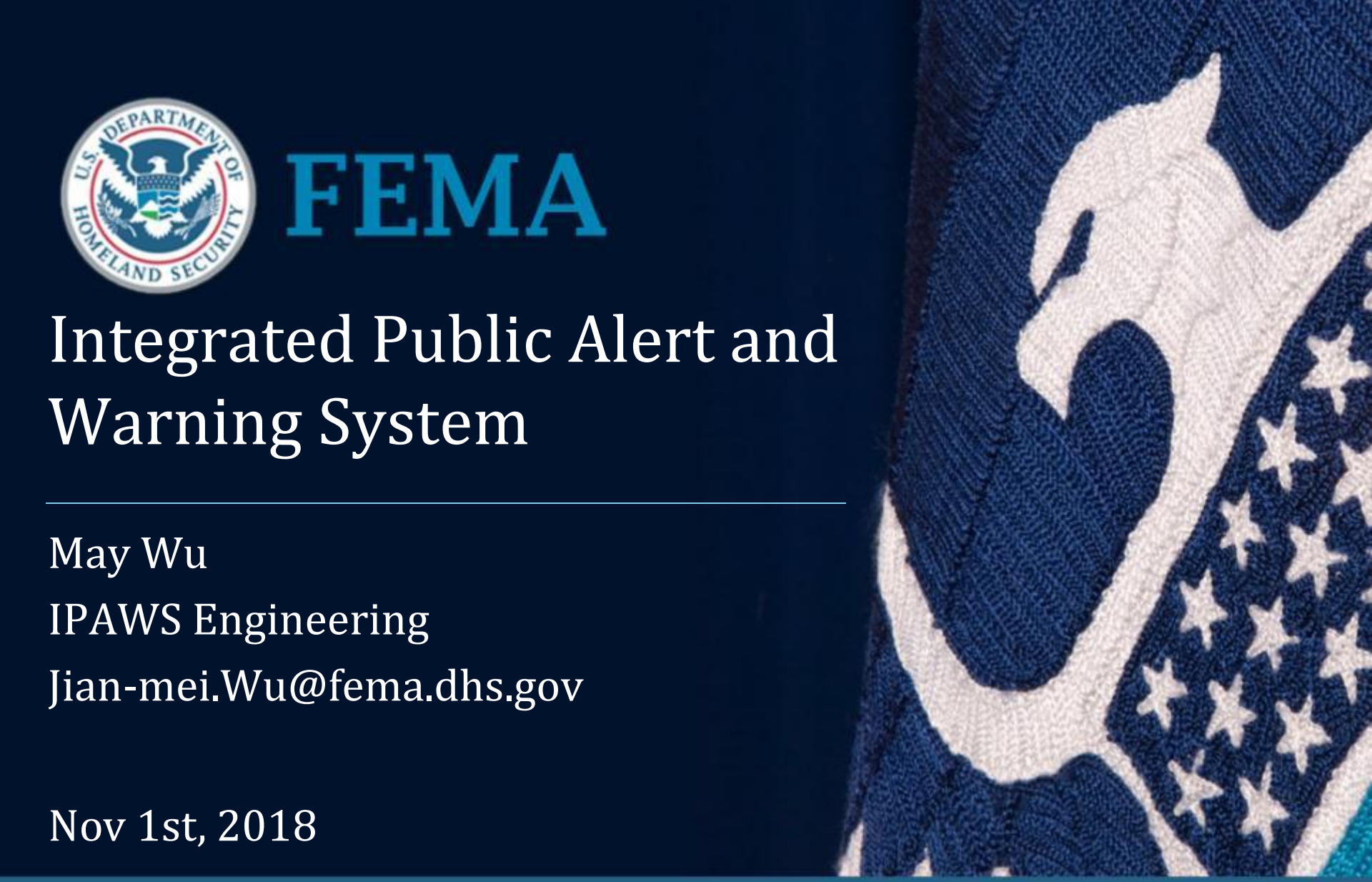

FEMA

Integrated Public Alert and Warning System

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Nov 1st, 2018

Agenda

- IPAWS Program Overview
- System Overview
- WEA Updates (due 2019)

The Evolution of Emergency Alerting

1951 - 1963
CONELRAD

Originally called the "Key Station System," the **CON**trol of **EL**ectromagnetic **RAD**iation (CONELRAD) was organized a network of ***AM radio*** stations with special procedures for warning citizens and providing emergency instructions and information in the event of a national catastrophic emergency.

1963 - 1997
EBS

EBS expanded emergency warning to include ***radio and TV*** stations providing the President with an expeditious method of warning the public during a national emergency.

Later expanded to enable state and local officials to alert local populations during local emergencies and provide for better and more accurate handling of alert reception and rebroadcast.

1997 - - - - - - - present -
EAS

EAS modernized the EBS providing automation of alert transmission and activation to ***radio and TV*** stations with the adoption of the Specific Area Message Encoding (SAME) protocol and provided better integration with National Weather Service and state and local alert systems.

IPAWS

IPAWS integrates and expands public alert and warning from just ***radio and TV***, to ***wireless devices***, ***Internet applications***, NOAA All-Hazards ***Weather Radios***, and ***future communications technologies*** using an international open standard for information exchange - the Common Alerting Protocol or CAP.

IPAWS enables public safety officials at all levels of government to warn citizens via a diverse and integrated network of private sector communications systems.

IPAWS enhances and extends a national infrastructure and capability to local, state, territorial, and tribal officials for public alerting and warning

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IPAWS Federal Guidance

Policy:

- ***Executive Order 13407 - Public Alert and Warning System***
  - Establishes policy of the United States to have an national warning system used by government officials at all levels of government to alert and warn people of all hazards

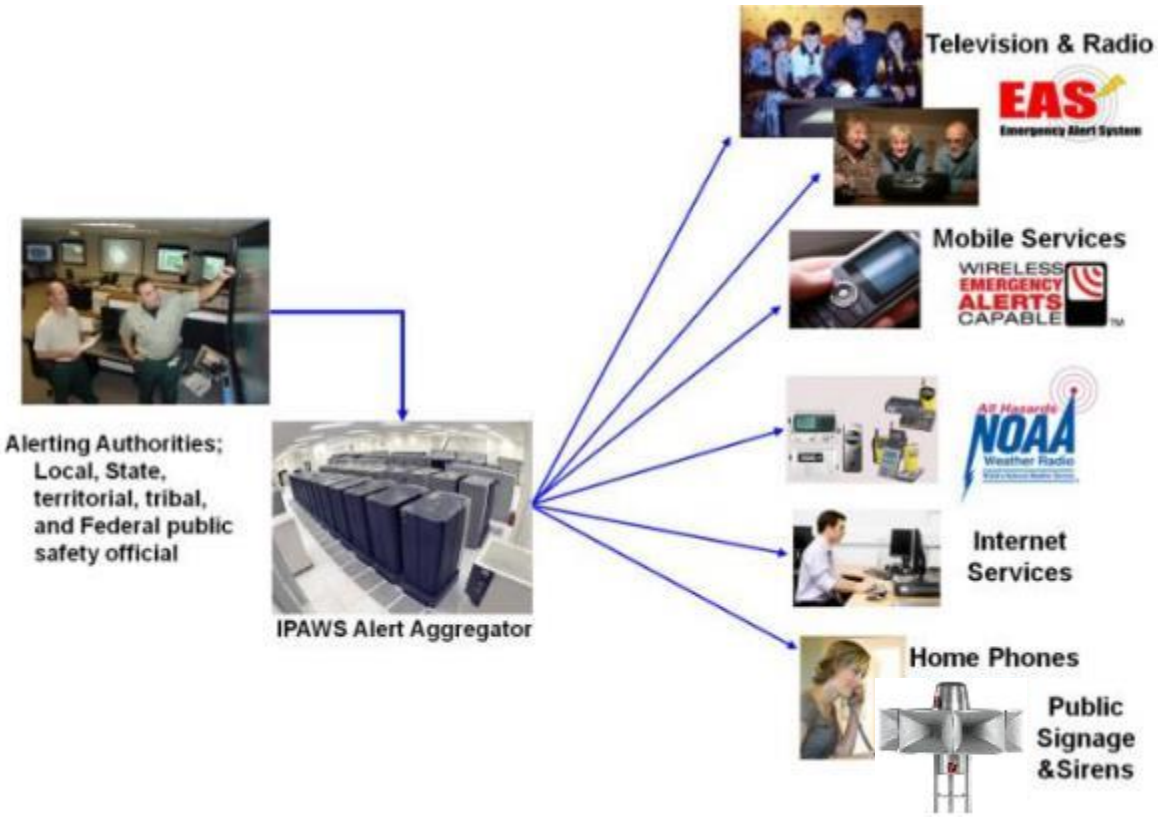
Law:

