



The Integrated Public Alert and Warning System (IPAWS)

Get Alerts, Stay Alive

Preliminary Findings from Preparations for the IPAWS National Test

2105 Broadcasters Clinic, October 14th

Al Kenyon

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www.fema.gov/IPAWS

What is IPAWS?



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FEMA photographer Al Kenyon

- IPAWS is a National System for Local Alerting

IPAWS supports sending of local alerts from local, state, tribal, territorial officials during emergencies and from the President in the event of a catastrophic national emergency.

IPAWS provides authenticated emergency alert and information messaging from emergency officials to the public through:

- Radio and television via the Emergency Alert System (EAS)
- Cellular phones via Wireless Emergency Alerts (WEA)
- National Oceanic and Atmospheric Administration (NOAA) All Hazards Weather Radio (NWR) via IPAWS-NOAA gateway through a process NOAA calls “HazCollect”
- Internet applications and websites via the IPAWS All-Hazards Information Feed



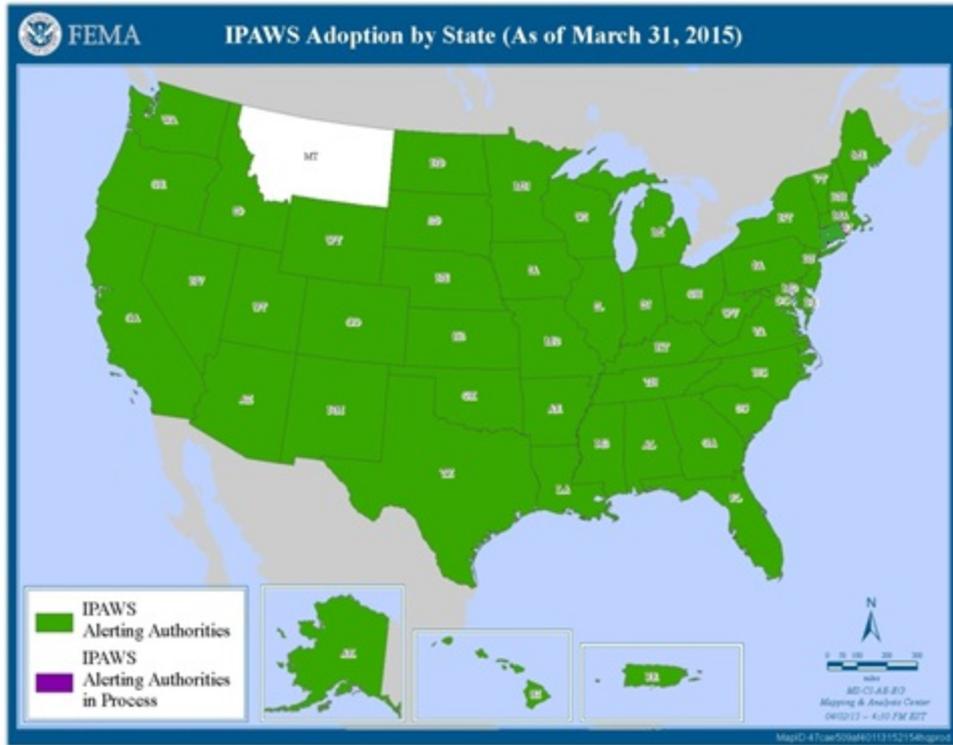
When can IPAWS be used?



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

Nationwide IPAWS Adoption



As of July 8, 2015	
Complete	In Process
596 Local	154 Local
49 States	0 State
2 Territories	
2 National	

“National” includes

- National Weather Service (NWS)
- National Center for Missing and Exploited Children (NCMEC)

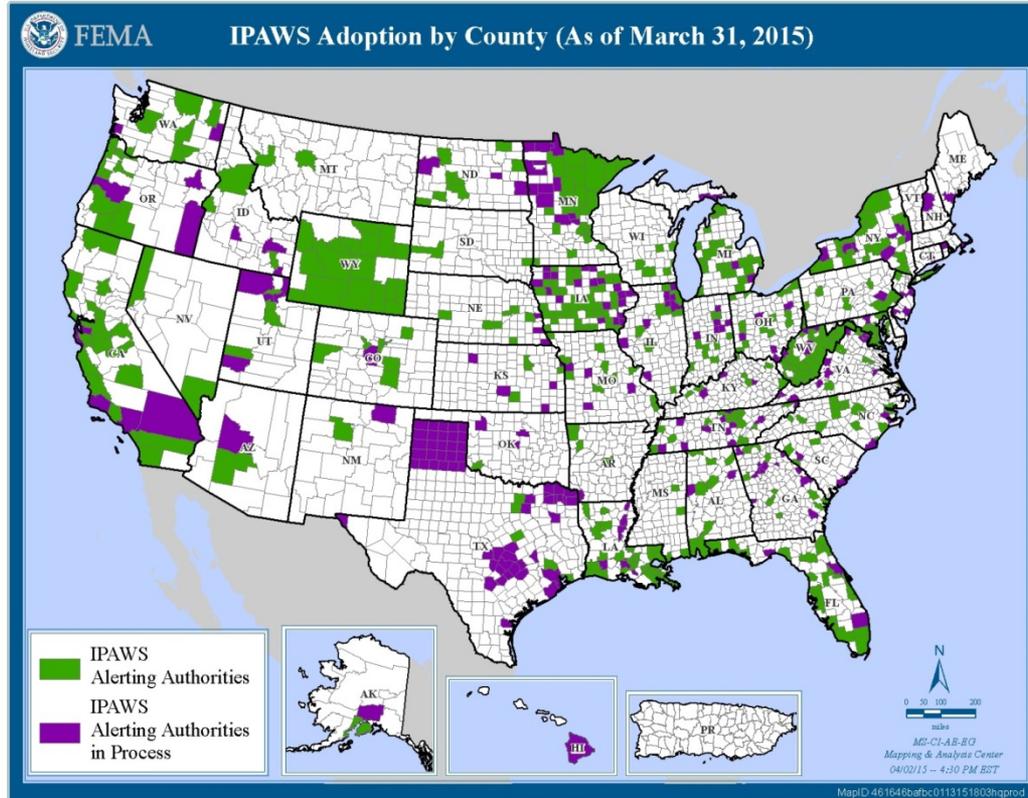


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NATIONAL
CENTER FOR
MISSING & EXPLOITED
CHILDREN®
www.missingkids.com

IPAWS Adoption by County/Parish



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IPAWS Local Jurisdiction Application

Event Codes: *[Check all that apply]*

EAS/GMAS/HazCollect

- | | |
|---|---|
| <input type="checkbox"/> Avalanche Warning (AVW) | <input checked="" type="checkbox"/> Law Enforcement Warning (LEW) |
| <input checked="" type="checkbox"/> Civil Danger Warning (CDW) | <input checked="" type="checkbox"/> Local Area Emergency (LAE) |
| <input checked="" type="checkbox"/> Civil Emergency Message (CEM) | <input checked="" type="checkbox"/> Nuclear Power Plant Warning (NUW) |
| <input type="checkbox"/> Earthquake Warning (EQW) | <input checked="" type="checkbox"/> Radiological Hazard Warning (RHW) |
| <input checked="" type="checkbox"/> Evacuation Immediate (EVI) | <input checked="" type="checkbox"/> Shelter in Place Warning (SPW) |
| <input checked="" type="checkbox"/> Fire Warning (FRW) | <input type="checkbox"/> Volcano Warning (VOW) |
| <input checked="" type="checkbox"/> Hazardous Materials Warning (HMW) | |

EAS/HazCollect Event Codes

- | |
|--|
| <input checked="" type="checkbox"/> Administrative Message (ADR) |
| <input type="checkbox"/> Avalanche Watch (AVA) |
| <input checked="" type="checkbox"/> Child Abduction Emergency (CAE) |
| <input checked="" type="checkbox"/> Telephone Outage Emergency (TOE) |

Test Codes

- | |
|--|
| <input type="checkbox"/> Required Monthly Test (RMT) |
| <input type="checkbox"/> Required Weekly Test (RWT) |

The undersigned has reviewed this application and the public alerting authorities requested by the applicant are consistent with the state Emergency Alert System plan, AMBER Alert System plan, or other operational public warning plans.

