

2017 National IPAWS EAS Test Final Report

On September 27, 2017, the FEMA Integrated Public Alert and Warning System (IPAWS) Program Management Office (PMO) conducted the third in a series of nationwide Emergency Alert System (EAS) Tests. This test exercised IPAWS message distribution via EAS.

The EAS test convened the Test Management Conference Call from a room at the National Emergency Management Association (NEMA) Annual Meeting in Scottsdale, Arizona. We began sharing the input screen for the Monroe DASEOC Common Alerting Protocol (CAP) message authoring tool via webinar shortly after 2:00 p.m. Eastern Time. We confirmed that the IPAWS Testing Common Operating Group (COG) was properly configured to send National Periodic Test (NPT) and Required Weekly Test (RWT) event code messages to the entire county both through the IPAWS management tool (AMS), and the COG profile view function on the DASEOC.

A representative of National Weather Service (NWS) confirmed there was no anticipated severe storm activity and a representative of the FEMA Operations Center confirmed no ongoing events that might preclude conducting the national EAS test.

At the designated time, NEMA President, Ms. Wendy Smith-Reeve, clicked the Send button to create the alert. The alert was assembled and presented for final approval and released. Here is a chart of the IPAWS Open Platform for Emergency Networks (IPAWS-OPEN) time stamps:

EVENT	Time Stamp	Delta Time
CAP alert received by IPAWS-OPEN	2017-09-27 18:20:18.27	
Initial record posted to EAS-FEED Platform	2017-09-27 18:20:20.27	2 seconds
EAS-RETRIEVALS record recorded	2017-09-27 18:20:20.27	0 seconds
Updated ATOM-FEED document recorded	2017-09-27 18:20:21.27	1 second
End-to-End Lifecycle		3 seconds

The first successful CAP retrieval from the EAS ATOM FEED occurred at 18:20:22 GMT, roughly one-half second after posting.

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EAS Message Receipt Success As Reported

Participant Type Reporting Receive Status	2017			2016			Delta (%)
	Yes	Total Reporting	YES %	Yes	Total Reporting	YES %	
Cable	2,688	2,808	95.7%	3,067	3,295	93.1%	2.65%
IPTV	221	227	97.4%				
Radio	12,883	13,243	97.3%	13,651	14,440	94.5%	2.75%
<i>Full Power</i>	12,056	12,349	97.6%	12,767	13,421	95.1%	2.50%
<i>Low Power FM</i>	828	895	92.5%	884	1,019	86.8%	5.75%
TV	2,421	2,734	88.6%	2,514	2,594	96.9%	-8.36%
Wireline	47	48	97.9%				
Overall	18,260	19,060	95.8%	19,232	20,329	94.6%	1.20%

EAS Message Relay Success As Reported

Participant Type Reporting Transmit Status	2017			2016			Delta (%)
	Yes	Total Reporting	YES %	Yes	Total Reporting	YES %	
Cable	2,535	2,808	90.3%	2,528	3,295	76.7%	13.56%
IPTV	197	227	86.8%				
Radio	12,450	13,198	94.3%	12,567	14,440	87.0%	7.30%
<i>Full Power</i>	11,701	12,349	94.8%	11,830	13,421	88.1%	6.61%
<i>Low Power FM</i>	750	850	88.2%	737	1,019	72.3%	15.90%
TV	2,283	2,734	83.5%	2,215	2,594	85.4%	-1.89%
Wireline	45	48	93.8%				
Overall	17,510	19,015	92.1%	17,310	20,329	85.1%	6.94%

Data in the Delta (%) column is based upon a comparison with data extracted using the same methodology from the “ETRS data Unique Final” data set from the 2016 test.

This data appears to comport with observations that television in particular reported lower successful reception percentage than last year. Note that improvements in message forwarding were present in all other categories. This indicates improved efficiency upon EAS message receipt and increased message delivery to the public.

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We also note that the number of EAS Participants reporting test results via the EAS Test Reporting System (ETRS) is off by approximately ten percent. Possible reasons for this change include: Participants not able to report due to damage to power and telecommunications infrastructure following hurricane strikes, and a general lack of awareness of the responsibility to report. During the two year lead-up to the 2016 test FEMA conducted an extensive series of state and regional tests which contributed to awareness for the 2016 test. There was no equivalent regional testing campaign prior to the 2017 test.