- ***Public Law 114-143, The IPAWS Modernization Act***
  - Enacts to law the policy statement and similar requirements found in Executive Order 13407
- ***Section 706 of 47 U.S.C. 606, The War Powers Act***
  - Provides for Presidential access to commercial communications during "a state of public peril or disaster or other national emergency"
- ***Public Law 93-288, The Stafford Act***
  - Sec. 202. Disaster warnings – directs FEMA to provide technical assistance to State and local governments to insure that timely and effective disaster warning is provided

Regulation:

- ***47 CFR Part 11 — Emergency Alert System (EAS)***
  - Provides for alert and warning on private sector radio and television infrastructure
- ***47 CFR PART 10 — Wireless Emergency Alerts (WEA)***
  - Provides for alert and warning to devices on wireless carrier networks

The IPAWS Vision



"Timely Alert And Warning To American Citizens In The Preservation of Life And Property"

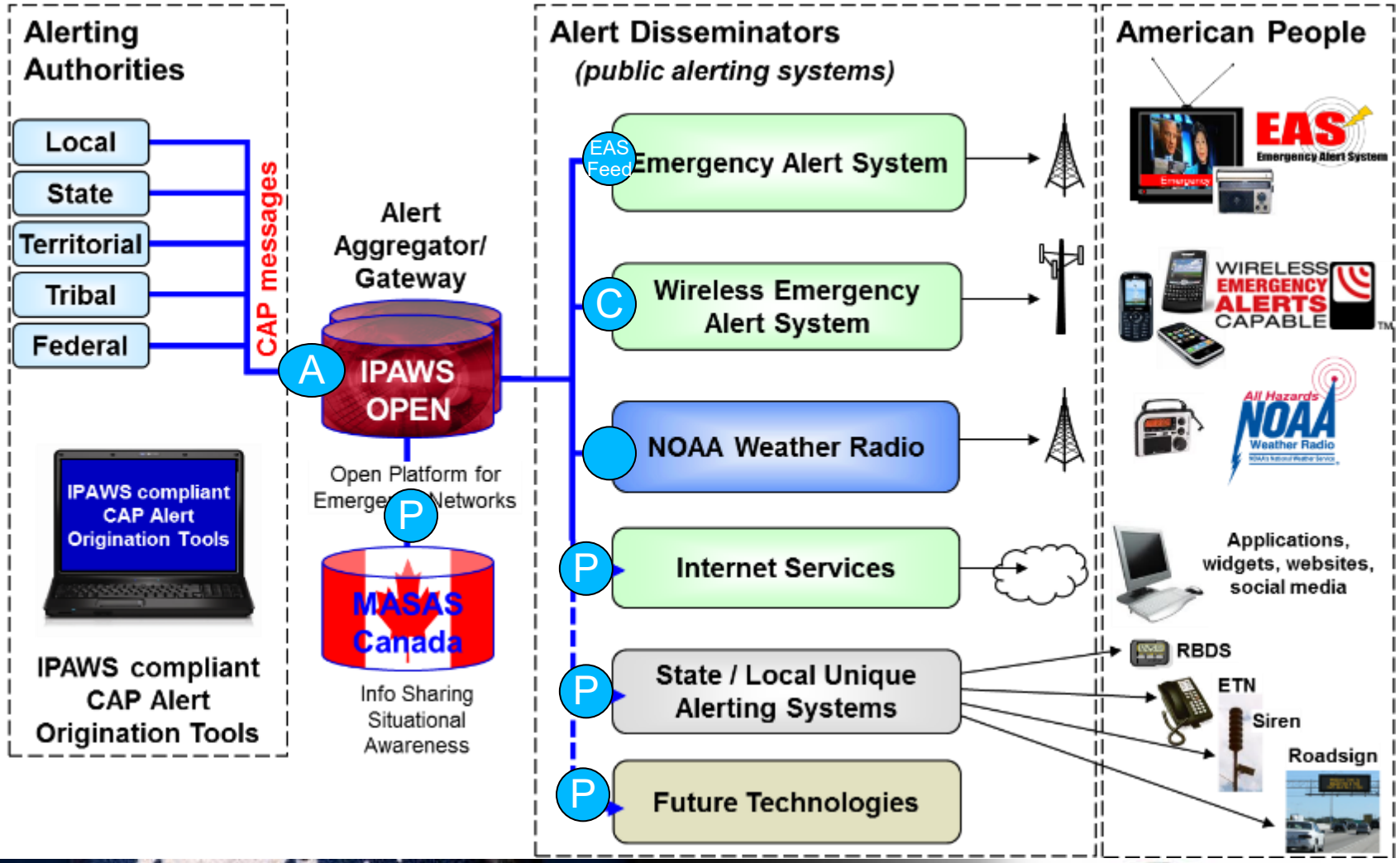
- One alert to several public dissemination channels
- Incorporated into mass notification systems - easier to use by public safety/alerting authorities
- Improves and enhances alert and warning capabilities:
  - Increases alert coverage
  - Increases likelihood public will take action
  - Increases awareness

IPAWS: a *National System* for *Local Alerting*

- Used by local, state, territorial, tribal, and federal agencies to send geo-targeted emergency alert and warning messages to the public
- Integrates:
  - Emergency Alert System (EAS) broadcasts to radio and television
  - Wireless Emergency Alerts (WEA) to cellular phones
  - Alert delivery to internet applications and websites
  - Future communications systems
- FEMA is responsible for*:
  - Development, operations and maintenance of the IPAWS
  - Partnering with the private sector communications industries
  - Providing technical assistance to State and local governments to insure that timely and effective disaster warning is provided

*in accordance with Public Law 114-143 - The IPAWS Modernization Act of 2015; Executive Order 13407 - Public Alert and Warning System; and the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Sec. 202. Disaster Warnings