For the State of Louisiana

Agency: LA GOHSEP

Signature: 

Date: 4/14/2015

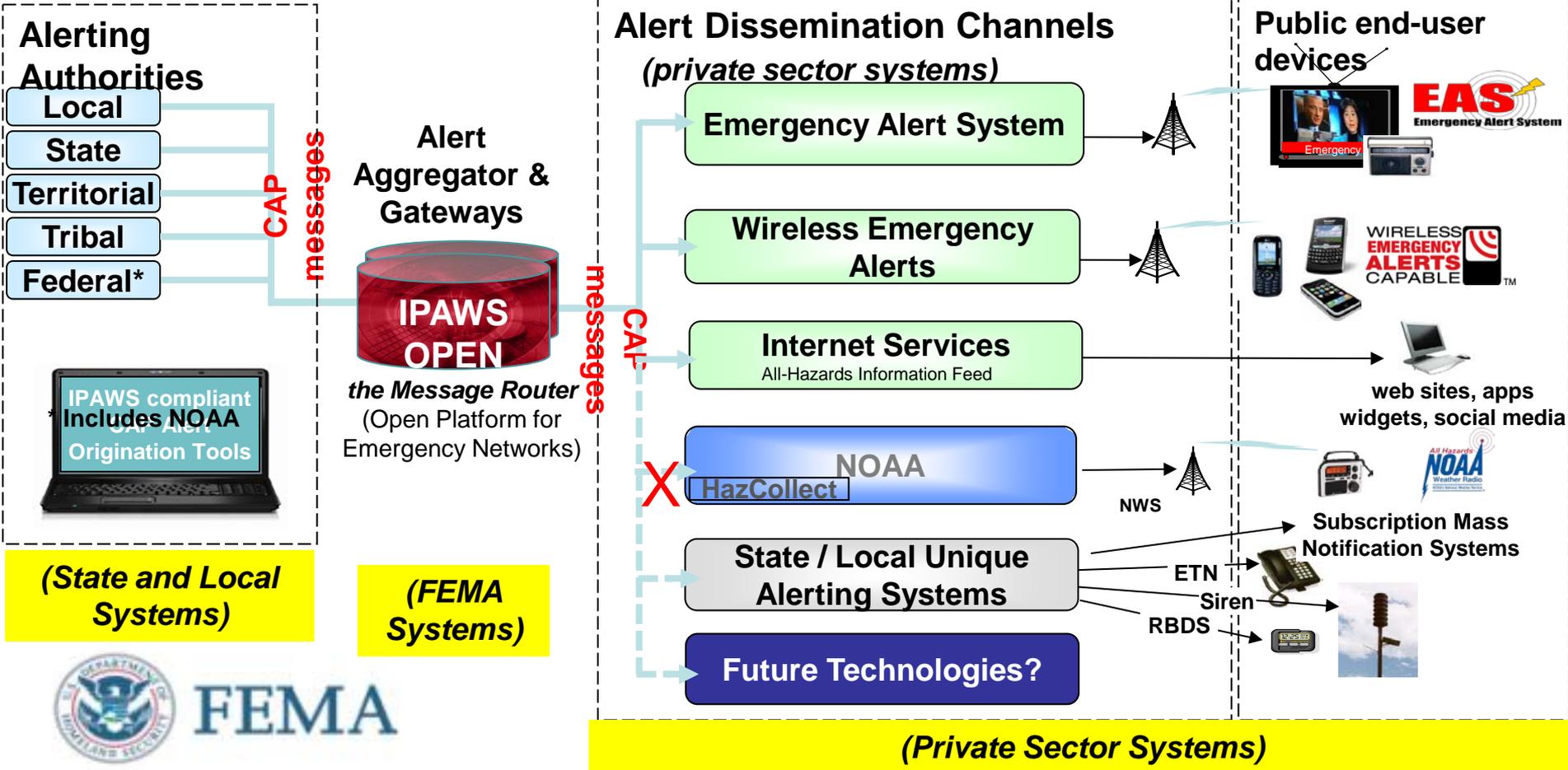
Name: Sean Wyatt Title: Section Chief, Operations

Email: sean.wyatt@la.gov Telephone: 225-358-5412



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IPAWS Architecture -



What IPAWS-OPEN does

A Gateway to “Alert Dissemination Channels”

Alert Aggregation:

1. Authenticates sender
 - A. Web Service Security
 - B. Digital Signature
2. Validates message format
3. Verifies permissions
 - A. What alerts can you send
 - B. Where can you send them
 - C. How can you send them
4. Hands off alert messages to IPAWS Alert Dissemination pathways: EAS, WEA, NOAA Weather Radio, Internet Apps



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Emergency Alert System Capabilities

via IPAWS, in addition to traditional EAS state or local configurations

- FCC requires all licensees to monitor IPAWS EAS feed
- Trigger Radio, TV and Cable alerts
- Delivers full text of emergency message
- Supports audio attachments (mp3)
- Supports audio links
- Supports Text to speech



FEDERAL EMERGENCY MANAGEMENT AGENCY
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July 16-24 IPAWS Usage

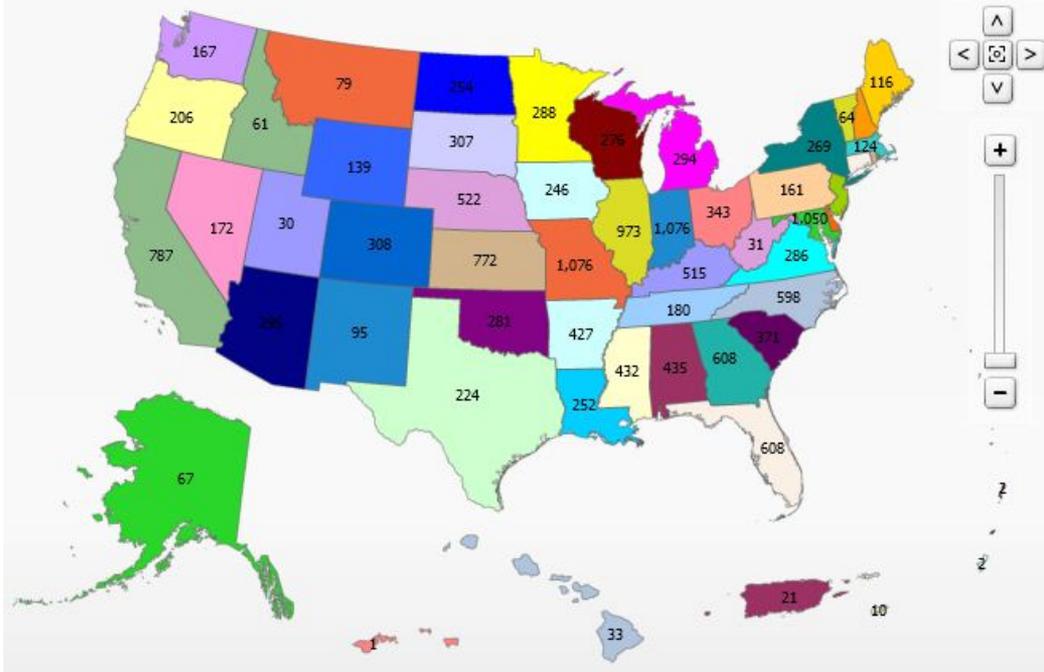
- 268 WEA messages were released.
- 11,380 messages overall
- 209 FFW (Flash Flood Warning)
- 47 TOR (Tornado Warning)
- 2 CAE (Child Abduction Emergency) (2 WEA)
- 2 LAE (Law Enforcement Advisory)
- 2 CEM (Civil Emergency Message)
- 6 DSW (Dust Storm Warning)
- 27 different COGs (Common Operating Group)