Reported First Source of Message Received

EAS Participants reported lower percentages of message receipt from IPAWS for the 2017 test according to ETRS responses:

Participant Type Reporting RX Yes	2017			2016			Delta (%)
	IPAWS 1st Source	Total Reporting First Source	IPAWS %	IPAWS 1st Source	Total Reporting First Source	IPAWS %	
Cable	1,016	2,636	38.5%	1,818	5,470	33.2%	5.3%
IPTV	129	215	60.0%	76	167	45.5%	14.5%
Radio	4,749	11,155	42.6%	6,054	12,381	48.9%	-6.3%
Full Power	4,480	10,442	42.9%	5,733	11,582	49.5%	-6.6%
Low Power FM	269	713	37.7%	321	799	40.2%	-2.4%
TV	906	2,235	40.5%	1,139	2,390	47.7%	-7.1%
Overall	6,819	16,283	41.9%	9,108	20,595	44.2%	-2.3%

We believe that the decrease in the percentage of alerts first received from IPAWS was due to the traffic load approaching or exceeding the maximum load capacity of one of the FEMA data centers. Last year we operated with a 50/50 traffic split between data centers, while this year we imposed a 25/75 traffic load split between the two data centers hosting IPAWS-OPEN. Indications are that the more heavily loaded data center could not serve all EAS device polling requests resulting in time outs. These led to retries at established device polling intervals. During the resulting polling delay EAS devices received the test message over the air from monitored EAS sources. This is useful information regarding the possible insufficiency of a single data center in the current configuration to serve a national message. This information will contribute to the ongoing design of the IPAWS-OPEN cloud environment.

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IPAWS Polling by EAS Device Vendor and Message Retrieval Statistics

This year we have access to detailed polling records from Akamai. Here is an example showing successful CAP message recoveries by EAS device vendor type:

SAGE	8,711
Monroe	7,643
Trilithic	889
Gorman-Redlich	819
Alerting Solutions, Inc.	83
EZ Automation	32
Syn-Apps LLC	6
GSSNet - AlertFM	2

Amazon Web Service traffic reported the following activity associated with serving the audio messages, which were again served from an Amazon cloud environment. Counts and percentages are roughly equivalent to last year's test data:

	2017		2016	
English	7,862	92.4%	7,816	91.8%
Spanish	646	7.6%	697	8.2%
Total	8,508		8,513	

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REPORTED FAILURE MODES

Reported Failure Mode	Number of Participants Reporting	Percent of Reported Failures
Configuration – General EAS device configuration errors	268	27.1%
Equipment Failure – EAS equipment failure or EAS equipment out for repair	210	21.2%
Clock – Timing issue within EAS device, typically due to NNTP server configuration	74	7.5%
Power Outage – Dark inside	52	5.3%
Middleware – Problems with automation, program switching, or software errors in plant beyond EAS device	51	5.2%
Source Contamination – Issues with Over The Air (OTA) source (also see “Monitor” below)	41	4.1%
Wiring – Connection between EAS device and audio chain not complete	38	3.8%
Harvey, Irma, Marie – Failure due to hurricane damage	35	3.5%
Update – EAS device software out of date	34	3.4%
Monitor – Monitored OTA source did not deliver complete NPT message	29	2.9%
Silent – Participant off air	28	2.8%
Network – IP connectivity issue between EAS device and FEMA servers (usually local network configuration)	25	2.5%
Wrong – Participant believes they are exempt from requirement to forward NPT	18	1.8%
Obsolete – EAS device installed is no longer supported and cannot process NPT	15	1.5%
Antenna – OTA reception issues attributed to antenna short coming or failure	11	1.1%
Auction – TV Station no longer operating due surrendered license for TV Repack (effectively Silent and not coming back)	10	1.0%
Source – Issues with OTA monitoring assignment	10	1.0%
Not Installed – EAS device doesn’t work if it’s still in the box	7	0.7%
Success – Participant DID relay message although it reported it did not in Form 2	7	0.7%
Rx – EAS off air receiver failure	5	0.5%
Operator Error – Errors attributed to manual processes	4	0.4%
Unplugged – EAS device not plugged in	4	0.4%
EmNet – Local EmNet server malfunction	3	0.3%
Message Conflict – Stations claimed incoming EAS message conflicted with NPT	3	0.3%
Schedule – Participant off air due to time sharing agreement	3	0.3%
No Audio – No audio message received (similar to “Monitor”, above)	2	0.2%
Wrong Text – Video service participant displayed text/header data for message other than NPT	2	0.2%
Text-to-Speech – EAS device forwarded message using TTS from CAP	1	0.1%