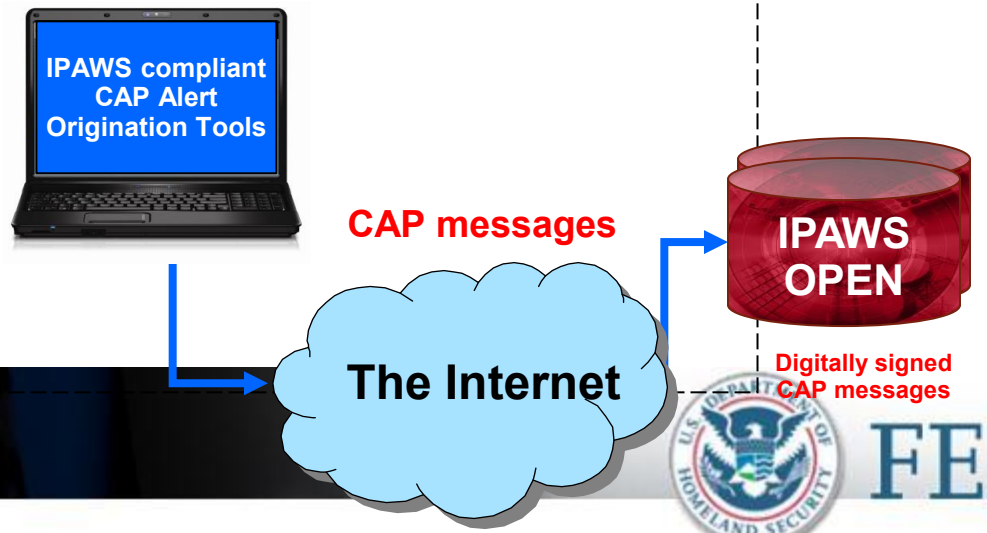
IPAWS Architecture



IPAWS-compatible Mass Notification tools:

Agencies choose and buy their own tools

- 44 different vendor alerting tools currently in use by state/local authorities using IPAWS:
  - CAP v1.2 Standard and the IPAWS Specification to the CAP Standard, CAP v1.2 IPAWS USA Profile v1.0
    - Tools have wide variety of different look and feel
    - Users find tools that best fits local operations
    - Not all tools support all IPAWS capabilities



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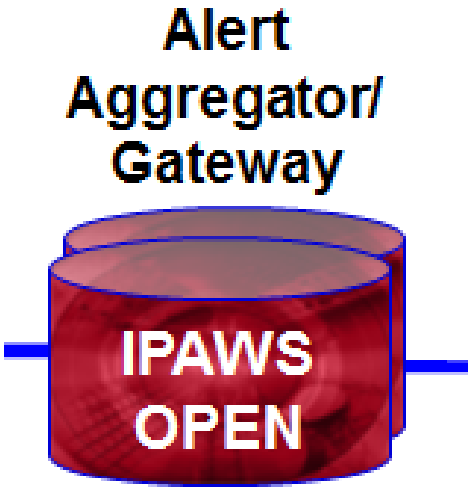
Alert Aggregation

What the Aggregator does:

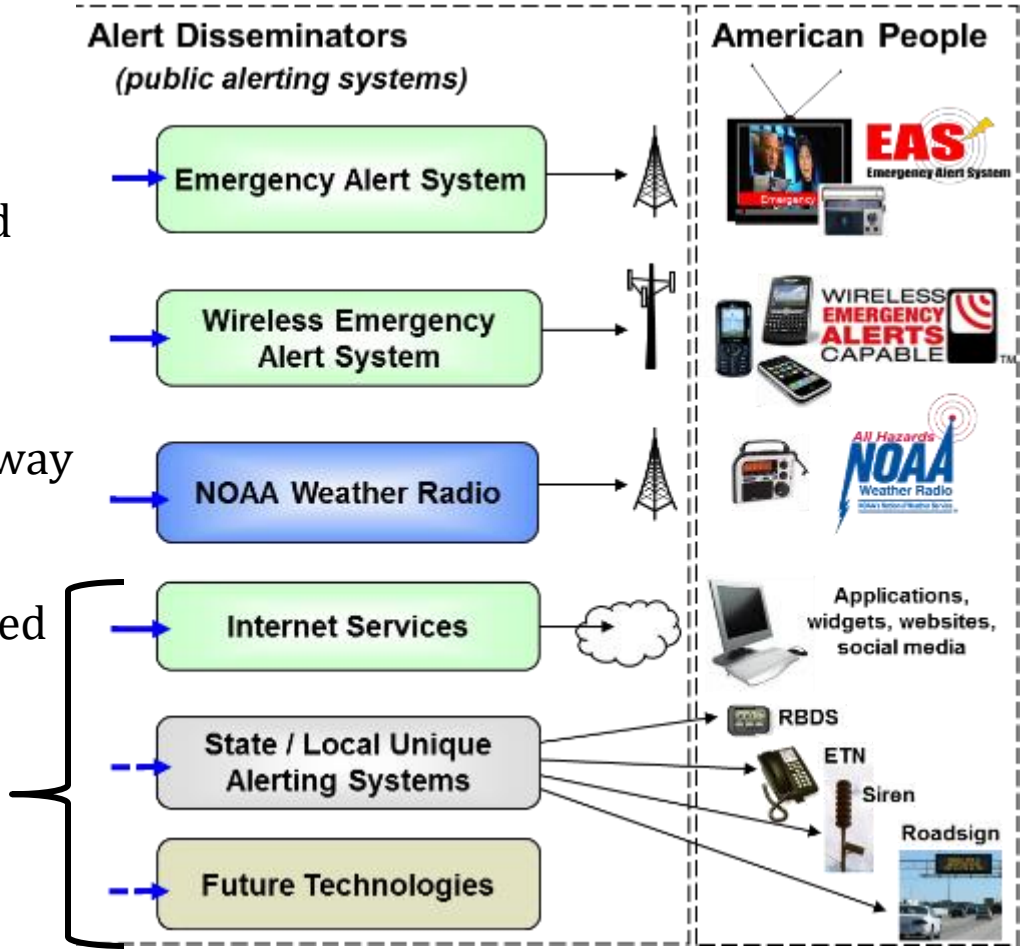
1. Authenticates sender
   A. Web Service Security
   B. Digital Signature
2. Validates CAP message
3. Verifies permissions
   A. What alerts can you send
   B. Where can you send them
   C. How can you send them
4. Non-repudiation, message integrity
5. Gateway to EAS, WEA, NOAA WX



the Message Router
(Open Platform for Emergency Networks)

Alert Dissemination

- Emergency Alert System
  - TV, Radio, Cable, Satellite
  - ~20,000 connected via EAS Feed
- Wireless Emergency Alerts
  - Opt-in Carriers
  - 61 connected via Fed Alert Gateway
- Interoperating Systems
  - 72 connected via Public Alert Feed



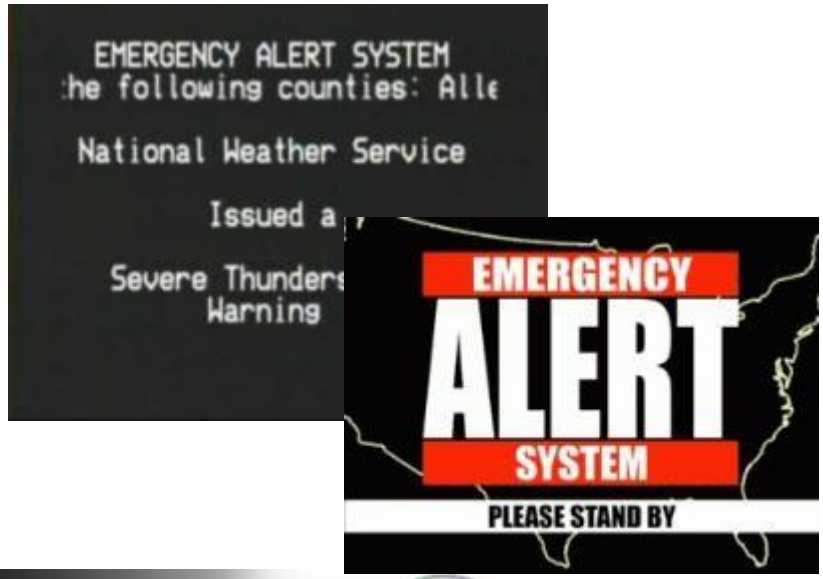
Alert Receipt by the Public

- EAS
  - Broadcast
  - Large footprint
  - County-based
- WEA
  - Broadcast
  - Medium footprint
  - Polygon based
- NOAA Weather Radio
  - Broadcast
  - Large footprint
  - County-based

http://wset.images.worldnow.com/images/24768116_BG1.jpg
http://www.weathernationtv.com/app/uploads/2017/02/noaa-weather-radio-300x212.jpg
https://i.ytimg.com/vi/Y3m-HdhGsQo/hqdefault.jpg