21 different event codes used



IPAWS Posted Messages July 16-24

Posted Messages By Geocode - 16-Jul-15 to 24-Jul-15 - Active - All Channels - All COGs - All Event Codes



Event Code	Description	Count
NWS	National Weather Service	4007
SPS	Special Weather Statement	2756
SVS	Severe Weather Statement	2075
FLS	Flood Statement	1910
SVR	Severe Thunderstorm Warning	936
FFS	Flash Flood Statement	336
SVA	Severe Thunderstorm Watch	271
FFA	Flash Flood Watch	253
FFW	Flash Flood Warning	245
SMW	Special Marine Warning	200
FLW	Flood Warning	184
TOR	Tornado Warning	61
TOA	Tornado Watch	50
RWT	Required Weekly Test	38
HWW	High Wind Warning	7
DSW	Dust Storm Warning	6
LAE	Local Area Emergency	6
RMT	Required Monthly Test	5
ADR	Administrative Message/Follow up Statement	2
CAE	Child Abduction Emergency	2
LEW	Law Enforcement Warning	2



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Wireless Emergency Alert Capabilities

LIMITATIONS
~~Capabilities~~

- 90 characters only
- Not all handsets work (*yet...*)
- Display & behavior inconsistent among handset types
- Still some localized network issues:
 - Duplicate alerts on some handsets
 - Some alerts delivered miles outside alert area
- No authorized way to test
- Public perception and education, “Why am I getting this?” and “Screechy” ring tone



NOAA All Hazards Weather Radio via IPAWS



All-Hazards Emergency Message Collection System, or HazCollect interface enables emergency alert messages from local alerting authorities to be broadcast over local NOAA Weather Radio transmitters directly from an IPAWS alert message

CURRENTLY NOT AVAILABLE!

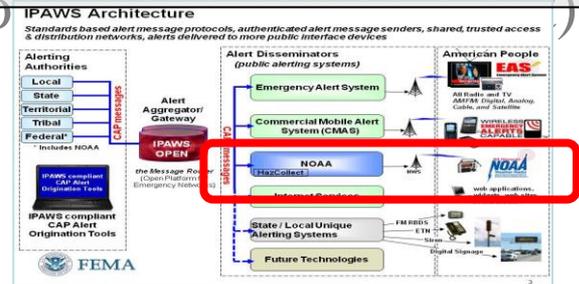
Disabled at NOAA.

Software and systems changes are under development

Local officials may still send alerts over NWR by calling/coordinating with the local Weather Forecast Office.

NOAA

- Radios include battery back-up (works for 10 hours)
- Most schools have weather radios



IPAWS Lab

- FEMA supported Test Lab & Staff available for alerting tool evaluation, demonstration, exercises and testing



All photos FEMA photographer Manny Centeno



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FEMA Primary Entry Point (PEP) Stations

- To satisfy requirement for a nationwide alert capability for warnings about a national catastrophic event, FEMA maintains relationships and equipment at a number of private sector radio stations across the US.
- FEMA PEP stations include:
 - extended backup power generation system
 - special communications connections
 - back up transmitter and EMP protection



Photos FEMA photographer Al Kenyon



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The First National EAS Test

- November 9, 2011- the first ever nationwide test of the National EAS
- Activation and message distribution via Primary Entry Point (PEP) system
- Used actual Presidential activation Emergency Action Notification (EAN) code
- EAS devices indicated that it was an actual alert driven by EAS header data. An intense public outreach campaign was mounted to avoid undue public concern.



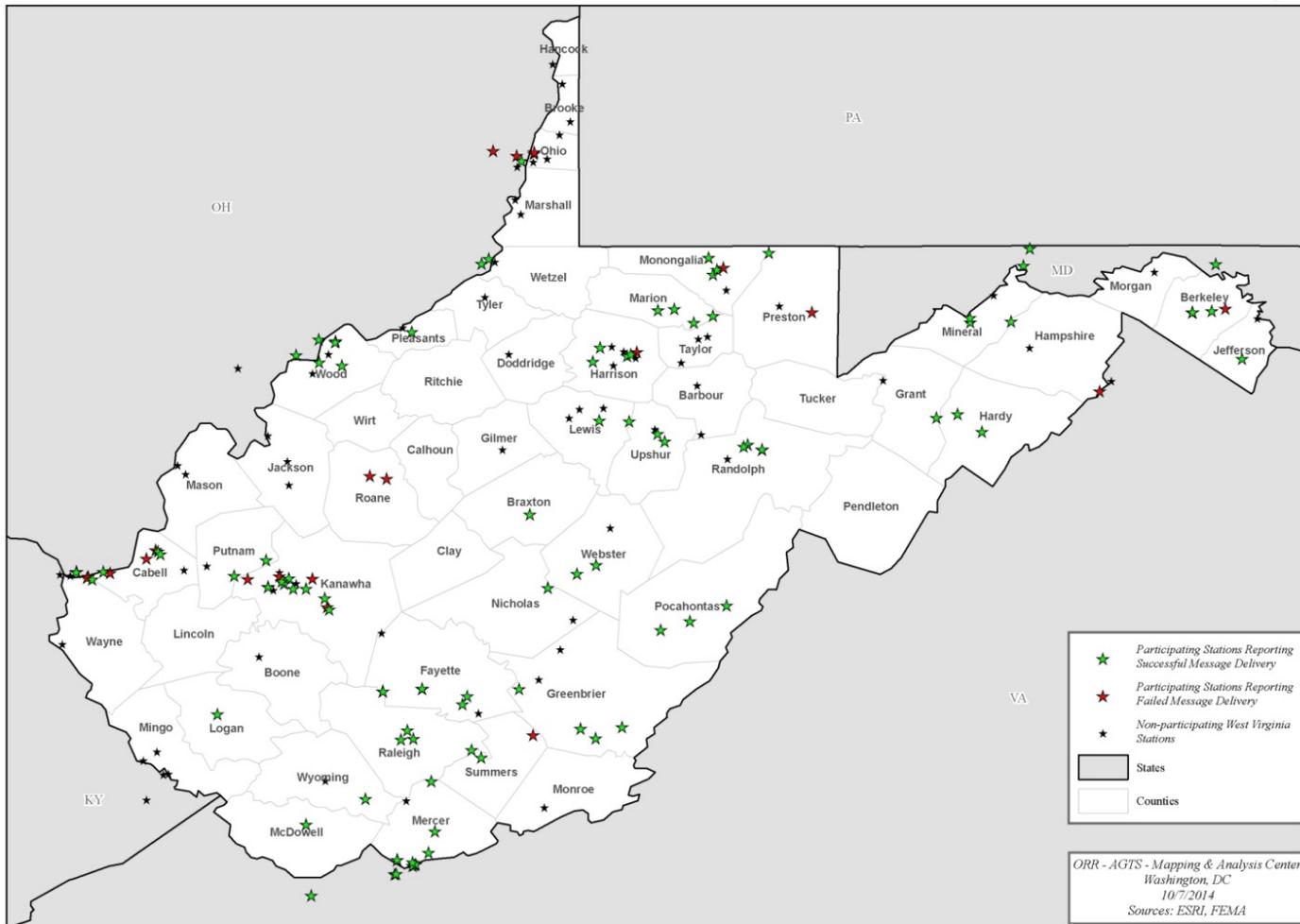
West Virginia

- FEMA worked with the West Virginia Broadcasters Association in late 2014 on an IPAWS National Test (INT) preparatory exercise in West Virginia.
- Over 80 percent of commercial broadcasters voluntarily participated in the IPAWS exercise. Overall broadcaster participation was 55%
- On September 17, 2014 at 2:00 PM the IPAWS Lab at JITC initiated a test message containing the National Periodic Test (NPT) code along with the location code for West Virginia for the EAS and IPAWS All-Hazards Information Feed pathways.
- Approximately 90 percent of the participating stations successfully transmitted the test message



