

ECIG Recommendations  
For a  
**CAP EAS Implementation Guide**  
EAS CAP Industry Group - ECIG  
EAS-CAP Implementation Guide Subcommittee  
DRAFT - Version 0.9  
5 April, 2010

Revision History:

Rev 1 - January 25, 2010 –Initial Version - Tom Wood

Rev 2 - February 1, 2010 Minor format updates, added revision history, new suggestions for Originators guide section, updates to Resource sections, updates to Video display construction, examples, and Test messages— Tom Wood

Rev 3 – March 21. Integrate answers from the issues matrix. Removed EAS-STN-ID from drawings and samples. Add additional discussions on scope and update/cancel. Addressed Red/Orange items. Integrate content from others, new figures, comments from Jared, Ed, Gary. Added notes to originators. Added recommendation for new mimeTypes. Changed title. Added EASText. Changed formatting for automatic TOC generation. Added section on test messages. Added FIPS6 in an older protocols section. Updated with items pending from the Issues Matrix. Added footnote on Speech to Text accuracy– Harold Price

Rev 4 – April 2-5. Changes for initial public release for comments. Added ECIG recommendations to IPAWS CAP Profile. Simplified Alert Text construction method. Improved fonts and formatting. Added section on Language recommendations. Added placeholders for unfinished Figures, examples, and Validation Criteria. Added numerous clarifications and changes agreed on by ECIG Sub-Committee – compiled by Tom Wood

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# 1 Introduction

## 1.1 Purpose

Public warnings intended for transmission over the Emergency Alert System (EAS) can be encoded in Common Alerting Protocol (CAP) messages in various ways. As both CAP v1.2 and the CAPv1.2 IPAWS Profile v1.0 make use of several free form text elements and several optional elements, there is ample opportunity for a CAP message rendered by one CAP-to-EAS device to differ when rendered by another vendor's device. There can also be a difference between what the originator intended for an alert, and what alerts contain, when broadcast by CAP/EAS devices.

The EAS-CAP Industry Group (ECIG), formed in 2008 as a group of EAS equipment manufacturers and other interest parties, has produced this recommendation for an Implementation Guide, for use by CAP-to-EAS equipment. The guide is intended to further reduce the areas of uncertainty in how an alert will be presented to the public via CAP/EAS, so that originators and distributors of alerts can deliver the intended message to the public, regardless of the vendors or platforms involved.

This EAS-CAP Implementation Guide has been prepared in light of several points of reference, including the Federal Emergency Management Agency (FEMA) CAP v1.2 IPAWS Profile v1.0 Requirements, the updated CAP 1.2 specification, and other references indicated below.

## 1.2 Disclaimer of Intellectual Property Claims

The Common Alerting Protocol (CAP) version 1.2 Committee Specification and the CAP v1.2 USA IPAWS Profile v1.0 are copyright 2009 by OASIS (the Organization for the Advancement of Structured Information Standards). The Implementation Guide recommended herein specifies particular usages within the scope of those specifications. The members of the Industry Group have represented that they make no individual or group claim of intellectual property regarding the Profile or to any of the other recommendations presented in this document.

## 1.3 Copyright

This document is copyright 2010 by the EAS-CAP Industry Group. This information in this document may be used freely by anyone, however, when reproduced as a whole, it must contain the attached copyright message. When reproduced in part, or included in another document, the EAS-CAP Industry Group must be included in references as the author of this document.

## 1.4 Terminology

Clarification on terms used in this document:

- A. The Key words **MUST**, **MUST NOT**, **REQUIRED**, **SHALL**, **SHALL NOT**, **SHOULD**, **SHOULD NOT**, **RECOMMENDED**, **MAY**, and **OPTIONAL** in this document are to be interpreted as described in RFC2119.
- B. The words warning, alert and message are used interchangeably throughout this document.
- C. EAS-CAP Profile is used interchangeably with IPAWS CAP Profile and CAP IPAWS Profile.
- D. EAS-CAP Profile Decoder means: A device or software application that performs one or more of the following tasks:

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1. Using the EAS-CAP Profile, converts a CAP alert into the CFR 47 Part 11 Emergency Alert System (EAS) format, commonly referred to as the ZCZC string.
2. Using the EAS-CAP Profile, converts a CAP alert into a text string intended for display as video, or input into a Text-to-Speech (TTS) converter, or as input for any other text display; and used in conjunction with an EAS alert.

## 1.5 References

This draft EAS-CAP Implementation Guide derives significant portions of its content from the Requirements for the Integrated Public Alert and Warning System (IPAWS) Common Alerting Protocol (CAP) Profile Implementation Guide, Draft Version 1.0 (8 January, 2010) and the ECIG EAS-CAP Profile Recommendation (EAS-CAP-0.1) (25 September 2008)

[http://www.cmasforum.com/docs/IPAWS\\_CAP-to-EAS\\_Requirements.pdf](http://www.cmasforum.com/docs/IPAWS_CAP-to-EAS_Requirements.pdf) and <http://eas-cap.org/Recommendation%20EAS-CAP-0.1.pdf>,

The IPAWS\_CAP-to-EAS Requirements document is itself a compilation of work from FEMA and the original ECIG CAP EAS Profile recommendation.

RFC2119 S. Bradner, Key words for use in RFCs to Indicate Requirement Levels, IETF RFC 2119, March 1997.

<http://www.ietf.org/rfc/rfc2119.txt>

FCC EAS Rules (CFR 47 Part 11):

<http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&rgn=div5&view=text&node=47:1.0.1.1.11&idno=47>

CAP v1.2 Committee Draft OASIS Emergency Management Technical Committee, March 2010  
<http://docs.oasis-open.org/emergency/cap/v1.2/pr03/CAP-v1.2-PR03.pdf>

CAP v1.2 USA IPAWS Profile v1.0 Committee Specification OASIS Emergency Management Technical Committee, October 2009

<http://docs.oasis-open.org/emergency/cap/v1.2/ipaws-profile/v1.0/cs01/cap-v1.2-ipaws-profile-cs01.pdf>

CAP v1.1 IPAWS Profile v1.0 Issues List - 1st Public Review, OASIS Emergency Management Technical Committee, Jun 2009

[http://www.oasis-open.org/committees/download.php/33000/CAPv1.1-IPAWS-Profile-v1.0-PR01-IssuesList\\_v2.4.xls](http://www.oasis-open.org/committees/download.php/33000/CAPv1.1-IPAWS-Profile-v1.0-PR01-IssuesList_v2.4.xls)

FEMA IPAWS CAP Profile Requirements FEMA IPAWS Program Management Office *FEMA IPAWS CAP v1.2 Profile Requirements v2.4 - Public*, December 2008

[http://www.oasis-open.org/committees/download.php/31084/FEMA\\_IPAWS\\_CAP%20v1.1\\_Profile\\_Requirements\\_v2.4\\_-\\_Public.doc](http://www.oasis-open.org/committees/download.php/31084/FEMA_IPAWS_CAP%20v1.1_Profile_Requirements_v2.4_-_Public.doc)

EAS-CAP Profile -EAS-CAP Industry Group EAS-CAP Profile Recommendation EAS-CAP-01, September 2008.

<http://www.eas-cap.org/Recommendation%20EAS-CAP-0.1.pdf>

## 2 General Requirements and Specifications

The FEMA IPAWS Program Management Office submitted the draft IPAWS CAP Profile Requirements document referenced above and available at the URL cited above as the basis for developing an Implementation Guide.

### 2.1 Recommended Additions to the IPAWS CAP Profile Requirements

ECIG advises the following additions which are not contained in the OASIS CAP v1.2 IPAWS Profile v1.0.