Emergency Alert System

- All radio/TV providers must monitor IPAWS-OPEN
- Equipment installed in all TV and Radio providers monitor for valid and relevant alert/warning messages
- Audio announcement and text display interrupts programming



Emergency Alert System

- EAS activation via IPAWS
  - Additional information
  - Supports audio attachment
  - Additional languages
- Local stations are not required to carry all alerts
  - Build relationships
  - Understand hazards
  - Agree on what will be carried

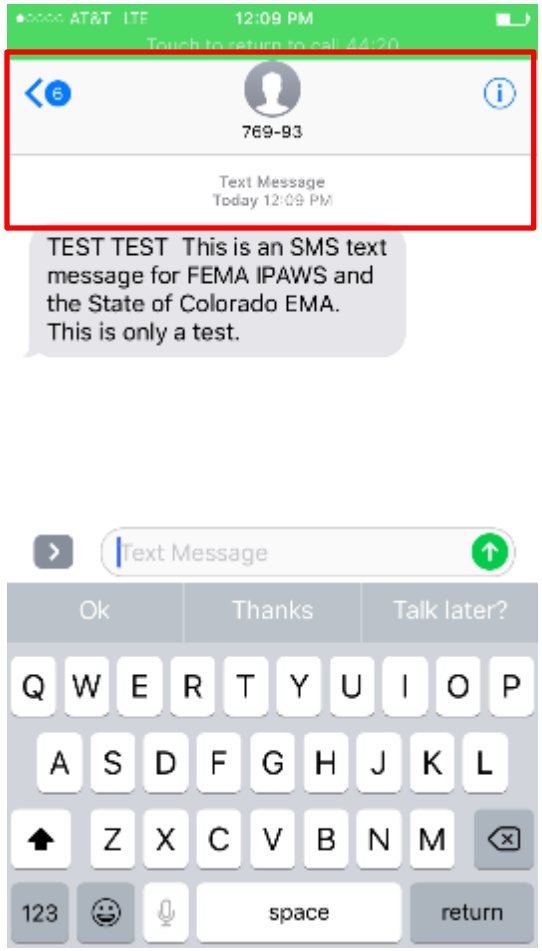
CAP1.2 Example (EAS)

```
  <msgType>Alert</msgType>
  <scope>Public</scope>
  <code>IPAWSv1.0</code>
- <info>
    <language>en-US</language>
    <category>Geo</category>
    <event>Evacuation Immediate</event>
    <urgency>Immediate</urgency>
    <severity>Extreme</severity>
    <certainty>Observed</certainty>
  - <eventCode>
      <valueName>SAME</valueName>
      <value>EVI</value>
    </eventCode>
    <expires>2018-10-09T18:54:50-07:00</expires>
    <senderName>Walton County EM</senderName>
    <headline>Evacuation Times Diminished Now is the Time to Leave</headline>
    <description>Walton County Emergency Management has issued a Mandatory Evacuation order for Zones A B and C due to the impending impacts of Hurricane Michael A shelter is open at
      Freeport High School in Freeport Florida There are no traffic issues existing on the hurricane evacuation route in Walton County There are no fuel shortages Now is the time to
      evacuate</description>
    <web>https://www.facebook.com/WaltonCountyEM/</web>
  - <parameter>
      <valueName>BLOCKCHANNEL</valueName>
      <value>CAPEXCH</value>
    </parameter>
  - <parameter>
      <valueName>BLOCKCHANNEL</valueName>
      <value>NWEM</value>
    </parameter>
  - <parameter>
      <valueName>BLOCKCHANNEL</valueName>
      <value>CMAS</value>
    </parameter>
  - <parameter>
      <valueName>BLOCKCHANNEL</valueName>
      <value>PUBLIC</value>
    </parameter>
  - <parameter>
      <valueName>EAS-ORG</valueName>
      <value>CIV</value>
    </parameter>
    <parameter>
      <valueName>timezone</valueName>
      <value>EST</value>
```

Wireless Emergency Alerts

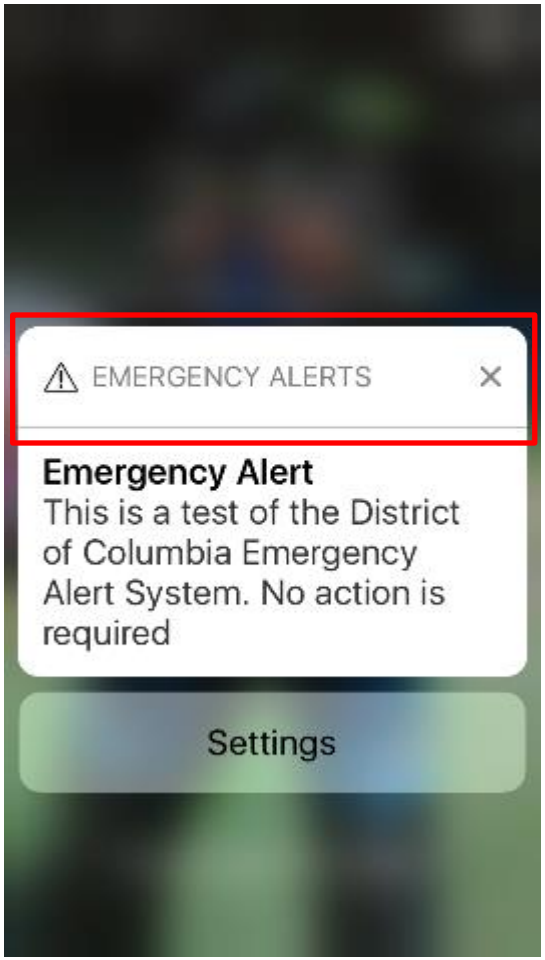
- Cell Broadcast
  - Not affected by network congestion
  - Sent to cellphones in designated area
- Not an SMS Text Message
  - Location based
  - Not subscription based
  - Not an app
- 90 character limit
- Can include URLs and phone numbers

SMS vs. WEA

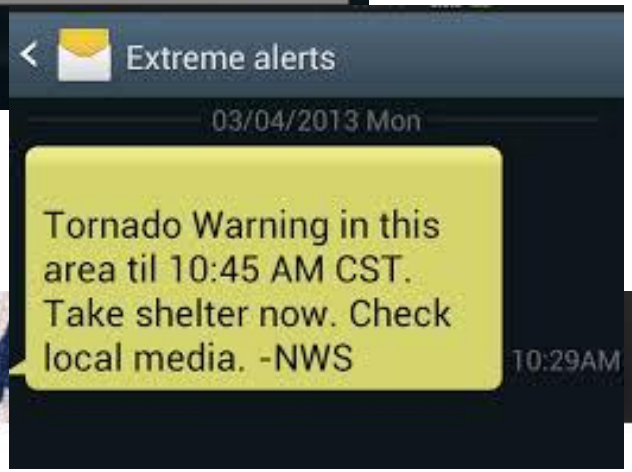


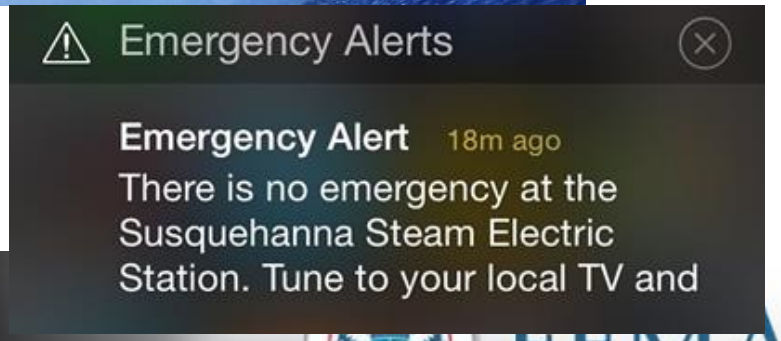
- SMS is a text message
  - Opt-in
  - Service congestion
  - Not specific to handset location
  - Your text message alert noise