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INT Phase II West Virginia Message Delivery



-  Participating Stations Reporting Successful Message Delivery
-  Participating Stations Reporting Failed Message Delivery
-  Non-participating West Virginia Stations
-  States
-  Counties

ORR - AGTS - Mapping & Analysis Center
 Washington, DC
 10/7/2014
 Sources: ESRI, FEMA

North Central Regional Test Partner States

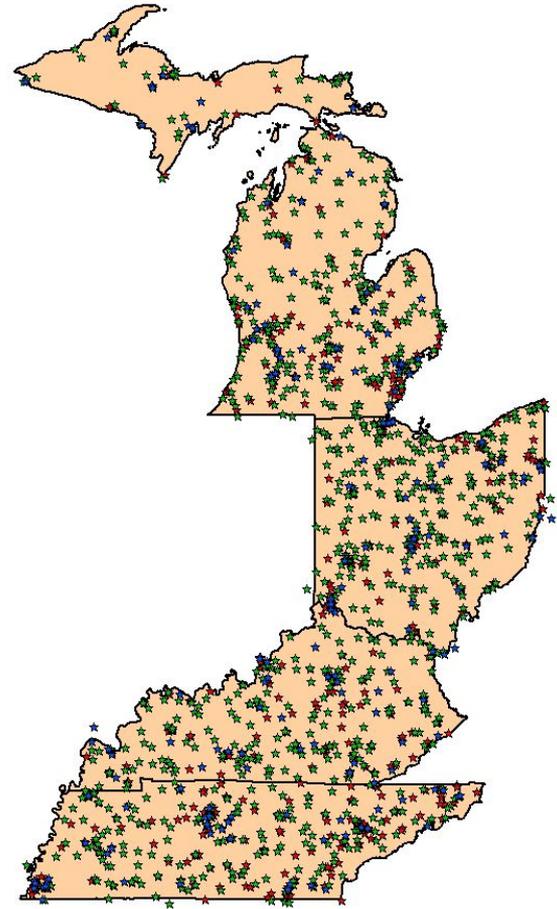
Michigan

Ohio

Kentucky

Tennessee

Approximately 1,350 FM Stations,
520 AM Stations and 300 TV
Stations



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North Central Region Test

On March 18th at 2:30 PM EDT FEMA's IPAWS Lab originated a CAP message containing the National Periodic Test (NPT) event code along with the geocodes for the participating state for the EAS, NWR and Public Feed pathways to conduct an IPAWS test.

This test required EAS Participants to adjust the incoming message filters on their EAS devices to cause immediate re-broadcast of a received NPT with their state location code.



Test Team Monitor Systems



FEMA Photographer AI Kenyon

FEMA monitoring teams were also supplied with mobile devices capable of receiving the WEA RMT so they could monitor the WEA component of the system, and provide feedback following the test.



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North Central Region Results

- The FEMA monitoring team recorded 128 randomly selected radio and television stations during the test. That sample yielded a 70% success rate.
- When just voluntary test participants are counted the success rate increases. For example, a MAB survey showed that 254 stations representing 63% of Michigan broadcasters participated with a success rate of over 88%.



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```

<?xml version="1.0" encoding="UTF-8" standalone="yes" ?>
- <alert xmlns="urn:oasis:names:tc:emergency:cap:1.2">
  <identifier>CAPNET-0-177-20150318143000</identifier>
  <sender>dasdec@10.1.10.67</sender>
  <sent>2015-03-18T14:30:00-04:00</sent>
  <status>Actual</status>
  <msgType>Alert</msgType>
  <source>IPAWS</source>
  <scope>Public</scope>
  <code>IPAWSv1.0</code>
- <info>
  <language>en-US</language>
  <category>Safety</category>
  <event>NATIONAL PERIODIC TEST</event>
  <urgency>Immediate</urgency>
  <severity>Extreme</severity>
  <certainty>Observed</certainty>
  <audience>All</audience>
- <eventCode>
  <valueName>SAME</valueName>
  <value>NPT</value>
</eventCode>
<effective>2015-03-18T14:30:00-04:00</effective>
<expires>2015-03-18T15:00:00-04:00</expires>
<senderName>IPAWS</senderName>
<headline>Emergency Alert System Test</headline>
<description>This is a National Test of the Emergency Alert System. This is only a test. Broadcast and cable operators in your area have developed this system in voluntary cooperation with FEMA, the F C C and local authorities to keep you informed in the event of an emergency. If this had been an actual emergency an official message would have followed the alert tones. This concludes this National Test of the Emergency Alert System.</description>
<instruction>No action is needed. This is only a test.</instruction>
- <parameter>
  <valueName>EAS-ORG</valueName>
  <value>PEP</value>
</parameter>

```