#### 2.1.1 Specific mimeTypees

The CAP element <mimeType> identifies the audio or video file format of the indicated content. While the current OASIS CAP v1.2 IPAWS Profile 1.0 identifies the files as “audio”, “audio-streaming”, “video” or “video-steaming”, it does not specify the codec or container format. Thus under the current scenario, EAS CAP equipment would need to determine the content of a file by download and electronic inspection. This is an inefficient and clumsy process and ECIG feels if these mimeTypees included the actual file type name it would be very beneficial. Thus, ECIG recommends that “-wav” and “-mp3” be appended to the existing OASIS mimeTypees when FEMA implements its IPAWS Profile.

By incorporating this ECIG recommendation, the mimeTypees would appear as follows:

*audio/x-ipaws-audio-mp3*  
*audio/x-ipaws-audio-wav*  
*audio/x-ipaws-streaming-audio-mp3*

Adding a format specific suffix to the base descriptor is a general way to extend the original mimeTypees. In this way the mimeType extensions for video can be defined at a later date when formats are determined.

#### 2.1.2 New EASText <parameter> Element

ECIG recommends that a new CAP <parameter> element named “EASText” be included in FEMA’s implemented IPAWS Profile. This is intended to allow emergency managers and other CAP message originators to dictate the exact text they wish to see conveying their message in TV visual crawl messages and radio and TV aural messages voiced by text-to-speech technology. The specifications and references to the EASText element are already incorporated into this Implementation Guide. If the EASText element is not present, ECIG has described in the Implementation Guide an alternate method to derive the visual crawl and text-to-speech information by building it from various other elements of the CAP message. See the relevant sections of the Implementation Guide for details.

### 2.2 Recommended Modifications to the IPAWS CAP Profile Requirements.

After careful examination, ECIG has found several areas in the FEMA IPAWS Program Management Office Requirements document that warrant reexamination. The EAS-CAP Implementation Guide omits the following recommendations contained in the draft IPAWS CAP Profile Requirement:

1. Ogg Vorbis Audio Format: Although the royalty-free Ogg Vorbis format would appear on the surface to provide cost savings, ECIG is of the opinion that MP3 capability would be needed in all

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devices anyway if MP3 is to be a part of the system at all. Thus there is no cost savings by adding Ogg Vorbis, and in fact it would add cost and complication as a separate codec is required for Ogg Vorbis. Further, ECIG feels that many of these audio messages may end up posted for public access, and certainly there is a greater number of imbedded MP3 codecs in the public sector than Ogg Vorbis codecs. Finally, because Ogg Vorbis is based on community support there is no guarantee of future support. In fact, Ogg Vorbis has been removed from HTML5, which is to be the future language for web multimedia presentation.

2. **DAQ:** ECIG feels Delivered Audio Quality is an issue for message originators, and cannot really be enforced back to the original audio source by this Implementation Guide. We feel it is thus out of scope for this Implementation Guide.
3. **Text Transcription of Audio Content:** ECIG feels there is no reliable software at this time that can produce text from an audio message at the level of accuracy required for emergency messages<sup>1</sup>. At this point in time, we feel the only solution is for message originators to provide matching audio and text within the message when it is authored. Therefore, we feel this is a message originator issue and thus out of scope for this Implementation Guide.
4. **Handling Multiple Event Codes:** The CAP v1.2 IPAWS Profile v1.0 already states that there can be only one <eventCode> with a <valueName> of SAME in a compliant CAP message. If there is an <eventCode> with a <valueName> other than SAME, it will be ignored by EAS rendering devices. ECIG does not see an issue to be addressed here.

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<sup>1</sup> While speech to text systems with accuracies of 95 to 98% are in use today, they typically require training (a sample of the user's speech reading benchmark text), and optimal conditions (limited background noise). Even at the optimal levels, a 95% accuracy would result in 18 errors in the 1800 character messages proposed here. Speech to text systems that are not trained, use audio with background noise, and an unlimited vocabulary of words, including place names, are much less accurate.

## 3 Implementation Guide Requirements and Specifications

### 3.1 Introduction

The purpose of this section is to provide requirements and technical specifications for originators and consumers of CAP messages that are specifically crafted to trigger the Emergency Alert System (EAS).

For the alerts in the EAS system to be invoked by a CAP alert message, originators must create CAP messages that are constructed in accordance with the CAP v1.2 IPAWS v1.0 Profile<sup>2</sup>. Likewise, equipment manufacturers must translate FROM these CAP messages constructed in accordance with the same profile TO the Federal Communications Commission (FCC) Part 11 target message formats. The following documentation is presented in the form of detailed flowcharts which start with the incoming CAPv1.2 IPAWS Profile v1.0 message, step through the translation process, and result in an EAS alert.

EAS Decoder specifications can be found in 47 CFR Part 11.33, [http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=/ecfrbrowse/Title47/47cfr11\\_main\\_02.tpl](http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=/ecfrbrowse/Title47/47cfr11_main_02.tpl)

The intent of the Implementation Guide is two-fold:

- 1) All CAP-to-EAS devices MUST generate the EXACT same EAS message for a given CAP message. To do otherwise could result in EAS messages for the same CAP alert that would not be detected as duplicates, resulting in multiple interruptions to broadcasters. As the FCC has reiterated, as recently as January 2010, EAS will exist for the foreseeable future<sup>3</sup>, we must take EAS rules into account.
- 2) For a given CAP message, generate the same alert text, allowing display of the same video crawl during broadcast, and use the same input to Text-to-Speech generation (if supported), as other vendor's CAP/EAS devices. This allows originators to know what the public will see and hear for a CAP initiated EAS activation, and allows origination software to display accurate preview information before an alert is sent.

### 3.2 EAS Alert Activations

An EAS activation of a test or an alert is for all practical purposes an encoding of data, speech, and sound into the audio domain. Public broadcasts of EAS audio comprises the core element of the EAS transmission system, allowing a branching tree of EAS encoders and decoders to propagate alerts. This branching graph is often referred to as the EAS "daisy-chain". The audio alert consists of up to four elements:

- 1) A header code. All EAS activations will include a header code data burst. The header code will be sent three times, with a one-second pause after each transmission, to ensure proper reception by EAS devices.
- 2) An attention signal. Following the header code, a two-tone attention signal is used to alert listeners and viewers that EAS activation has occurred and that a message will follow. The attention signal should be used if, and only if, a message will be included as part of the alert.
- 3) A message. The FCC specifies that the message portion may be audio, video, or text. In practice, neither text nor video is actually embedded into the audio signal. Video and text accompany video broadcasts of EAS alert audio, but these elements are not part of the audio encoding of EAS, and are

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<sup>2</sup> The full name is Common Alerting Protocol, v. 1.2 USA Integrated Public Alert and Warning System Profile Version 1.0. Please see Appendix A for an overview of CAP v1.2

<sup>3</sup> "... it is likely that the existing EAS will continue to function as a critical alerting system for the foreseeable future", Second Further Notice of Proposed Rule Making, FCC 10-11, released January 14, 2010.