- WEA is cellular broadcast
  - No need to opt-in
  - No message congestion
  - Specific to handset location
  - Unique noise



IPAWS WEA use examples:





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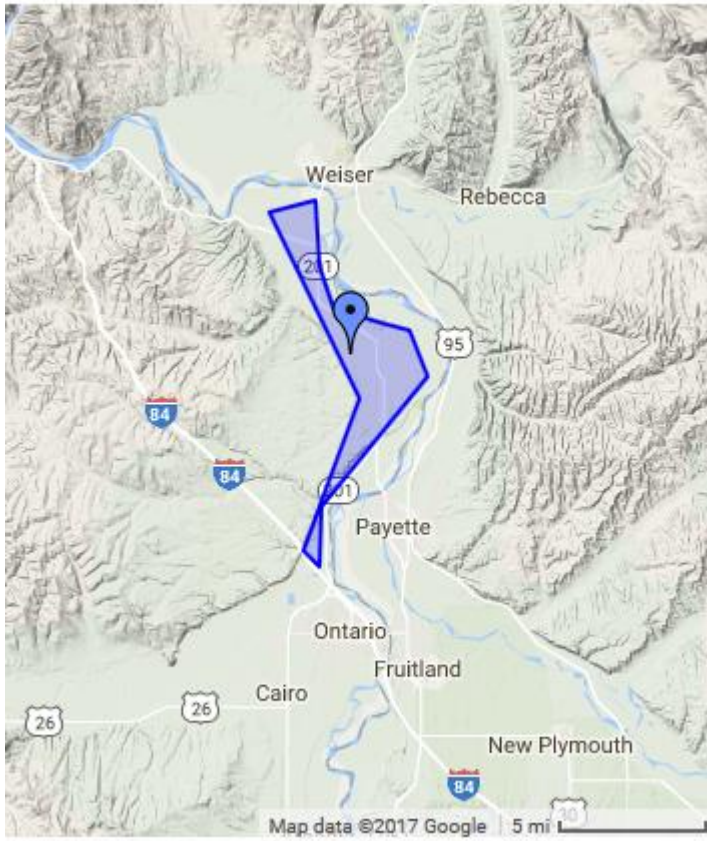
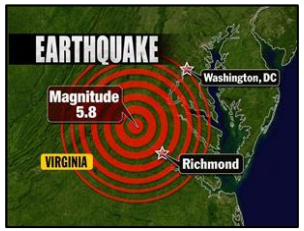
CAP1.2 Example (WEA)




```
<?xml version="1.0" encoding="UTF-8" standalone="true"?>
<alert xmlns="urn:oasis:names:tc:emergency:cap:1.2">
    <identifier>AS-OR-49a4cee6-275b-453a-9ffa-9dbc417792c9</identifier>
    <sender>Robert.Hunsucker@malheurco.org</sender>
    <sent>2017-01-09T14:14:17-07:00</sent>
    <status>Actual</status>
    <msgType>Alert</msgType>
    <source>AlertSense</source>
    <scope>Public</scope>
    <addresses/>
    <code>IPAWSv1.0</code>
  - <info>
        <language>en-US</language>
        <category>Safety</category>
        <event>Civil Emergency Message</event>
        <responseType>Prepare</responseType>
        <urgency>Immediate</urgency>
        <severity>Extreme</severity>
        <certainty>Observed</certainty>
      - <eventCode>
            <valueName>SAME</valueName>
            <value>CEM</value>
        </eventCode>
        <effective>2017-01-09T14:14:17-07:00</effective>
        <expires>2017-01-09T15:14:17-07:00</expires>
        <senderName>Malheur County EM,OR</senderName>
      - <parameter>
            <valueName>BLOCKCHANNEL</valueName>
            <value>EAS</value>
        </parameter>
      - <parameter>
            <valueName>CMAMtext</valueName>
            <value>Prepare for minor flooding 4 low lying areas of the Snake River-Ontario to Weiser </value>
        </parameter>
      - <parameter>
            <valueName>BLOCKCHANNEL</valueName>
            <value>NWEM</value>
        </parameter>
      - <area>
            <areaDesc>Flood</areaDesc>
            <polygon>44.23240859791255,-117.01812744140625 44.238312212932016,-116.98654174804688
                44.20534278429107,-116.98379516601562 44.185158356346356,-116.97418212890625
                44.17826452922573,-116.94259643554688 44.17407859804763,-116.9216537475586
                44.15215916724575,-116.91032409667969 44.08783162859382,-116.9820785522461
                44.05749207201752,-116.98448181152344 44.06588017158586,-116.99478149414062
                44.14082683077555,-116.95701599121094 44.23240859791255,-117.01812744140625</polygon>
          - <geocode>
                <valueName>SAME</valueName>
                <value>041045</value>
            </geocode>
```

When is IPAWS used?















Anything public safety officials determine as *threat to public safety:*

- ✓ Evacuation
- ✓ Shelter-In-Place
- ✓ Law Enforcement Situations
- ✓ 911 Outage
- ✓ Road Closure
- ✓ Chemical Spill/Release
- ✓ Water Contamination
- ✓ Emergency Water Distribution Location
- ✓ Emergency Relief Location
- ✓ Emergency Shelter Locations
- ✓ Dam Release Alert
- ✓ Critical Power Outage
- ✓ Nuclear Accident
- ✓ Landslide
- ✓ Pipe Line Break
- ✓ Extreme Weather
- ✓ Flooding
- ✓ Volcano
- ✓ Earthquakes
- ✓ Wildfires
- ✓ Child Abductions/AMBER