```

- <area>
  <areaDesc>Kentucky,Michigan,Ohio,Tennessee</areaDesc>
  - <geocode>
    <valueName>SAME</valueName>
    <value>021000</value>
  </geocode>
  - <geocode>
    <valueName>SAME</valueName>
    <value>026000</value>
  </geocode>
  - <geocode>
    <valueName>SAME</valueName>
    <value>039000</value>
  </geocode>
  - <geocode>
    <valueName>SAME</valueName>
    <value>047000</value>
  </geocode>
</area>

```



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All-Hazards Information Feed

Website Sample Source:
<http://ipawsonweather.alertblogger.com/>



IPAWS NON WEATHER

IPAWS Public Alerts from all Alerting Authorities except the National Weather Service

HOME ABOUT

Alert: Emergency Alert System Test

Posted by grandpah on 18 March 2015, 6:32 pm

Event: NATIONAL PERIODIC TEST

Sender Name: IPAWS

Issued: 2015-03-18T14:30:00-04:00

Expires: 2015-03-18T15:00:00-04:00

Description: This is a National Test of the Emergency Alert System. This is only a test. Broadcast and cable operators in your area have developed this system in voluntary cooperation with FEMA, the F C C and local authorities to keep you informed in the event of an emergency. If this had been an actual emergency an official message would have followed the alert tones. This concludes this National Test of the Emergency Alert System.

Instruction: No action is needed. This is only a test.

Urgency: Immediate

Severity: Extreme

Certainty: Observed

Categories: Safety,

Resource links:

EAS Broadcast Content

Type: audio/x-ipaws-audio-mp3

Link:

Alert Content

Type: image/jpeg

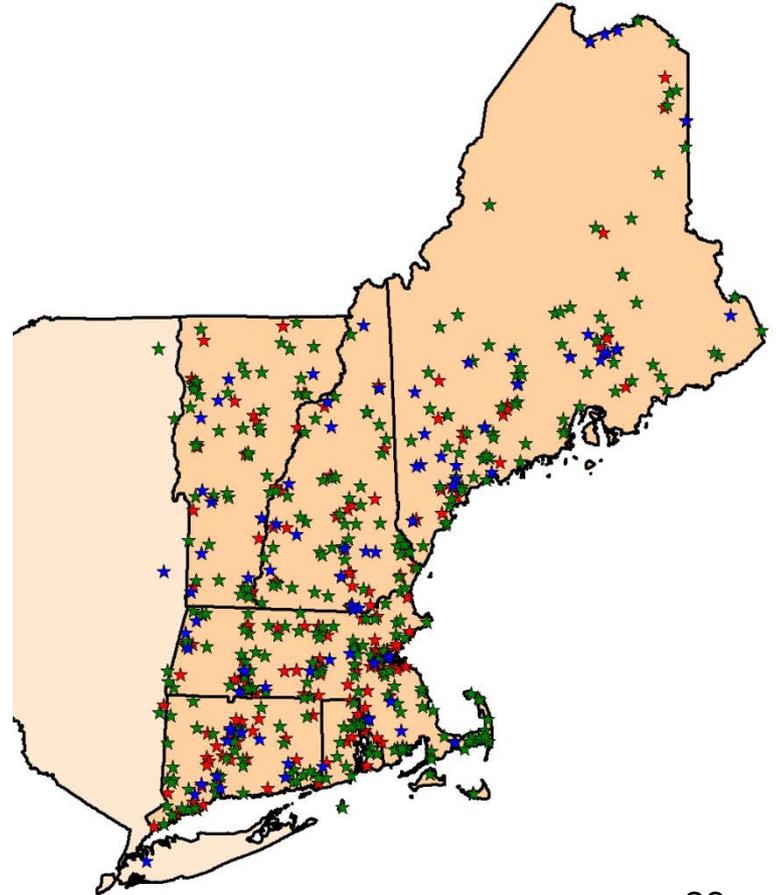
Link: <http://>

Area Description: Kentucky,Michigan,Ohio,Tennessee

New England Regional Test Partner States

Connecticut, Maine,
Massachusetts, New
Hampshire, Rhode
Island, and Vermont

Approximately 460 FM Stations,
200 AM Stations, and 125 TV
Stations



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New England Regional Test

September 16th – 2:20 PM EDT via IPAWS

IPAWS Lab originated an NPT message:

“This is a National test of the Emergency Alert System. This is only a test. Broadcast and cable operators in your area have developed this system in voluntary cooperation with FEMA, the FCC and local authorities to keep you informed in the event of an emergency. If this had been an actual emergency an official message would have followed the alert tone. This concludes this National test of the Emergency Alert System.”



New England Regional Test

- The FEMA monitoring team recorded 128 randomly selected radio and television stations during the test. That sample yielded a 70% success rate.



Test Observations

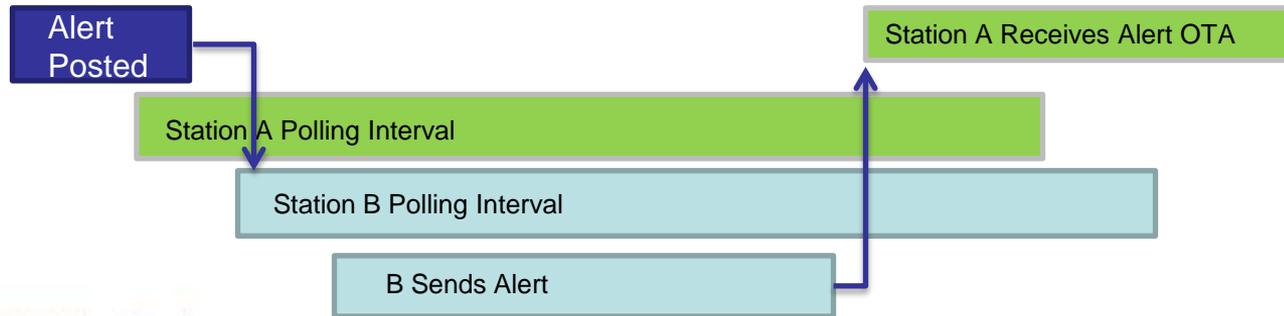


Message Source

- During the WV test many TV stations received the test message over the air from an LP station, therefore they could not display the full message text in the scroll.
- Ohio offered to have Ohio LPs delay the test message one minute to see if it would benefit video service operators.

Message Reception Time

- Typical log report: “Received CAP decoded from IPAWS at 2:30:45; received LP1 at 2:31:50.”
- IPAWS message reception time is a product of the EAS Device polling interval.



One Minute Hold Effect

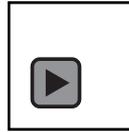
- Of 29 observed television stations outside of Ohio, 16 stations scrolled the full message text delivered via IPAWS... that's a 55% success rate.
- In Ohio, with LP stations holding the IPAWS delivered alert for one minute, 10 of 10 observed stations scrolled the full message text.

Audio Issues

- Clipped/distorted audio is often a product of the Over the Air EAS relay
- Here's how an alert message can sound from IPAWS: 
- We captured this odd artifact which I refer to as audio punch-through: 

“Mildly Terrifying”

You’ve been processing over the air EAS alerts for years without a problem. What could go wrong?



Make sure the clock rate is correctly set on your EAS device.



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Too Much Audio Gain, Not Enough Time



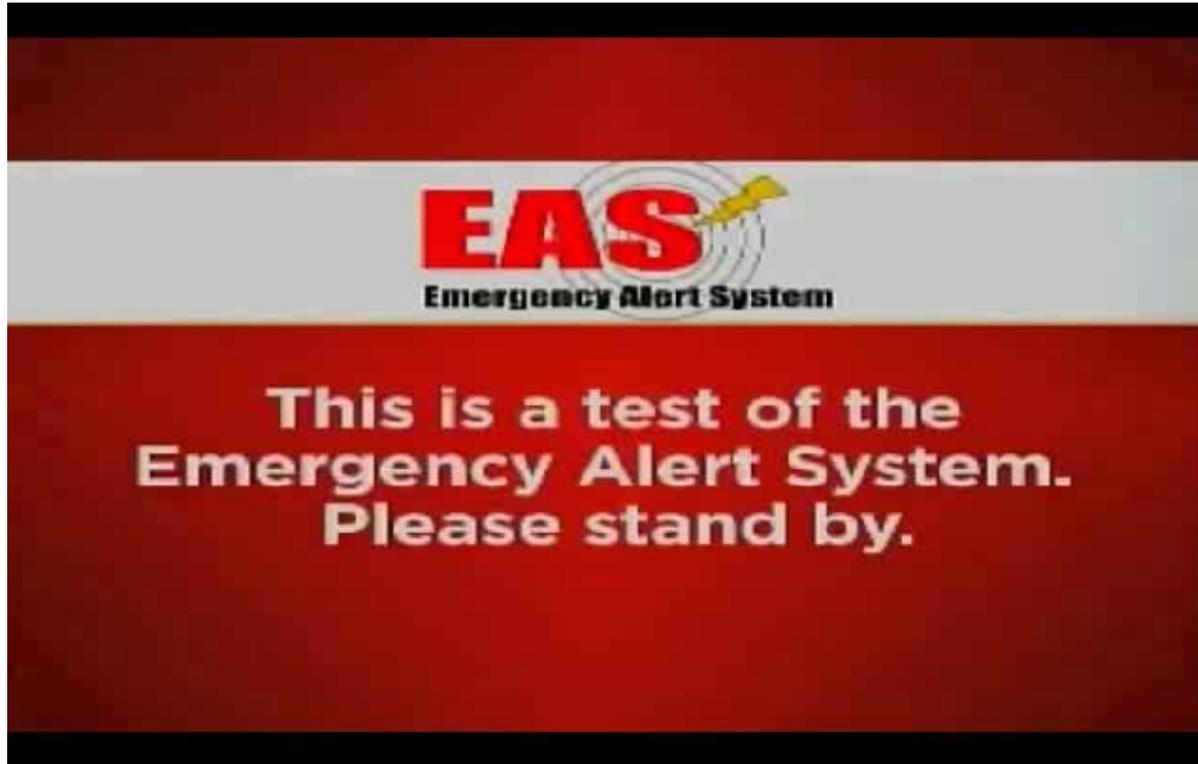
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(Video blurs conceal station call letters)

Scroll Colors

Green	24	(20 White, 4 Black font)
Black	6	(all White font)
Clear	5	(3 Yellow, 2 White font)
Blue	3	(all White font)
Gray	3	(2 Yellow, 1 White font)
Red	2	(1 White, 1 Black font)
White	1	(Blue font)

How about White on White?



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A few message scrolls began with old alert information.



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(5 second freeze inserted)

Attention Signal First, Alert Second



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(Alert also includes Attention Signal)

And Finally a Mystery...



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Solved... (thanks to SeaTTY)

The screenshot shows the SeaTTY software interface. At the top, there is a menu bar with 'File', 'Setup', 'Mode', 'Speed', 'Shift', and 'Help'. Below the menu bar is a control panel with buttons for 'OnTop', 'Normal', '50', '300', 'AEC', '50', 'SQL', 'Start', 'M-', 'M+', and 'FastD'. The main window displays a spectrum display at the top with a frequency scale from 1000 to 3000. Below the spectrum is a log of received transmissions. The log contains several lines of text, including call signs and frequencies. At the bottom of the window, there is a status bar showing 'SAME 521 Baud 1823 Hz 521 Hz UpB: 0'.