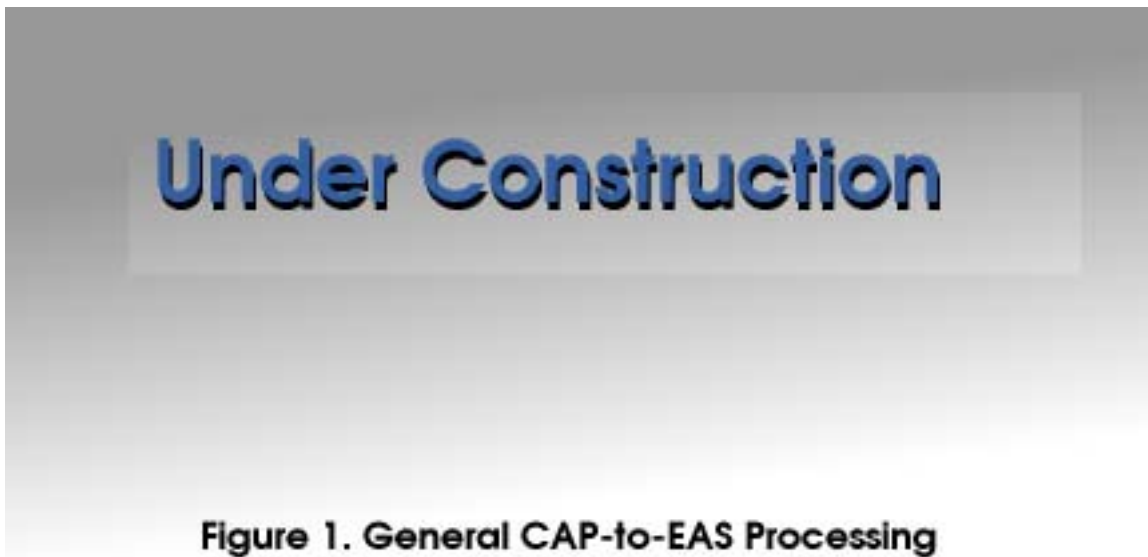


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not propagated through the “daisy chain” architecture of EAS decoding receivers. So for purposes of this document, the message portion is an audio message only. The audio message, when present, follows the attention signal. EAS encoder/decoders handle attention signal and audio message insertion during an EAS activation.

- 4) An end of message code. **All** EAS activations will conclude with an end-of-message code data burst. The end-of- message code will be sent three times, with at least a one-second pause after each transmission, to ensure proper reception by EAS devices.

Properly crafted CAP messages can provide the data elements needed to construct these four parts of an EAS alert. Thus CAP provides an alternative method for distributing EAS alerts into the EAS system outside of the traditional EAS “daisy-chain”. And since CAP can provide extra descriptive details that cannot be encoded into an EAS audio alert, these details can in theory be available at the point of reception to enable not only triggering of the EAS system, but also for broadcast from this point.



*[ Figure 1 – General CAP-to-EAS Processing is under development and will be included later.]*

## 3.3 General Processing Rules

### 3.3.1 Multiple Parameters

When there are multiple occurrences of a parameters element with the same valueName, and the valueName is not meant to describe a list of items, then recipients SHALL accept the value in the first occurrence of the item only. An example would be multiple occurrences of the EAS-Must-Carry parameter.

## 3.4 Constructing an EAS Header Code from CAP IPAWS v1.0 Profile

### 3.4.1 EAS Header and CAP IPAWS v1.0 Profile

Refer to 47 CFR 11.31 for details on the EAS header.

IPAWS CAP v1.0 Profile elements will be used in the construction of the EAS Header as follows.

#### 3.4.1.1 ORG (Originator)

The EAS Originator Code (ORG) SHALL be included in the <value> element of a CAP <info><parameter> block with a <valueName> of "EAS-ORG". Only those originator codes defined in the 2002 update to Part 11 are permitted<sup>4</sup>:

Originator Codes are specified in FCC Part 11.31d, as follows.

- PEP** - Primary Entry Point System
- EAS** - Broadcast station or cable system
- WXR** - National Weather Service
- CIV** - Civil authorities

#### 3.4.1.2 EEE (Event code)

The EAS Event Code (EEE) SHALL be represented using the CAP <info><eventCode> element with a <valueName> of "SAME."

The EEE <value>, such as CAE or CEM, is case sensitive.

The EEE code SHALL be passed to the EAS processing element of a CAP/EAS system, even if the EEE code is not one defined by Part 11. The EAS element of the CAP/EAS system may make a separate determination on whether or not to air the alert in the EAS domain.

A CAP message without a SAME event code SHALL not be aired.

#### 3.4.1.3 PSSCCC (Location Code)

Each EAS County Location Code (PSSCCC) SHALL be included in the <value> element of a separate CAP <area><geocode> element with a <valueName> of "SAME."

This <value> is understood to be the 6-digit EAS/SAME Location Code, comprised of the standard FIPS Code with a leading digit indicating the 1/9<sup>th</sup> area sub-division.

The geocodes SHALL be placed into the EAS ZCZC string. At least one <geocode> must be present, and only the first 31 geocodes SHALL be placed in the order that they are encountered in the CAP message. The ordering preservation is required to allow duplicate EAS messages to be detected by direct comparison of the ZCZC string. EAS only allows up to 31 codes in the ZCZC string.

A location code consisting of all zeros ("000000") shall indicate a message intended for the entire United States and Territories. The "000000" FIPS code was not (and as of this writing, is not) a part of the Part 11 specification. Not all EAS equipment in the field recognizes this code. While a CAP converter

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<sup>4</sup> The EAN code was removed as a valid originator in a 2002 update to EAS, and new equipment manufactured after 2004 does not originate it. However, users were not required to update their systems, and some may still generate a code of EAN. As the CAP profile is a post-2002 environment, EAN is no longer defined for those systems, and should not be used.

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implementation, or an All-In-One CAP/EAS device, can use the 000000 code, the action taken by a legacy EAS device receiving such a FIPS code varies from vendor to vendor.

### **3.4.1.4 TTTT (Duration)**

The EAS Duration (TTTT) SHALL be calculated as the interval between the times in the CAP <info><expires> element and the CAP <sent> element. The times in these elements SHALL be interpreted as being represented in the International Organization for Standardization (ISO) 8601 format per the OASIS CAP 1.2 specification.

If the calculated interval does not conform to one of the intervals permitted for the “TTTT” parameter in FCC Part 11.31(c), the interval shall be rounded to the next highest permitted interval up to 99 hours, 30 minutes.

If the interval between <sent> and <expires> elements is less than one hour, the valid range permitted for EAS Duration shall be 0015, 0030, or 0045.

If the interval between <sent> and <expires> elements is greater than one hour, the valid range permitted for EAS Duration shall be in half-hour increments from 0100 to 9930.

### **3.4.1.5 JJHHMM (Time)**

The EAS Time Alert Issued (JJHHMM) SHALL be represented using the CAP <alert><sent> element in the ISO 8601 format per the OASIS CAP 1.2 specification.

### **3.4.1.6 LLLLLLLL (EAS Station ID)**

The EAS Station ID (LLLLLLLL) is always inserted by the EAS device, and is not specified by any element of the CAP message.

### **3.4.1.7 Governors Must Carry**

Although the Governors “Must Carry” information is not reflected in any EAS field, the CAP/EAS device must air a message so marked in accordance with FCC 11.55. A “Must Carry” message only overrides the device Originator and Event Code filtering for automatic forwarding. Local device Location Code filters, duplicate alert prevention, and the alert duration limit will still apply.

Messages for which the Governor’s “must carry” authority is invoked SHALL be marked by the inclusion of an additional CAP <info><parameter> block with a <valueName> of “EAS-Must-Carry” and a <value> of “True.”