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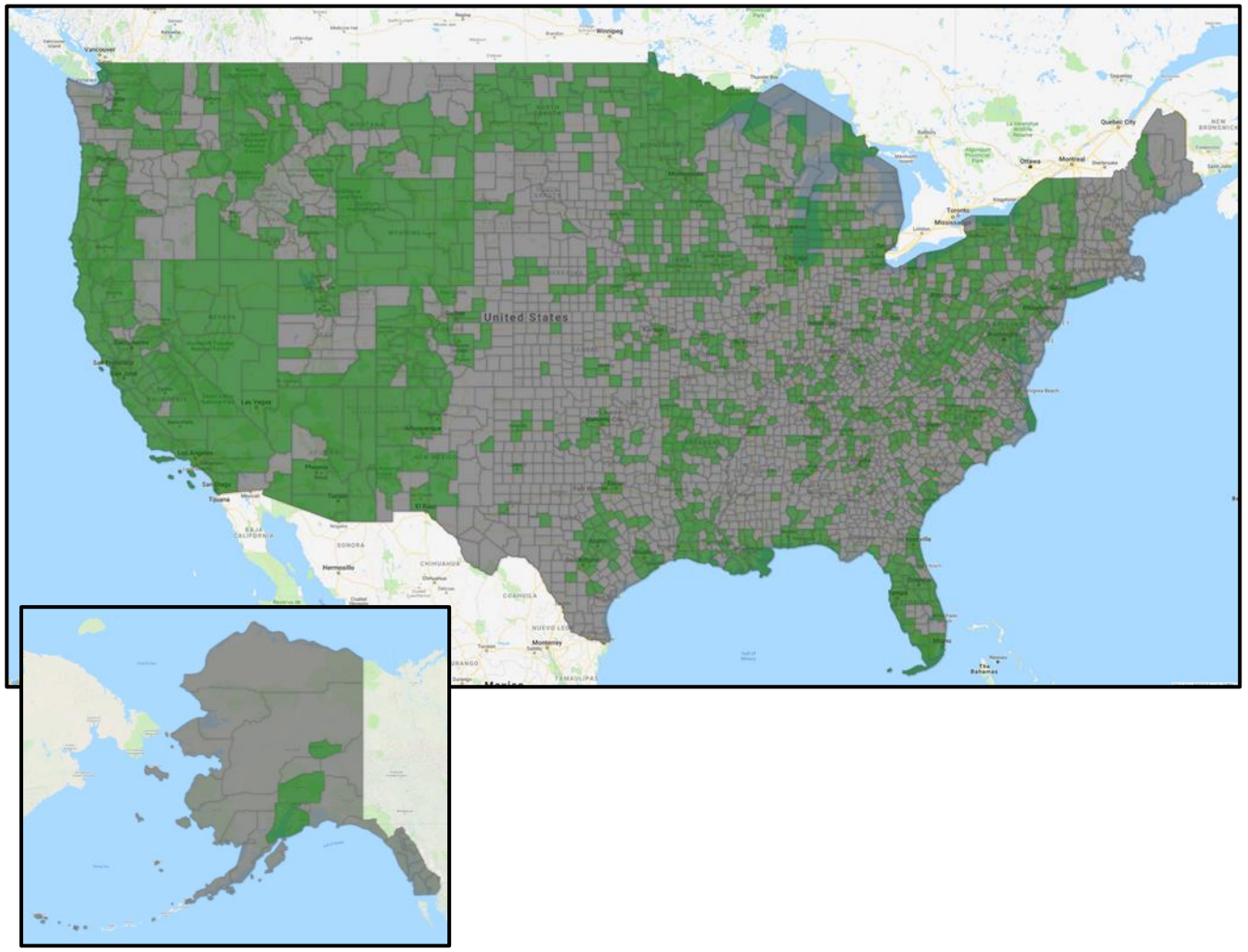
Authorities with Public Alerting

(as of October 12, 2018)

1,169 Total IPAWS Public Alerting Authorities:
1093* Local (*includes 19 military bases)
68 State-wide
3 Territory
3 Tribal
3 Federal



IPAWS Usage Statistics (as of October 26, 2018)

3,106,075	• Total messages processed by IPAWS
42,544	• Total Wireless Emergency Alert (WEA) messages sent
39,863	• WEAs sent by NWS
1,324	• WEAs sent by NCMEC
1,357	• WEAs sent by state/local
13,118	• Total Emergency Alert System (EAS) messages sent
11,920	• EAS, including tests, sent by state/local
1,198	• EAS non-test sent by state/local

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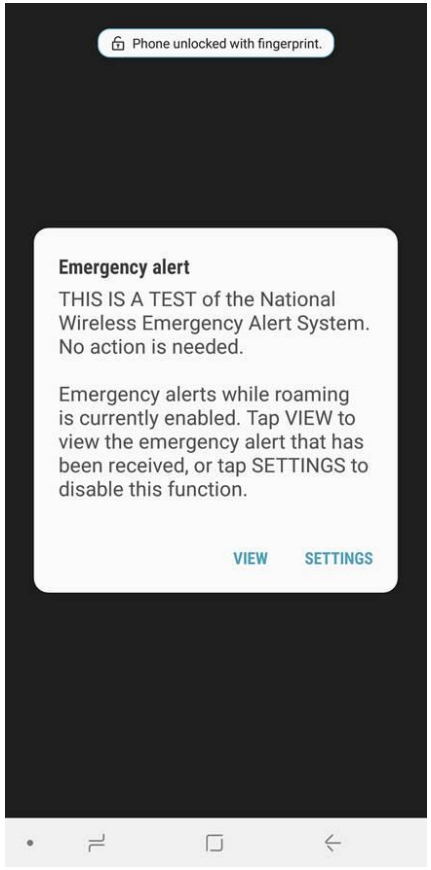
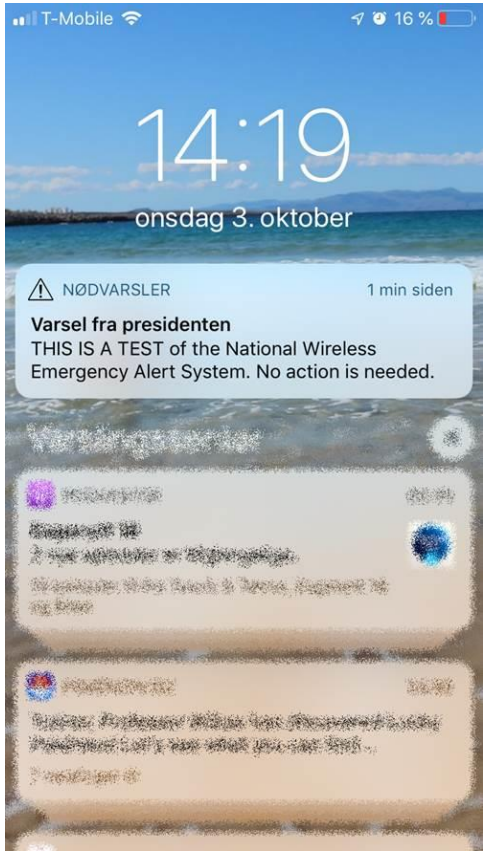
IPAWS National Test

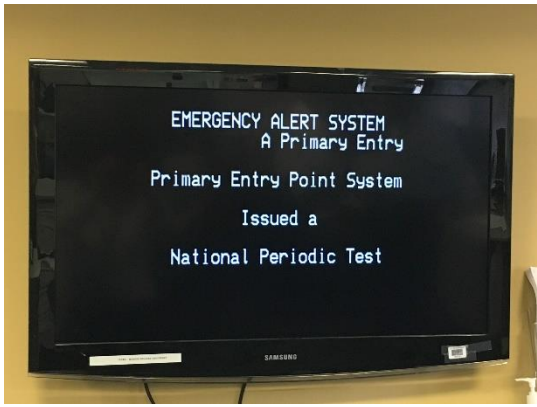
US Handset



Australian Handset



Norwegian Handset



TV Station

Changes to WEA in the Works…

Participating wireless carriers must support changes to WEA regulations by 2019*:

FCC adopted in September 2016:

- Increase message length from 90 to 360 characters by May 2019
- Add new alert category, “Public Safety Messages” by May 2019
- Spanish language WEA by May 2019
- WEA test code by May 2019
- Support URLs and phone numbers
  - Text URLs and phone numbers as of Nov 2016
  - “Clickable” URLs and phone numbers as of Nov 2017

Requires changes to alerting tool interfaces and FEMA’s IPAWS-OPEN

FCC adopted in January 2018:

- Hit 100% target area within 0.1 mile overshoot by Nov 2019
- Preserve alerts on phone for 24 hours by Nov 2019

**Changes will be phased into network and phone upgrades. i.e. 90 character and broad geo-targeting will remain in some areas and some phones for years TBD*

IPAWS-OPEN v3.11

- IPAWS-OPEN 3.11 Release – Approx. May 2019
  - English 360 WEA text
  - Spanish 360 WEA text
  - 5 Allowable WEAHandling Codes
    - Presidential alerts – Users cannot "Opt Out"
    - WEA Tests – Users will need to "Opt in"
    - Amber
    - Imminent Threat
    - Public Safety
  - USGS to use proprietary A-interface for early earthquake WEAs - no impact on alert origination software

WEA Algorithm Breakdown

1) 90 English is required

2) 360 English is optional

    a) If 360 English is absent, IPAWS will map the 90 English into the 360 English field