```
File Setup Mode Speed Shift Help
OnTop Normal 50 300 AEC 50 SQL Start M- M+ FastD

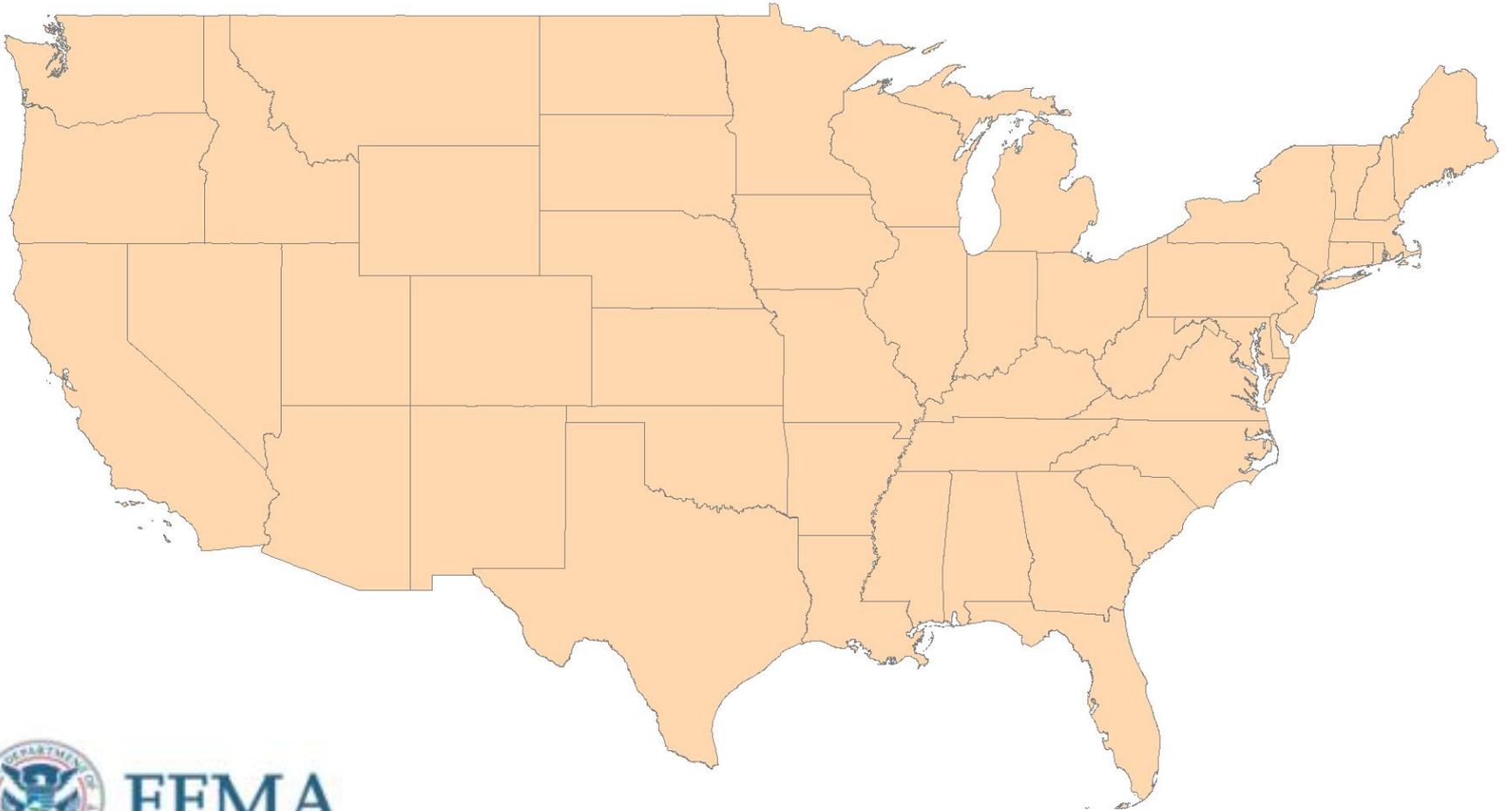
ZCZC-PEP-NPT-021000-026000-039000-047000+0030-0771830-WKBD/TV -_6_
~~~_D
ZCZC-PEP-NPT-021000-026000-039000-047000+0030-0771830-WKBD/TV ~_G_^2
ZCZC-PEP-NPT-021000-026000-039000-047000+0030-0771830-WKBD/TV -L}_~_m
NNNN_Y_T_
NNNN_=_o
NNNN_
ZCZC-CIV-NPT-021000-026000-039000-047000+0045-0771830-WKBD/TV -__
o
ZCZC-CIV-NPT-021000-026000-039000-047000+0045-0771830-WKBD/TV -_m__S
ZCZC-CIV-NPT-021000-026000-039000-047000+0045-0771830-WKBD/TV -_Z__
NNNN__qe_cLtY
NNNN_7{__
NNNN_

06 Apr 15
08 Apr 15
10 Apr 15

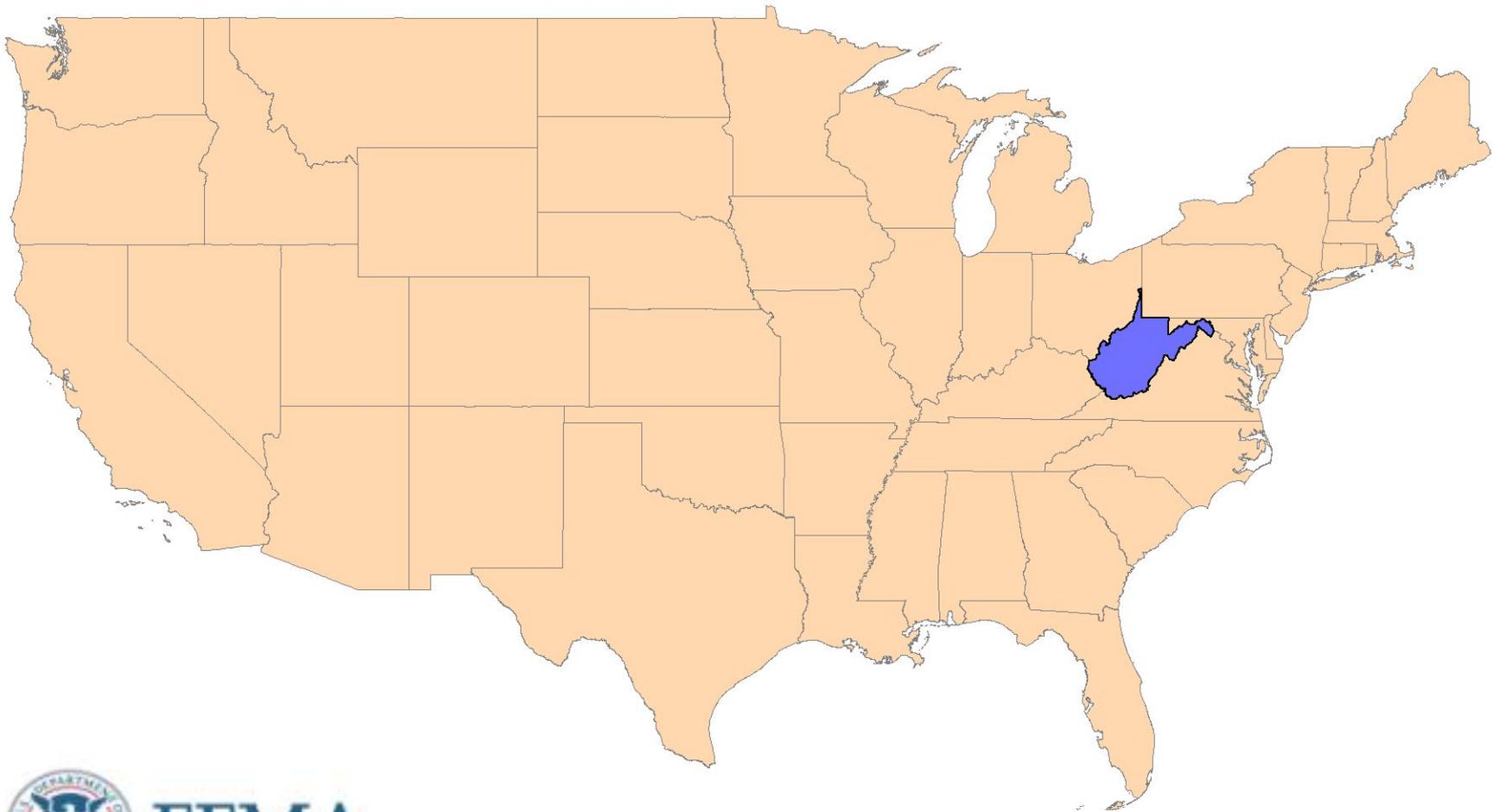
SAME 521 Baud 1823 Hz 521 Hz UpB: 0
```