## **3.5 CAP EAS Audio from CAP IPAWS v1.0 Profile**

### **3.5.1 Using or constructing EAS Audio during a CAP-to-EAS alert activation**

During a CAP-to-EAS alert activation, an EAS Audio message will be used or constructed as follows:

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- 1) If attached audio with a CAP <resource><resourceDesc> element value of “EAS Broadcast Content” is present, the EAS device SHALL use the referenced EAS recorded or streaming audio as the audio portion of the EAS alert.
- 2) If attached EAS audio is not present, and the EAS device supports text-to-speech technology, then text-to-speech audio SHALL be rendered as described in the “Constructing Text-to-Speech Audio from CAP IPAWS v1.0 Profile” section below and used as the audio portion of the EAS alert.
- 3) If none of the CAP elements required to construct a text-to-speech audio message as outlined in Figure 2 are present, the expanded EAS message SHALL be used as the text, and rendered as text-to-speech.
- 4) If there is no attached EAS audio, and the device does not support text-to-speech, the alert SHALL be sent as EAS-codes-only with no audio.
- 5) If an EAS Audio Uniform Resource Locator (URL) cannot be accessed in a reasonable amount of time, then text-to-speech audio SHALL be rendered as described in the “Constructing Text-to-Speech Audio from CAP IPAWS v1.0 Profile” section below and used as the audio portion of the EAS alert. If the device does not support text-to-speech, the alert SHALL be sent as EAS-codes-only with no audio. The individual device user will decide what value to enter into the reasonable-amount-of-time value in that particular device.
- 6) Multiple <resource> elements MAY be present in an <info> block. Only one resource with a <resourceDesc> of “EAS Broadcast Content” SHOULD be present in an <info> block. If more than one is present, for example, to provide the audio in alternate formats, the audio content SHOULD be the same. The device may choose the format that meets its needs, however, only the content of one resource SHALL be rendered by the EAS device. If the data referenced by the first suitable URI cannot be obtained in a reasonable time (as defined below), the EAS device WILL proceed with text-to-speech rendering (if supported), and will not attempt to access other resource URIs.
- 7) If an audio attachment cannot be downloaded within two minutes, or if an audio stream cannot be started within 30 seconds, the device will start the alert with TTS processing.

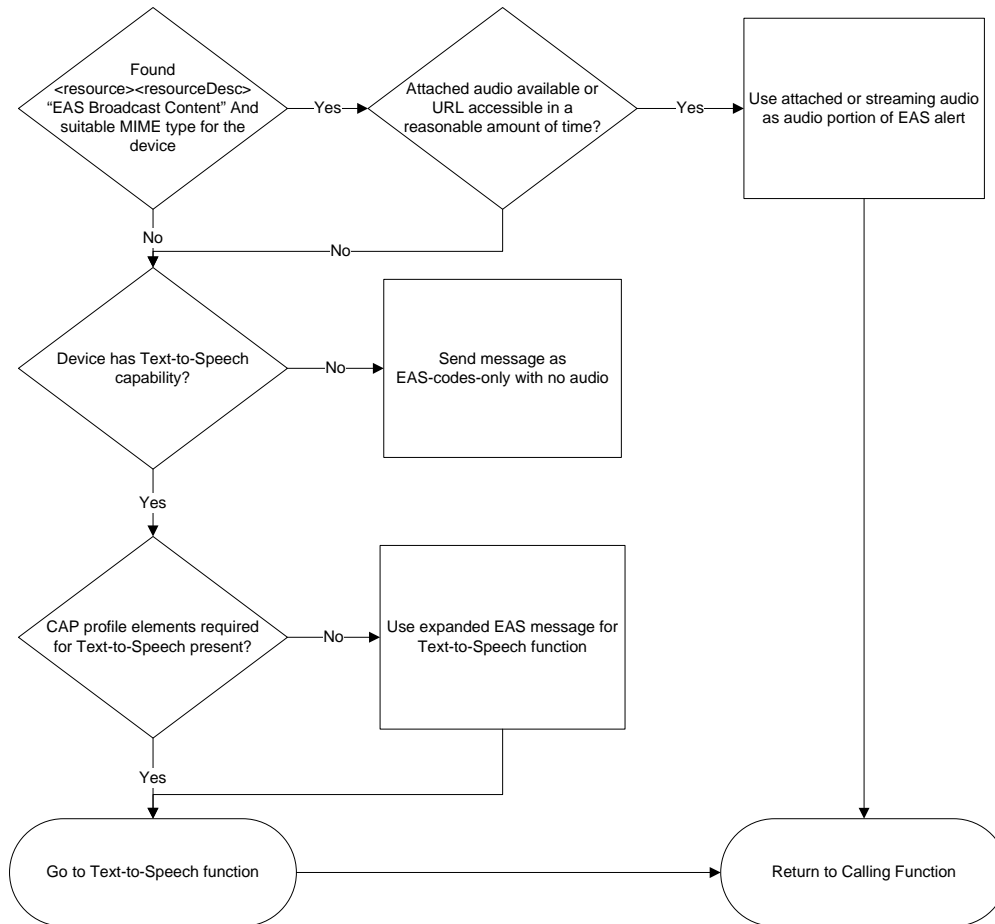


Figure 2 - Audio EAS Processing

### 3.5.2 Constructing EAS Recorded Audio from CAP IPAWS v1.0 Profile

Ideally, originators of EAS compatible CAP alert messages will provide the audio portion of the message. Where a recorded audio message intended for EAS use accompanies the CAP message in a CAP <resource> block, the EAS recorded audio message is constructed as follows (see Figure 3):

- 1) The audio SHALL be encoded as an MP3 file as mono, 64 kbit/s data, preferably sampled at 22.05 kHz or otherwise at 44.1 kHz, or as a WAV PCM file as mono, 16-bit, sampled at 22.05 kHz.
- 2) The CAP <resourceDesc> element value SHALL be “EAS Broadcast Content” as specified by the CAP IPAWS v1.0 Profile.
- 3) The CAP <mimeType> element value identifies the file format of the content as specified by the CAP IPAWS v1.0 Profile. The defined mimeTypees do not specify the codec or container format. The EAS rendering device must determine the content of a file by inspection. ECIG strongly recommends that new mimeTypees be added to the profile to resolve audio format ambiguity, by appending –wav or –mp3 to the end of the defined mime types.

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- 4) A message **MAY** include a video resource, but it **MUST** also include a resource with an audio format. Alerts without an audio format resource will have audio generated by Text-to-Speech or no audio, if the CAP/EAS device does not support Text-to-Speech.
- 5) The CAP <uri> element must be used to identify the location of the file on a network, or on a local file system.
- 6) Support for the <derefUri> element is **NOT** required for CAP/EAS devices.
- 7) The audio **SHOULD** be a reading of the same text used for the alert text display. It is a recommended practice that the recorded audio message match the alert text display message. Details on the construction of the alert text message are provided in a following section.
- 8) The FCC Part 11 two-minute limit on EAS audio messages **MUST** be enforced for all alerts except the EAN alert. This requirement will place constraints on the speed and cadence used by the speaker to create the recording. In the case of prepared or streaming audio for the EAN, the resulting audio may exceed two minutes.
- 9) If the text used for the recording has been shortened from the full original CAP text, as indicated in the text by an ellipsis style insertion of three asterisks (“\*\*\*”) such a deletion **SHALL** be indicated by a one-second pause immediately following the shortened section of text.