3) Spanish is optional

    IF Spanish is used:

    a) 90 character Spanish OR 360 character Spanish OR both must be used

    b) If 90 character Spanish is absent, but 360 character Spanish is present, IPAWS will map the 90 English into the 90 character Spanish field

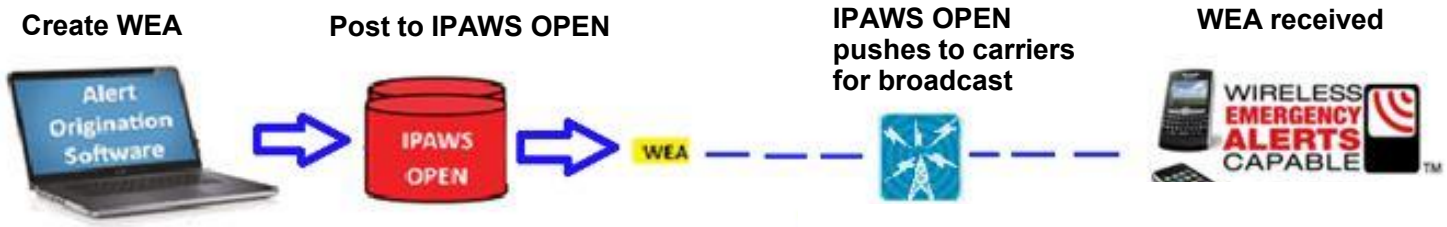
    c) If 360 character Spanish is absent, but 90 character Spanish is present, IPAWS will map the 90 character Spanish into the 360 Spanish field

4) If a Spanish Info Block is NOT present, Carriers will broadcast the English message to Spanish-enabled phones

WEA Algorithm Breakdown

- Cell carriers need to accommodate both the new and old WEA standards
  - New WEA supports 360 character English and 360 character Spanish
  - Old WEA supports 90 character English and (oddly) will also support 90 character Spanish
  - Alerting Authorities should have flexibility to take advantage of 360 Spanish, but if they don't use the new features, they run the risk of people not receiving any alert
- AOSPs should provide User input fields for all capabilities, but with only the 90 character English <CMAMtext> required

WEA Architecture



- New CAP <info> parameters:

- <info> block 1 – English
  - **<WEAHandling>**
  - **<CMAMtext> required** for 90 characters
  - **<CMAMlongtext>** for 360 characters

- <Info> block 2 – Spanish (optional)
  - <info> block 2 is duplicate to <info> block 1 except:
  - **<CMAMtext>** for 90 characters
  - **<CMAMlongtext>** for 360 characters

CAP

- Parallel processing in CAP alerts to CMAC1.0 and CMAC 2.0
  - Only 1 version of CMAC message will be implemented by a wireless carrier gateway
  - <eventcode> will no longer pass in CMAC 2.0 XML message

IPAWS

New WEA CAP Parameter

- New CAP <parameter>
  - <valueName> = **<WEAHandling>**
  - <value>
    - Presidential
    - Amber
    - Imminent Threat
    - Public Safety
    - WEA Test
  - Messages without <WEAHandling> will be rejected
  - <WEAHandling> will translate to <CMAC_Special_Handling> parameter

<WEAHandling> Parameter	<CMAC_Special_Handling> Parameter	Event Codes
Presidential	Presidential	EAN
Amber	Amber	CAE
Imminent Threat	No <CMAC_Special_Handling> Parameter Included	Other Event Codes (e.g., LAE, CEM, LEW, RHW, etc…)
Public Safety	Public Safety	Other Event Codes (e.g., LAE, CEM, LEW, RHW, etc…)
WEA Test	WEA Test	DMO, NPT, RMT, RWT

WEA Changes to Support English and Spanish

Multi-Lingual <info> blocks

- English
  - <info> block = <language> = <en-US>
  - Vendors will still be required to carry 90 character <CMAMText>
  - Option for <CMAMlongtext> which will support 360 characters
  - The 90 character text will be sent to current devices not upgraded for 360 characters and to non-LTE capable phones or all phones connected to non-LTE capable towers
  - The 360 character text will be sent via LTE to all 360 character compatible devices
  - If no <CMAMlongtext> is provided in the origination CAP message, the 90 character <CMAMtext> will be copied by IPAWS into the 360 character element that is sent to the carriers

WEA Changes to Support English and Spanish

- Spanish
  - The Spanish block is optional.
  - <info> block = <language> = <es-US>
  - If the Spanish block is used, elements in this block must duplicate the English info block except that the textual content elements (as opposed to enumerated values) will be written in Spanish
  - Originators may choose to fill in <CMAMtext>, or <CMAMlongtext>, or both
  - In the case that Spanish <CMAMtext> is missing, the 90 character English text will be sent to the carriers for broadcast on older devices and towers
  - In the case that Spanish <CMAMlongtext> is missing, the 90 Character Spanish <CMAMtext> will be sent in its place to the newer devices and networks

Behind the Scenes: <info> block to support English

<info> block 1:

<language> = en-US (English)

New parameter:
<valueName> = WEAHandling
<value> = Imminent Threat

New paremeter:
<valueName> = CMAMlongtext
<value> = up to 360 characters

```
<info>
  <language>en-US</language>
  <category>Safety</category>
  <event>Local Area Emergency</event>
  <responseType>Monitor</responseType>
  <urgency>Immediate</urgency>
  <severity>Extreme</severity>
  <certainty>Observed</certainty>
  <eventCode>
    <valueName>SAME</valueName>
    <value>LAE</value>
  </eventCode>
  <expires>2017-03-20T09:00:00-04:00</expires>
  <senderName>VA_HP</senderName>
  <headline> Test Message only Disregard please.</headline>
  <description> THIS is NOT an Actual Message. It is only a test. This is Descriptive text that defines the alert</description>
  <instruction>This is not an Actual message. It is only a Test. This is where the call to action for folks receiving the message should be provided.</instruction>
  <parameter>
    <valueName>WEAHandling</valueName>
    <value>Imminent Threat</value>
  </parameter>
  <parameter>
    <valueName>CMAMtext</valueName>
    <value>90 character English text to WEA </value>
  </parameter>
  <parameter>
    <valueName>CMAMlongtext</valueName>
    <value>this is where the 360 character description in English would go</value>
  </parameter>
</info>
```

Note: <valueName> = CMAMtext still required to support 90 character text

Behind the Scenes: <info> block to support Spanish

<info> block 2: optional

<language> = es-US (Spanish)

New parameter:
<valueName> = WEAHandling
<value> = Imminent Threat

New paremeter:
<valueName> = CMAMlongtext
<value> = up to 360 characters

```
<info>
  <language>es-US</language>
  <category>Safety</category>
  <event>Local Area Emergency</event>
  <responseType>Monitor</responseType>
  <urgency>Immediate</urgency>
  <severity>Extreme</severity>
  <certainty>Observed</certainty>
 - <eventCode>
      <valueName>SAME</valueName>
      <value>LAE</value>
  </eventCode>
  <expires>2017-03-09T12:12:00-04:00</expires>
  <senderName>CA_HP</senderName>
  <headline> Test Message only Disregard please.</headline>
  <description> THIS is NOT an Actual Message. It is only a test. This is Descriptive text that defines the alert</description>
  <instruction>This is not an Actual message. It is only a Test. This is where the call to action for folks receiving the message should be provided.</instruction>
 - <parameter>
      <valueName>WEAHandling</valueName>
      <value>Imminent Threat</value>
  </parameter>
 - <parameter>
      <valueName>CMAMtext</valueName>
      <value>90 character Spanish text to WEA </value>
  </parameter>
 - <parameter>
      <valueName>CMAMlongtext</valueName>
      <value>this is where the 360 character description in Spanish would go</value>
  </parameter>
 + <area>
</info>
```