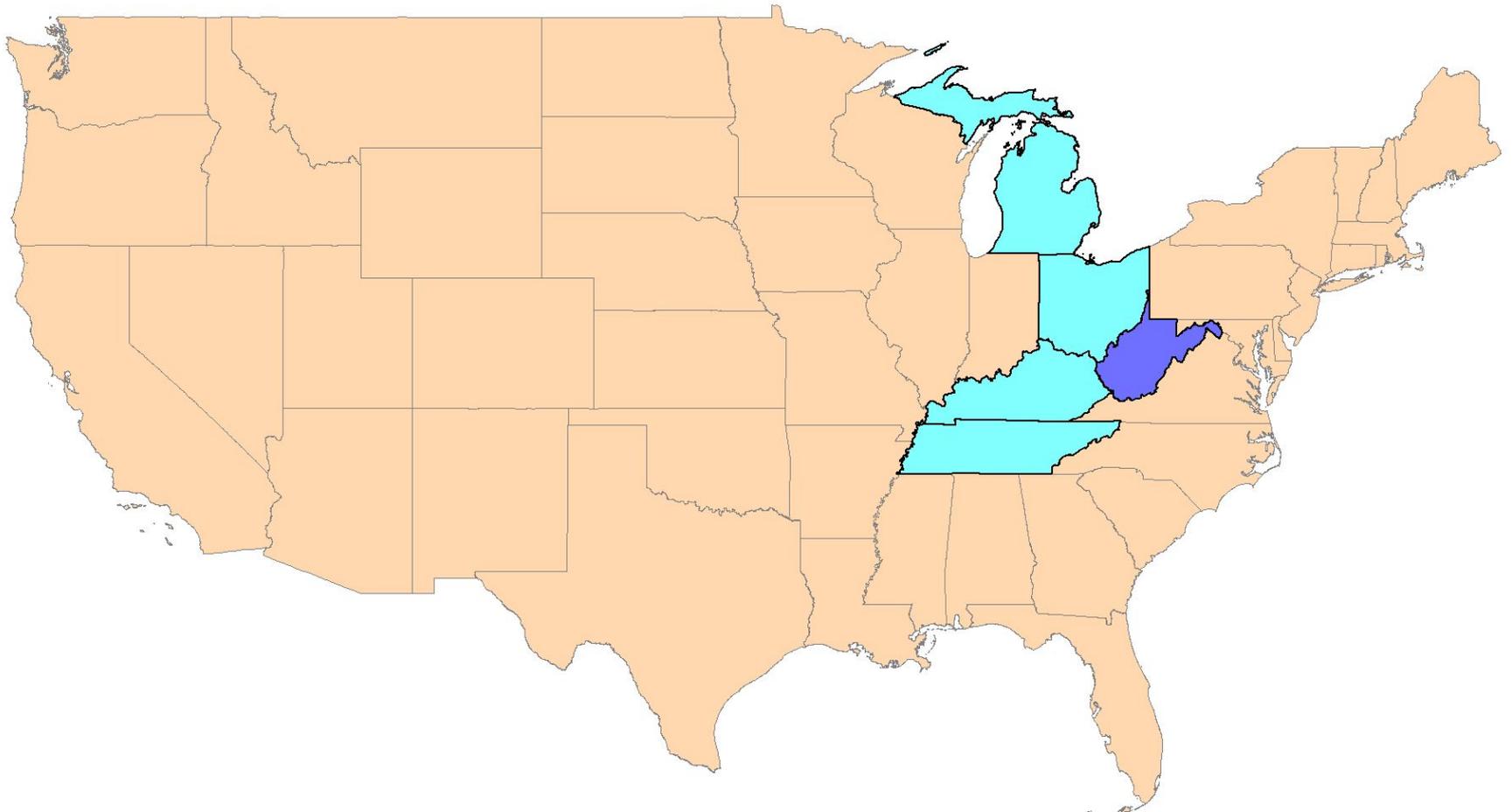
FEMA

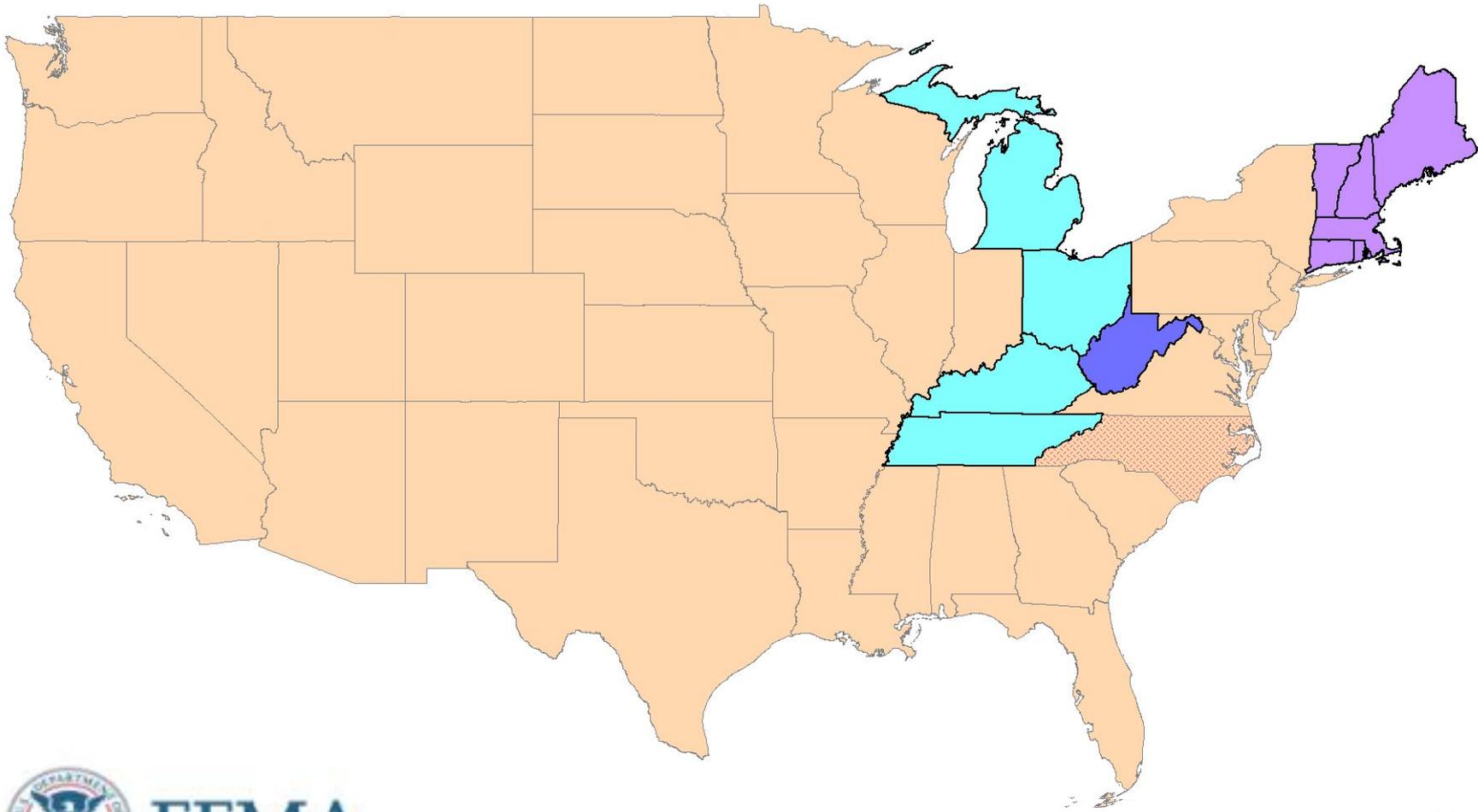


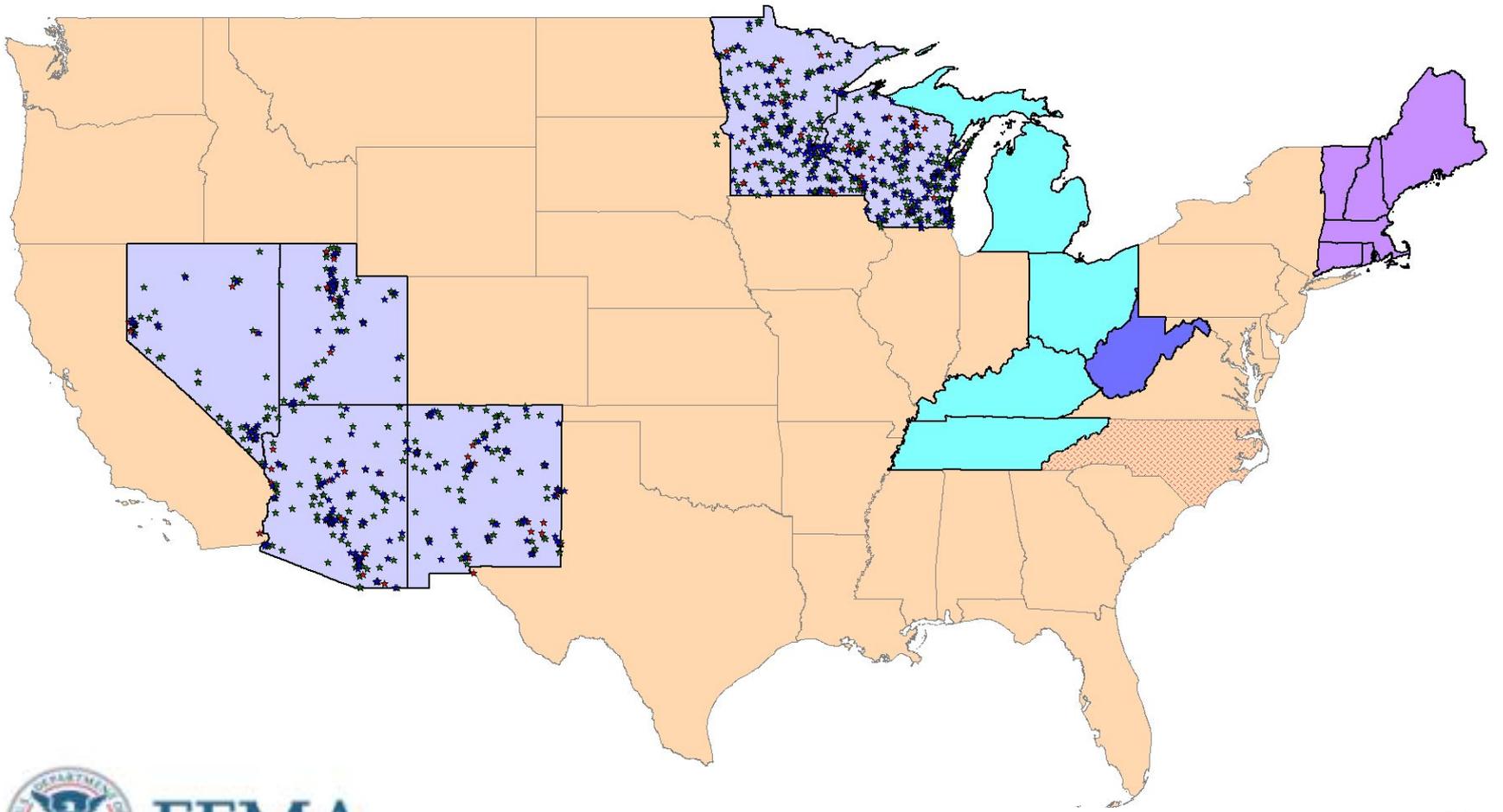
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QUESTIONS?

IPAWS

Integrated Public Alert and Warning System

Contacts

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Visit:

<http://www.fema.gov/ipaws/>



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For more information

- ▶ EMI Independent Study Courses:

- **IS-247a: *IPAWS Introduction***

- <https://training.fema.gov/EMIWeb/IS/is247a.a>

- **IS-248: *IPAWS for the American Public***

- <http://training.fema.gov/EMIWeb/IS/courseOverview.aspx?code=IS-248>

- **IS-251: *IPAWS for Alerting Authorities***

- <http://training.fema.gov/EMIWeb/IS/courseOverview.aspx?code=IS-251>

- ▶ IPAWS Stakeholder Information and Webinar Mailing Lists:

- <http://www.fema.gov/integrated-public-alert-and-warning-system-working-groups>



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