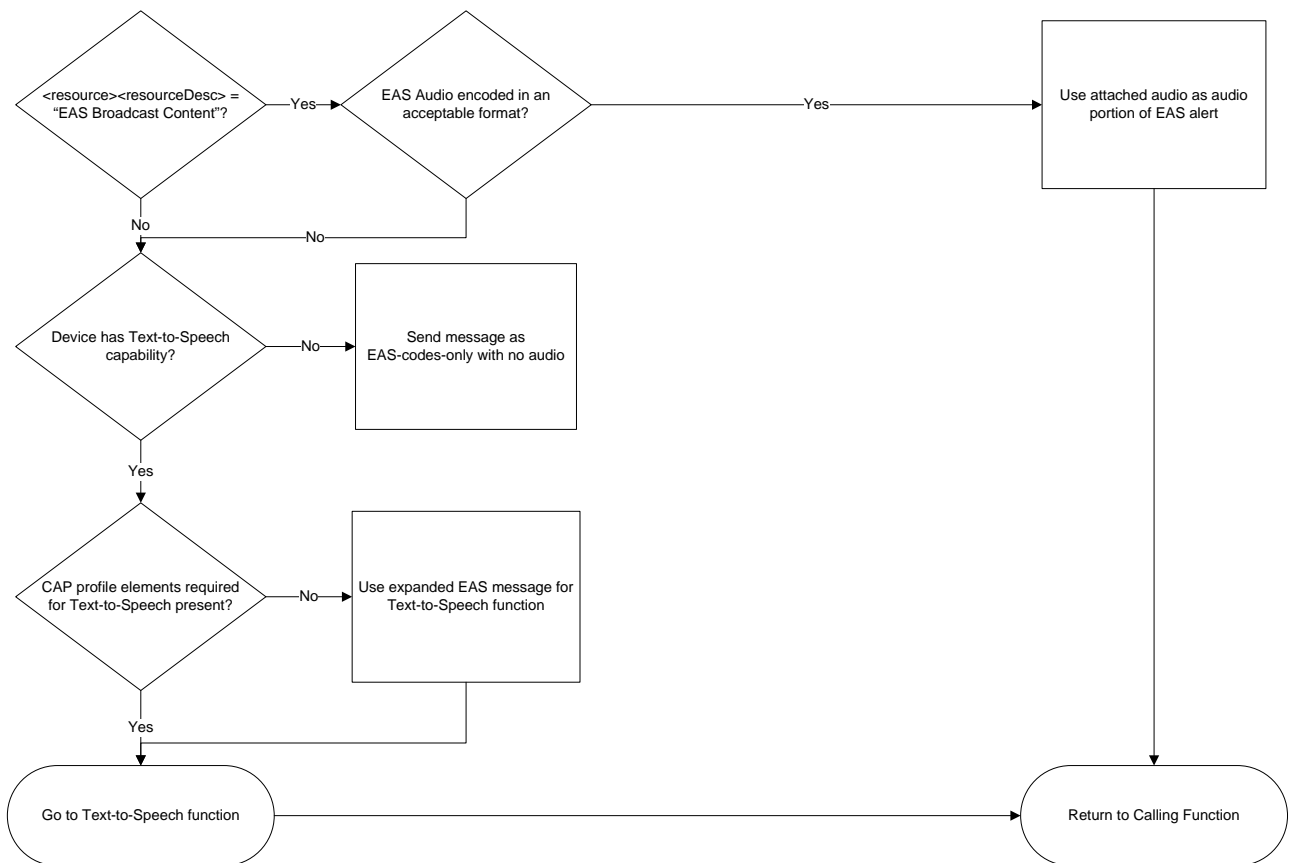


Figure 3: EAS Recorded Audio Processing

### 3.5.3 Constructing EAS Streaming Audio from CAP IPAWS v1.0 Profile

Where a streaming audio message intended for EAS use accompanies the CAP message in a CAP <resource> block, such as for an EAS EAN message, the EAS streaming audio message is constructed as follows (see Figure 4):

- 1) As required by the IPAWS profile, the CAP <resourceDesc> element value SHALL be “EAS Broadcast Content.”
- 2) The audio SHALL use one of the following streaming methods:
  - a. MP3 streaming as either HTTP progressive-download streaming, or
  - b. HTTP streaming MP3 server.

Note: because of the possibility that a particular device may not be able to access the streaming server the originator SHOULD provide text information sufficient to tell the listener where to get additional information, even if, as is the case with a real-time streaming alert, a complete transcript of the information is not available. Although the streaming audio time for an EAN is not limited, the text length limitations, and therefore the Text-to-Speech length, are still constrained.

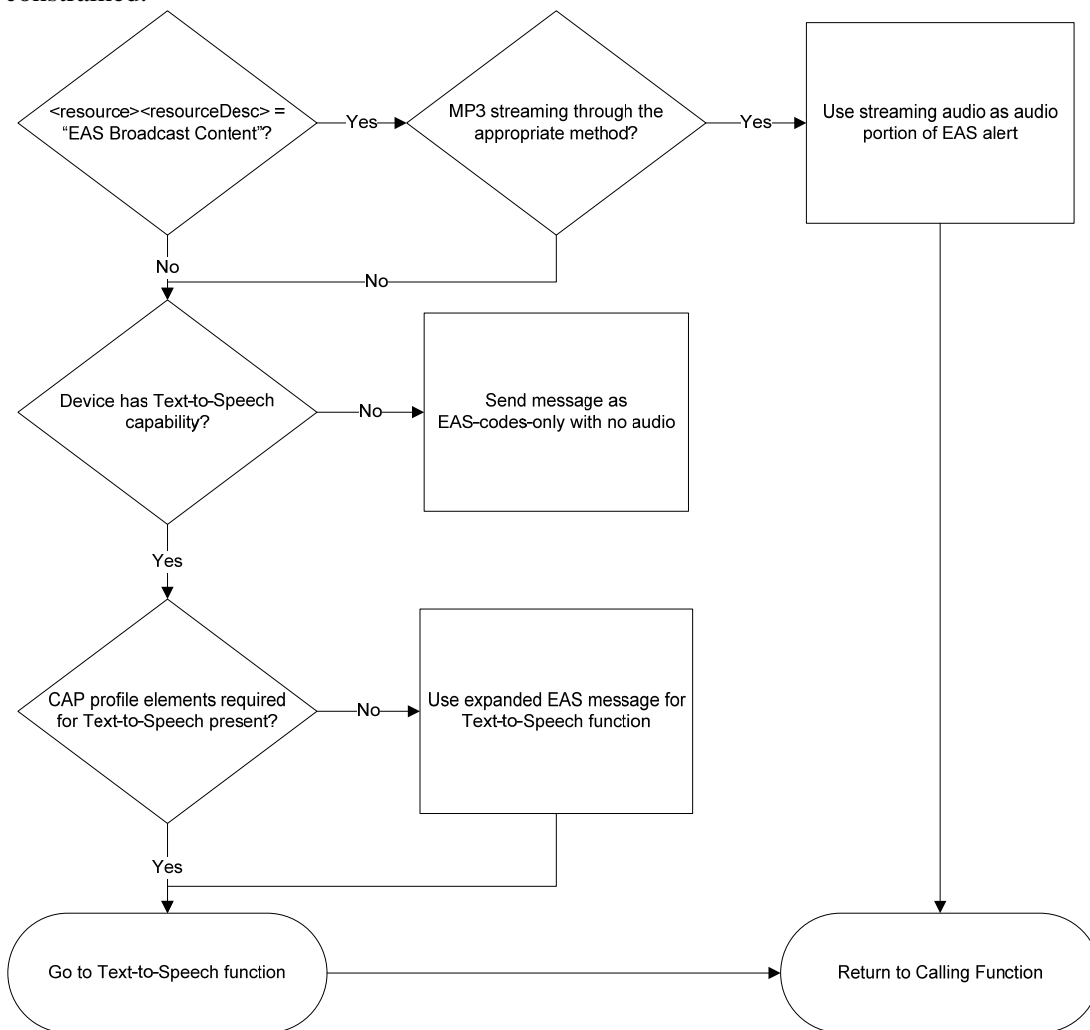


Figure 4: Streaming Audio EAS Processing

### **3.5.4 Constructing Text-to-Speech from the CAP IPAWS v1.0 Profile**

Where the CAP message is to be converted to audio using text-to-speech technology the delivered message SHALL consist of an exact translation of the Alert Text.

Whenever the text included from the CAP elements has been shortened from the full original text, as indicated in the text by an asterisk ellipsis (“\*\*\*\*”) such a deletion SHALL be indicated by a one-second pause immediately following the shortened section of text.

The FCC Part 11 two-minute limit on EAS audio messages will be enforced for all except the EAN alert. This requirement will place constraints on the parameters used to tune the audio results text-to-speech system. In the case of text-to-speech translation for the EAN alert, which is only used in the case that live or streaming audio is unavailable, the resulting audio may exceed two minutes, but the text length limits are still in effect, constraining the ultimate length of the audio.