Note: 2nd <info> block is required to support Spanish 90/360 WEA Text

FEMA

ipaws@fema.dhs.gov

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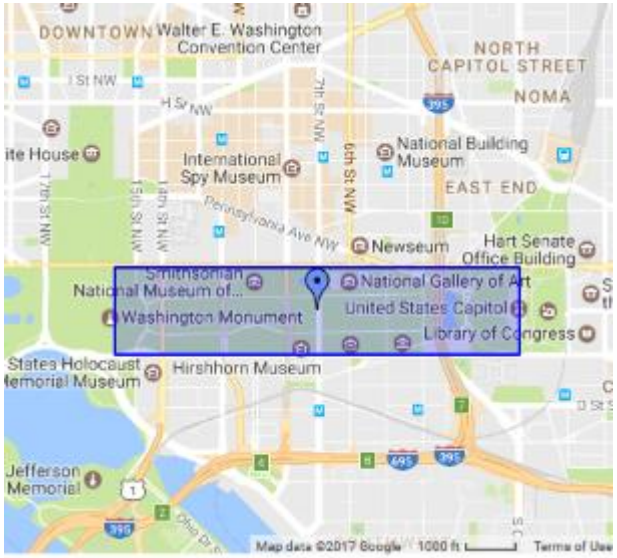
BACKUP

Common Alerting Protocol (CAP)

- Developed by the *Organization for the Advancement of Structured Information Standards* (OASIS) at http://www.oasis-open.org
- IPAWS uses:
  - OASIS Common Alerting Protocol Version 1.2, July 1, 2010
  - OASIS Common Alerting Protocol Version 1.2 USA Integrated Public Alert and Warning System Profile Version 1.0, Committee Specification 01, October 13, 2009.
  - EAS-CAP Industry Group (ECIG) Recommendations for CAP EAS Implementation Guide – Version 1.0, May 17, 2010 http://www.eas-cap.org/documents.htm

Wireless Emergency Alerts

- Geo-targeting
  - Targeting based on cell tower location
  - Constrain distribution
  - Include polygon or circle large enough to include a cell tower
  - There will be bleed-over



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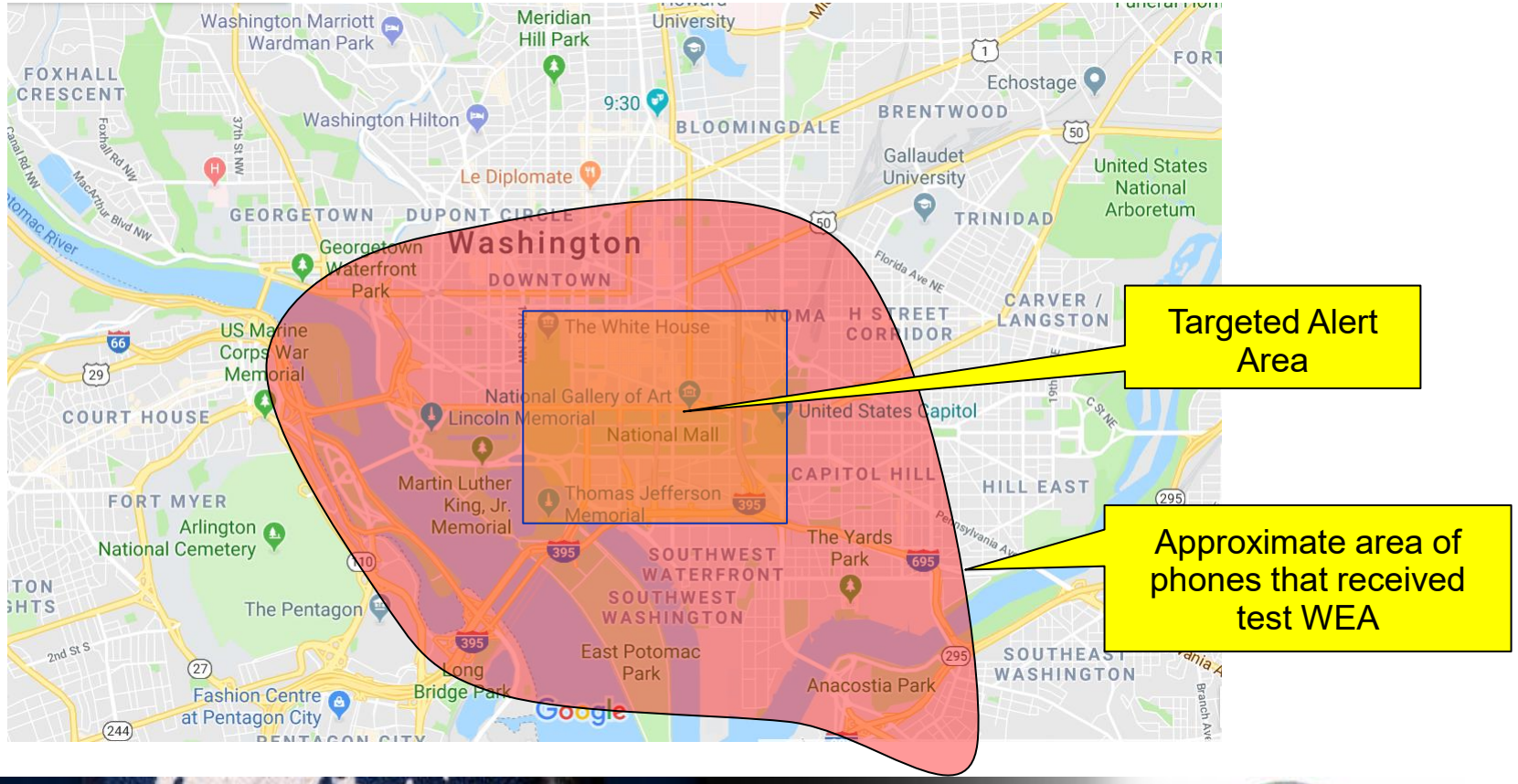
Washington DC HSEMA WEA Test
Jan 2017

- Alert received up to 2 miles outside polygon



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FCC Further Notice of Proposed Rulemaking (a.k.a. Under Consideration)

- Defining the Modes of Participation in WEA
  - What do "in whole" and "in part" really mean?
- Infrastructure Functionality
  - Is WEA really available everywhere there's coverage?
- Alert Message Preservation
  - Review old messages on the phone
- Earthquake Prioritization
  - Alert delivery in less than 3 seconds, or your pizza is free
- Disaster Relief Messaging
  - Many-to-one messaging
- Multimedia Alerting
  - Cell broadcast images to phones
- Multilingual
  - Beyond English and Spanish
- Matching the Geographic Area
  - Reach 100% of phones in targeted area with no more than 0.1 mile overshoot
- WEA on 5G networks

Some of these were added in the latest FCC Report & Order

https://apps.fcc.gov/edocs_public/attachmatch/FCC-16-127A1.pdf
https://apps.fcc.gov/edocs_public/attachmatch/FCC-18-4A1.pdf

NOAA Weather Radio

- Connection between IPAWS and NOAA Weather Radio is currently under further development
  - Warnings sent via IPAWS are not broadcast by NOAA Weather Radio transmitters
  - Local Weather Forecast Offices may support broadcast of non weather emergency messages (NWEM) by request
  - Local radio/TV EAS may activate from NWEM broadcast on NOAA Weather Radio >>> check state and local EAS Plans

- NOAA is not distributing National Weather Service warnings to the IPAWS EAS Feed
  - Radio and TV EAS stations must get NOAA weather warnings via alternate sources. e.g. audio monitoring of local NOAA Weather Radio transmitters and/or state relay networks