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Roughly half as many EAS Participants reported failure mode information for the 2017 test compared to the 2016 test. The following table compares reported failure modes for this year’s test with the reported failure modes for the 2016 test:

	2016		2017		Significant Change
Configuration	443	28.14%	268	27.1%	
Silent	321	20.39%	28	2.8%	-17.6%
Update Required	220	13.98%	34	3.4%	-10.5%
Equipment Failure	217	13.79%	210	21.2%	7.4%
Rules Variance	108	6.73%	18	1.8%	-4.9%
Source Issues	91	5.72%	70	4.1%	-1.6%
Obsolete Equipment	65	4.13%	15	1.5%	-2.6%
Wiring Errors	44	2.80%	38	3.8%	
Automation	42	2.67%	51	5.2%	2.5%
Connectivity	18	1.14%	25	2.5%	1.4%
Antenna (reception)	2	0.13%	11	1.1%	
EAS Device Out (offline)	1	0.06%	7	0.7%	
Manual Operation	1	0.06%	4	0.4%	

We see roughly the same percentage of Configuration errors. The number of Silent stations is off considerably indicating that pre-analysis sorting is more effective for the 2017 test. The percentage of reported Equipment Failures is up which supports FEMA’s previously stated opinion that equipment failures will continue to be a significant factor for failures. The number of EAS Participants reportedly operating at variance to Federal Communication Commission (FCC) EAS Rules has dropped which is indicative of better understanding of the Rules among those EAS Participants with responses in ETRS.

Test performance in US Territories

American Samoa –all report stations received and forwarded the test message.

Guam – Received and forwarded by 17 of 19 reporting stations with eight reporting pulling the message direct from IPAWS.

Saipan – Received and forwarded by three stations with five of eight stations reporting.

Puerto Rico and the US Virgin Islands – No reports of success due to post hurricane infrastructure issues.

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Observations, Comments, and Recommendations

While the apparent overall quality of the data collected in ETRS has improved FEMA continues to have concerns regarding the quality of EAS Participant responses recorded in ETRS. For example seven EAS Participants indicated that they did not receive the NPT message, but did successfully relay the message they claimed not to receive.

More than 100 EAS Participants reported first reception of the NPT message from a NWS source. This was only possible for those 27 Washington State EAS participants monitoring National Oceanic and Atmospheric Administration Weather Radio (NWR) transmitters associated with the Seattle Weather Forecast Office, as that was the only place in the country where NWR carried the NPT message.

Following both the 2016 and 2017 tests, FEMA reviewed more than 120 video clips capturing the visual and aural performance of television stations relaying the NPT message. Without commenting on individual station performance, FEMA recommends that the FCC establish guidelines for the required aural and/or visual components for a television station to claim successful relay of the test message. The video clips show some stations which reported successful relay actually did not transmit the test message audio. Likewise there were varying forms of visual message display associated with stations reporting successful message relay including a few stations that displayed scrolling text associated with a previously received EAS message. Further, the clips contain many examples of the NPT audio message being played back simultaneously with normal program audio. Sometimes normal program audio levels were attenuated or “ducked” while the EAS message audio played. In some cases normal program audio was not attenuated at all and the EAS message audio was barely audible in the background.

The NPT event code EAS message is a stand in for a National Level Presidential EAS message. It is no more appropriate to continue to play normal program audio during relay of an NPT message than it would be to mix normal program audio with an official live emergency message from the President of the United States. In the months following the 2016 national test an operator error in a local sheriff’s office caused television stations in Bakersfield, California, to relay a locally generated Emergency Action Notification (EAN). A comparison of the performance of that television station’s EAN relay to their NPT relay demonstrated that in both cases the television station mixed program audio the EAS message audio. We cite this case to support FEMA’s concern that improper handling of the NPT message will be replicated should it ever be necessary to convey an EAN.