### **3.6 Constructing Alert Text from CAP IPAWS v1.0 Profile for EAS activations**

A CAP message contains many free form text elements, many of them optional. The CAP-to-EAS device must pull these various elements together and generate one text string for use in displays, logs, video crawl, and as a source for Text-to-Speech generation, if needed by the alert, and supported by the device. The maximum length of this text has been set to 1800 characters. This was chosen based on various requirements, which are primarily the buffer limitations in character generators and other display devices, and the two minute audio time limit for EAS messages.

The section below describes a method for constructing the alert display text. Also defined is a single explicit element that will provide the needed text in a single place.

#### **3.6.1 White space rule**

Before adding a string to the generated text output intended for Text-to-Speech generation (if TTS is supported by the device) or for use by character generators or any other one line scrolling displays, the CAP/EAS device SHALL collapse the string:

- 1) Remove leading and trailing whitespace.
- 2) Replace all whitespace characters with space, and converting runs of spaces to a single space.

Whitespace includes the following characters: space, form-feed, new line, carriage return, horizontal tab, and vertical tab.

#### **3.6.2 EASText element**

Messages intended for EAS dissemination MAY include an instance of <parameter> with a <valueName> of "EASText", and a <value> containing free form text limited in length to 1800 characters. If this element is present, the EAS receiver SHALL use it as the alert text for the generated Video Crawl, and for Text-to-Speech conversion (if no audio URI is present and a Text-to-Speech device is present).

The originator SHOULD ensure that the content of the audio URI is the same as the text due to regulations that require broadcasters with audio and visual outputs to provide the same information to both outputs.

The originator SHOULD take into account that the text may be the only text displayed to the user, or passed to an announcer as a script, and SHOULD include all important information, and the information required in the EAS regulations. This information should include the type of event, effected audience and area, expiration time, description, call to action, etc.



### **3.6.3 CAP/EAS Alert Text with the FCC Required Text**

Presently, the FCC requires that alert text accompanying EAS alerts must at least consist of “A sentence containing the Originator, Event, Location and the valid time period of the EAS message constructed from the EAS ZCZC Header Code as required in FCC Rules Part 11.51(d)” [referred to herein as the FCC Required Text]. While this requirement is in effect, the CAP messages need to be constructed by Originators in a manner that provides the additional CAP descriptive information without adding redundancy. If the FCC requirement is dropped in the future, then CAP messages SHOULD be constructed to include these relevant details.

### **3.6.4 Alert Text construction details**

The outline of the alert text construction is:

The FCC Required text. This is a sentence containing the Originator, Event, Location and the valid time period of the EAS message constructed from the EAS ZCZC Header Code as required in FCC Rules Part 11.51(d),

*followed by:*

If the <parameter> <valueName> EASText item is present, the <value> of the EASText parameter element.

*Otherwise:*

*Optional:* If <senderName> is present, add the phrase “Message from”, and the full or partial text of the CAP <senderName> element, *followed by:*

The full or partial text of the CAP <description> element; *followed by:*

The full or partial text of the CAP <instruction> element.

Whenever the text included from the CAP <description> or <instruction> elements is shorter than the full original text, any deletion SHALL be indicated by an asterisk ellipsis (“\*\*\*”).

There SHALL be an absolute maximum of the first 1800 characters rendered from the combination of all of the above elements. See below for the details of using partial text from the CAP <description> and/or <instruction> elements. This is enough space for an effective alerting message, but it is incumbent upon CAP message originators to author both effective and size efficient descriptions.

The following sub-sections describe the individual parts.

#### **3.6.4.1 The FCC Required text**

The FCC Required text sentence SHALL be constructed directly from the EAS ZCZC header string. This header string is specified by the FCC Rules Part 11 and is also defined above. The header string is generated from parsing the CAP message and applying the CAP/EAS Profile. The CAP/EAS Profile insures that the same ZCZC string will be produced across vendors and platforms. This regularity will thus also produce the most consistent text across platforms. The

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FCC Required Text will, at a minimum, include a translation of the following:

- The ORG (EAS Originator) code;
- The EEE (EAS Event) code;
- A listing of all of the PSSCCC (Location) codes;
- The valid time period of the alert event;

The FCC Required Text may be dropped as a requirement in the future. At that time the same kind of information would be presumably included within the other CAP fields.

### 3.6.4.2 Sender (optional)

The information contained in the CAP <senderName> element is useful to identify the specific originator of the alert. This field is more specific than the generic EAS ORG or the limited 8 character Station ID code. This is an optional CAP element and may not exist. Printing the sender name is optional.

### 3.6.4.3 Descriptive text

The information contained in the CAP <description> and <instruction> elements contain the specific details needed to make the alert truly informative to the public. There are other elements that could also be considered, such as <headline>, <areaDesc>, and <event>. But given that there is character limit imposed on the alert text message, and that these elements carry mostly redundant information (<areaDesc> could prove to be a notable exception but the information in an <areaDesc> element SHOULD be placed by the CAP originator in the <description> element for inclusion in the alert text), weight is given to the displaying the values of the <description> and <instruction> elements. The <headline> element is likely to be redundant considering the inclusion of the FCC Required text. Given the text must start with the FCC Required text, use of a headline is inconsistent with its intention of being an introductory announcement.

### 3.6.4.4 Maximum character size enforcement

The limit for the text display is 1800 characters. This includes the FCC Required text string and the Sender. Obviously, the amount of space left available after rendering the FCC Required text will vary in every instance of alert text construction. If the combined size of the <description> and <instruction> elements exceeds (1800 minus Size of FCC Required text) then partial inclusion of either or both the values of the <description> and <instruction> elements will be required. Here is an algorithm for computing the allocation of space for these two elements:

```
# Start by allowing half of the available character space to <description> and half  
to <instruction>.
```

```
half = (1800 - (length of Required Text + Sender)) / 2
```

```
if length of <description> < half:
```

```
# Shorten allowance for <description> and allocate excess to <instruction>.
```

```
max_length_description = length of <description>
```

```
max_length_instruction = half + (half - max_length_description)
```

```
else:
```

```
max_length_description = half
```

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```
if length of <instruction> < half:  
# Shorten allowance for <instruction> and allocate excess to <description>.  
max_length_instruction = length of <instruction>  
  
max_length_description = half + (half - max_length_instruction)  
else:  
max_length_instruction = half
```



*[ Figure 5 – Alert Text Processing is under development and will be included later.]*

### 3.7 Languages

FCC part 11 states that logging of EAS messages SHALL be in the primary language of the EAS Participant. It states that in all other cases, the language of announcements “may be in the primary language of the EAS Participant”. Regulators, however, continue to explore support for multiple languages. To assist in the use of multiple languages with the EAS system, we offer the following guidelines, rules, and comments.

A CAP-to-EAS device SHALL provide for the specification of a primary language. That language need not be English. A CAP-to-EAS device MAY offer one or more secondary languages.

Rules for the CAP message contents:

- 1) When multiple languages are available in a CAP message intended to render to EAS, multiple <info> blocks SHALL be used.
- 2) Each <info> block SHOULD contain the language element; the default “en-US” SHALL be used if language is null or not present.
- 3) If an <info> block provides an audio resource, it SHOULD be in the language of the <info> block.
- 4) If multiple <info> blocks in the same language are present, only the first such block is processed.
- 5) Each <info> block MUST refer to the same alert, and MUST contain the same content, in the coded fields, such as, <category>, <responseType>, <urgency>, <severity>, etc. The <info> block MUST contain the same information in the text elements, in the appropriate language of the <info> block.

Rules for rendering the CAP message:

- 1) If the CAP-to-EAS device is set for a primary language only:
  - a. Use the first <info> block that matches the primary language. If no such block is present, then use the first block with a language of en-US (explicitly or by default). Lack of a language block in the desired primary language does not remove the obligation of an EAS participant to relay a required alert, such as EAN, EAT, RMT, a message marked as Governors Must Carry, or other alerts designated as required by the FCC in the future (such as the National Periodic Test under discussion in 2010).
  - b. Generate the Alert Text from the elements of this <info> block. Use the audio from the first resource in a suitable format from this <info> block.
  - c. If suitable audio is not present, then use Text to Speech in the primary language, if supported by the CAP-to-EAS device. If Text to Speech in the primary language is not supported, then if the primary language is not en-US, use the audio from the first <info> block with language en-US (explicit or by default), either from the resource, or from Text to Speech if supported.
- 2) If the CAP-to-EAS device is set to provide a primary language and one or more secondary languages:

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- a. Process the first <info> block that matches the primary languages, and the first <info> block that matches each of the desired secondary languages. If no primary or secondary language <info> blocks are present, then select the first block with a language of en-US (explicitly or by default). Lack of a language block in the desired primary or secondary languages does not remove the obligation of an EAS participant to relay a required alert, such as EAN, EAT, RMT, a message marked as Governors Must Carry, or other alerts designated as required by the FCC in the future (such as the National Periodic Test under discussion in 2010).
- b. Generate the Alert Text strings from the selected <info> blocks. The total length of 1800 characters may be used, with truncation as necessary, however, if the CAP-to-EAS device is interfaced to equipment that CAN render more than 1800 characters, then a longer string MAY be used, allowing the complete content of all desired languages to be crawled. The CAP-to-EAS device can run one long crawl, or several smaller crawls, as desired. Each language, however, MUST be truncated to 1800 characters.
- c. Generate audio as follows. Use the first suitable audio resource from each of the selected <info> blocks. If an <info> block does not contain a suitable audio resource, generate Text to Speech audio for that language, if supported. If no audio can be generated from any selected <info> blocks, but audio can be generated from the first block with language en-US, use this audio. If the total length of the generated audio is less than 120 seconds, then use the audio as the EAS alert audio. If the total length of the generated audio is greater than 120 seconds, then:
  - i. Play the primary audio message, truncated to 120 seconds, followed by the normal EAS End of Message data.
  - ii. Then play the contents of the other audio messages, each truncated at 120 seconds, until all selected languages have been played.

The intent of the above rules is to:

- 1) Provide for a non-English primary language, while still requiring English to be used for required alerts if the desired primary language is not present.
- 2) Allow for longer crawls containing all desired languages, if supported by the crawl hardware/software.
- 3) Allow for audio messages longer than 120 seconds total by placing some of the languages after the end of the EAS portion of the alert. Note that each language is still limited to 120 seconds, and the Part 11 rules are still maintained, but the station audience can still receive an unlimited number of multilingual messages.
- 4) Each CAP message will still generate only one EAS message. The audio content of the EAS message could be different as each station broadcasts the message. State plans should (and already do) take this into account, and have EAS participants only monitor other stations that broadcast in their primary language.

It is ECIG's recommendation that the originator of the message provide text in all of the major languages used by a local area. Many EAS participants are automated and unattended during at least some portion of the day – human aided translation at the station is not practical, and machine translation is not reliable enough for precise emergency instructions.

## **3.8 CAP/EAS msgType handling**

### **3.8.1 Alert**

The message is always processed.

### **3.8.2 Update**

The CAP/EAS device **MUST** remove the referenced message from the air queue, if it has not already aired.

The CAP/EAS device **MAY** halt a message that is in progress. If the message is halted, an EAS End of Message **MUST** be sent if any EAS headers have been sent. If the message is halted, it **MUST** immediately be followed by the Update message. This is to avoid the problems that can occur if the public hears a partial message.

The Update message is processed in the normal way for air.

Note: There is no “minor change” parameter as there is in some profiles. Updates to EAS alerts should be used with caution as they may cause an airing of an alert that has already been sent once, for a field that does not affect the audio or alert text of the message.

Originators should assume, however, that no matter how soon after the original alert an update is issued, the original alert may be broadcast to the public.

### **3.8.3 Cancel**

The EAS/CAP device **MUST** remove the referenced message from the air queue, if it has not already aired.

If the Cancel message contains all the required elements to air an EAS message, then the message is processed for air as if it were an Alert or Update message. To cancel an alert without generating an EAS alert, the originator should not include SAME event and geocode codes.

### **3.8.4 Ack and Error**

A CAP/EAS device is not required to process received Ack or Error messages. It is not required to send an Ack or Error message.

## **3.9 Test messages**

There are two types of test messages. In the EAS domain, stations commonly put “test” messages on the air, and are in fact required to do so in the case of the Required Monthly Test (RMT).

In the CAP domain, there is a way of sending “test” alerts, with a <status> of “test”. The natural inclination of CAP originators is to send the RMT event with status=test. These are viewed by the CAP/EAS system as a CAP test, and the alert is **NOT** placed on the air. Specifically, EAS/CAP devices may receive messages with a “test” <status>, but those messages will **NOT** be forwarded for purposes of EAS activation (on air display). Similarly, messages with “exercise” or “draft” <status> will **NOT** be forwarded for purposes of EAS activation.

Therefore, for purposes of EAS activation, EAS test messages (RMT and RWT) must have a <status> of “ACTUAL”. RMT messages – the only EAS test message to commonly go over the air – must have an “ACTUAL” <status> to do so. To avoid confusion in the EAS domain, we have chosen not to give RMT

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(and the other EAS test codes, such as RWT, DMO, NPT, NMN) a special status by deviating from the <status> element of “ACTUAL”. To reach the public, i.e. to go over the air, the status MUST be “ACTUAL”.

To avoid confusion in the CAP domain, we recommend that originators use the following CAP fields for EAS on air tests:

*CAP <status> element <value> of Actual.*  
*CAP <urgency> element <value> of Unknown.*  
*CAP <severity> element <value> of Minor.*  
*CAP <certainty> element <value> of Unknown.*

If a CAP/EAS device does receive a message with <status>=TEST, it MUST NOT place that alert on the air. It MAY log it, but MUST mark it as a test, so that there is no confusion with a live alert. Such a test alert SHOULD NOT be sent to other attached automatic devices in such a way that there can be any possibility that the test message will be treated as an actual alert.

### ***3.10 Standards for older CAP protocol versions.***

This document describes the requirements and actions of a CAP/EAS device when handling CAP v1.2 and CAP IPAWS v1.0 profile messages. During the transition from older versions of the protocol to this version, a CAP/EAS device may need to handle older protocols.

Wherever possible, the rules established in this document should be applied to older protocols as well. If an EAS message is generated, the rules for handling those elements that are present in the older protocol as defined here SHOULD be followed.

In addition,

- 1) When processing CAP 1.1 messages, CAP/EAS devices SHOULD assume a value of CIV as an originator code if one is not provided in the CAP message.
- 2) A <geocode> with a <valueName> of FIPS6 SHOULD be accepted and handled as a <geocode> with a <valueName> of SAME.

### ***3.11 Reception Of An Alert in Both the CAP And The EAS Domain***

An EAS participant’s CAP to EAS system SHOULD avoid sending duplicate messages in the EAS domain. An EAS device is already constrained by Part 11.33(a)(10) “Duplicate messages must not be relayed automatically”. Additional complications arise if an alert is received in both the CAP and the EAS domains.<sup>5</sup>

Definitions of duplicate messages:

- 1) If a CAP message has the same <identifier>, <sender>, and <sent> elements, it is a duplicate in the CAP domain.
- 2) If an EAS message is identical to another EAS message, as determined by a byte-wise comparison of the ZCZC strings (not including the LLLLLLLL field), it is a duplicate message in the EAS domain. Note that two messages with the same locations in different orders are different messages.<sup>5</sup>

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<sup>5</sup> This is based on the actions of some legacy devices, and some interpretations of Part 11. ECIG believes this is a best course of action. This implementation guide also requires building the ZCZC string from the <geocode> elements in the order the <geocode> elements are present in the CAP message.

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- 3) If the EAS message generated by a CAP message is identical to the EAS message generated by another CAP message, or by a message received in the EAS domain, then that CAP message is a duplicate in the EAS domain.
  - a. It is possible to have two CAP messages that are not CAP duplicates generate two EAS messages that are duplicates.
  - b. If the CAP component and the EAS component of a CAP-to-EAS system are loosely coupled, it is still the responsibility of the system to not automatically relay duplicate EAS messages.

Handling duplicate messages:

- 1) If duplicate CAP messages are received, and neither has yet been processed, the CAP-to-EAS device may choose either one to process, optionally performing an ACK or ERROR response to either or both as needed. The CAP system SHALL only render one of them to EAS.
- 2) Once a CAP message has been rendered to EAS, if the resulting EAS message is a duplicate EAS message, and the duplicate has not yet aired, then the CAP-to-EAS system can choose either one to automatically air, but not both. The system is free to choose whichever it believes is the better alert. The system is free to optionally allow an operator to determine which is best. Only one of the duplicate alerts SHALL be automatically placed on the air.
- 3) Once an EAS message has been aired, subsequent duplicate EAS alerts (originally received from CAP or direct from EAS) SHALL NOT be automatically aired by the system. The system may optionally allow a live operator to select and air a duplicate alert, however, such a duplicate alert MUST be sent with an EAS header that is a duplicate – allowing downstream EAS stations to properly detect the message as a duplicate.

Note: If a CAP-to-EAS device receives an alert in the EAS domain, and it has a duplicate alert that has been received via CAP, but neither has yet aired, it SHOULD use the CAP version of the alert. The assumption is that the CAP alert will have better quality audio and significantly more detailed text. A CAP message may not always be better, however, especially if the attached audio cannot be fetched due to transport problems. In that case, the EAS version may be preferred because it may contain the original audio, voiced by a human. As stated above, the CAP-to-EAS system, possibly in conjunction with a live operator, can make its own determination of which is better, but it MUST not automatically air both. We also recommend against using the text from a CAP message and the audio from the EAS message – because of the nature of EAS, it is not possible to absolutely guarantee that an EAS domain duplicate is a true duplicate.



## 4 Notes for Originators and Origination Software

Originators of CAP alerts that will trigger the EAS system must provide all the information required for use within the IPAWS system and must create compliant CAP messages. This is defined by CAP v1.2, the CAP IPAWS Profile v1.0, and the Implementation Guide. Items of particular significance are discussed below.

- 1) The EAS-ORG parameter MUST be provided.
- 2) A SAME event code MUST be provided.
- 3) At least one <geocode> with value name of SAME MUST be provided. Only the first 31 geocodes will be used for the EAS alert. Other geocodes with other value names MAY be provided, but CAP/EAS messages will only use the SAME values to determine if an alert will be aired.
- 4) EAS Devices may modify the expiration times of the CAP message by rounding up to the nearest valid EAS duration.
- 5) The EASText parameter MAY be provided, which will define the alert text used for video crawls and Text-to-Speech. Otherwise, a combination of the contents of the event code, the geocodes, the sent and expired times, the <description>, <instruction>, and <sender> will be used to generate the video crawl and Text-to-Speech content.
- 6) The value of the <areaDesc> element is ignored. Specific location and area details should be included in the <description> in order to become part of the alert text at the CAP-to-EAS receiver.
- 7) The total length of the text message MUST be no more than 1800 characters. More characters will result in truncated alert text. Text to Speech audio will be truncated to 120 seconds.
- 8) Audio content MAY be provided in a resource with one of the IPAWS mime types and the appropriate <resourceDesc>. Audio will be truncated to 120 seconds, except in the special case of the EAN event type. Audio may be provided in WAV or MP3 format, with other sample rate and bit rate restrictions as provided in the profile. Use of MP3 over WAV is recommended to provide good quality audio at a low bit rate.
- 9) EAS messages will be aired only if the scope is Public.
- 10) EAS messages will be aired only if the status is Actual. Note that some EAS event types are for testing use, including RMT, RWT, DMO, NPT, and NMN. Even though these alerts are notionally “test” alerts, EAS messages will only go to air if the status is “Actual”, for example, if a CAP system is to generate a Required Monthly Test in an area, the status must be Actual. To avoid other CAP users from treating an RMT as an actual event, we recommend that these elements be used:
  - CAP <status> element <value> of Actual.
  - CAP <urgency> element <value> of Unknown.
  - CAP <severity> element <value> of Minor.
  - CAP <certainty> element <value> of Unknown.
- 11) A CAP/EAS device will process the following msgTypes for air:
  - Alert
  - Update
  - Cancel

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If the “Alert” message has not yet aired, the Update and the Cancel message will air in its place, however, there is no way to guarantee that the Update or Cancel will be processed before the original “Alert” message has already gone to air.

## **5 CAP/EAS Examples of the CAP IPAWS v1.0 Profile**

*[A set of EAS compatible CAP messages has been created and is under review. These will be included later.]*

## **6 CAP-to-EAS Validation Criteria**

Platforms receiving CAP messages intended to activate the EAS system **MUST** pass the CAP messages through a validation phase before using the message to generate an EAS alert.

*[The CAP-to-EAS validation section has been written and is under review. It will be included later.]*

## 7 Acronyms

|            |  |
|------------|--|
| ASCII      | American Standard Code for Information Interchange                   |
| ATIS       | Alliance for Telecommunications Industry Solutions                   |
| CA         | Class A television   |
| CAP        | Common Alerting Protocol   |
| CAPCP      | Common Alerting Protocol Canadian Profile                            |
| CDC        | Centers for Disease Control  |
| CFR        | Code of Federal Regulations  |
| CIV        | Civil authorities  |
| CMAS       | Commercial Mobile Alerting System                                    |
| DAB        | Digital Audio Broadcast  |
| DBS        | Direct Broadcast Satellite   |
| DE         | Distribution Element   |
| DHS        | Department of Homeland Security                                      |
| DOM        | Document Object Model  |
| EAS        | Emergency Alert System   |
| ECIG       | EAS-CAP Industry Group   |
| EDXL       | Emergency Data Exchange Language                                     |
| EDXL-CAP   | Emergency Data Exchange Language Common Alerting Protocol            |
| EDXL-DE    | Emergency Data Exchange Language Distribution Element                |
| EEE        | EAS Event code Element   |
| EOC        | Emergency Operations Center  |
| FCC        | Federal Communications Commission                                    |
| FEMA       | Federal Emergency Management Agency                                  |
| FIPS       | Federal Information Processing Standards                             |
| HazCollect | HazCollect Non-weather Emergency Messages                            |
| IPAWS      | Integrated Public Alert and Warning System                           |
| ISO        | International Organization for Standardization                       |
| ITFS       | Instructional Television Fixed Service                               |
| LPFM       | Low Power FM   |
| LPTV       | Low Power TV   |
| MDS        | Multipoint Distribution Service                                      |
| MMDS       | Multichannel Multipoint Distribution Service                         |
| mp3        | MPEG 2, Layer 3  |
| NOAA       | National Oceanic and Atmospheric Administration                      |
| OASIS      | Organization for the Advancement of Structured Information Standards |
| OIC        | Office for Interoperability and Compatibility                        |
| ORG        | EAS Originator Code  |
| PEP        | Primary Entry Point  |
| PMO        | Program Management Office  |
| RFC        | Request for Comments   |
| SDARS      | Satellite Digital Audio Radio System                                 |

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|     |  |
|-----|--|
| TIA | Telecommunications Industry Association      |
| TTS | Text-to-Speech                               |
| URL | Uniform Resource Locator                     |
| WPM | Words Per Minute                             |
| WXR | National Weather Service EAS Originator Code |
| XML | Extensible Markup Language                   |