Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
The Emergency Alert System	)	EB Docket No. 04-296
	)	
Frank W. Bell	)	

Re: NOTICE OF PROPOSED RULEMAKING

While EAS+ is capable of selecting First Responders, delivering messages to cell towers, ISPs, etc., this is intended to also be an adequate backup for CAP message delivery. The CAP Broadcast mode is an addition to this. In a disaster, emergency communications systems can be impacted severely, so EAS+ delivery as a backup is desirable. Also EAS+ can be used in First Responder's emergency exercises, unlike EAS. First Responders are accustomed to using tools and methods that they have practiced on in training and in exercises.

The EAS-CAP Interoperability Group (ECIG) has made a well considered proposal for how to convert CAP messages to EAS messages. However the target system is defined as EAS as defined by the current Part 11 FCC Rules. These rules considerably constrain the capabilities possible. The ECIG proposal provides a great improvement to delivery of messages to EAS systems, e.g. using text-to-speech, but does not provide for any improvement in EAS itself. This proposal demonstrates that very many improvements are practicable by using the capabilities of digital TV and HD radio. At the same time backwards compatibility with existing analog encoder/decoders is maintained by making the FSK audio data match the current definition, so if any analog radio station is daisy chained off the audio of a digital station, such a station's encoder/decoder would behave as it currently does. As such legacy encoder/decoders are replaced, the additional EAS+ capabilities would become operational as much as is possible in such an analog station. ECIG have finalized their v1.0 filing, now this filing is due based on the consideration that this is part of a discussion process. As such, there are likely to be areas to improve in the numerous items covered here. There is work to be done and problems to address, as is sometimes pointed out here. However the effort and creativity that can be applied are expected to be equal to the task, and hopefully the redefined EAS would exceed the quality and capabilities that the current policy direction is anticipating. Also, the progress should be made in a timely manner because we do not know what or where or when a disaster may next be.

The National Weather Radio is the basis of the Consumer Electronics Associations' Public Alert system. In their Exhibit 1 of Public Alert Vs EAS, it is EAS that is considered deficient. While the NWR signal is described as digital, it is actually modulated on audio similar to the EAS analog system. While the developments of NWR are not the responsibility of FEMA, it would be advantageous if co-ordination were made, particularly in the possibility of receivers for NWR being capable also of receiving HD Radio data for the improved EAS. Having a common system avoids the added expense in the receiver of processing two systems of data transmission.

The SBE has made a filing that proposes that spectrum be assigned to Emergency Management communications in the band of vacated TV channels. Specifically this is understood to be two sections within the 700 MHz D block. For the record, this filing is not intended to be to the detriment of that filing because even though the digital daisy chain/mesh method using private mode described herein could be of benefit for subsequent broadcast to the public, it is not in all circumstances expected to be a substitute for a radio CAP transmission network for Emergency Management. However in some circumstances it is expected to be an adequate substitute and being basically improved software based on a standard for a next-generation EAS, it would more cost-effective as well as being an improved EAS system for those situations where the digital daisy chain/mesh is not used, or used for parts of a state. Whether the CAP transmission network is a dedicated spectrum, or accomplished by some other means within the National Broadband Plan, the possibility of saving money by using the digital Daisy Mesh applies where it is practical. This is most appropriate when decided on a State by State or Tribal basis.

As broadcasters would become more integral with IPAWS through the deployment of EAS+CAP, there needs to be legislation or rules implemented to make this effective in practical circumstances. Specifically, broadcast engineering and technical related staff need authorization and appropriate identification to enter areas relevant to their equipment maintenance and operation during emergencies when civilians are excluded. Also supplies of fuel and other essential materials and parts need to be able to be delivered by appropriate means, e.g. tanker trucks. Failure to provide this will in time will result in the broadcast transmission shutting down and with it the delivery of the EAS+ information to the public. This legislation or rules SHOULD to be implemented at a Federal or National level. Broadcast news staff is not included in such authorization, and will be included in existing arrangements which are unchanged by such necessary legislation or rules. If news function is to be provided by technical or engineering staff, or accompanying news staff, this SHALL be addressed by appropriate news reporting arrangements with emergency authorities.

Version modifications since FCC filing 2010-4-26

2010-4-27; Urgency Severity and Certainty bit assignments changed so the default is the EAS ASCII values.
2010-4-30; EDXL-DE v2.0 Draft revision and IEEE1512 provided for.
2010-5-30; CAP Canadian Profile provided for and ECIG CAP-EAS 1.0 incorporated and adaptations updated.

Rationalization of CAP V1.2, EDXL-DE, EAS and EAS+

Frank W. Bell

Introduction

EAS was developed before CAP, and has a number of limitations that CAP and EDXL address. However a number of the EAS limitations can be addressed, which EAS+ does. Also there is a place for a compact and well defined protocol that can be triggered by CAP and EDXL-DE messages, and deliver alerts by broadcast to consumer electronics. This is a goal of IPAWS. Also the capabilities are intended to be adequate for EAS+ to be a backup alert distribution method when the CAP WAN (or DEAS) fail. EAS currently is not suitable for such a situation. The limitations of EAS+ are addressed by the ability to send CAP (and possibly future EDXL-DE) messages or other downloadable files in a CAP Broadcast mode. This paper is to address the different definitions of the two systems and on occasion, suggest improved definitions. While EDXL-DE is not included as a requirement, the inclusion of it in this paper is to extend the capabilities toward future requirements of CAP that the Emergency Management profession finds desirable, and also to elucidate some details of the CAP standard.

While OASIS has the capability to define a satisfactory standard, the implementation in radio and TV would require development of standards by other parties such as ATSC, Ibiquity, Dolby, a standards organization for HD radio, and possibly others. The quality of implementation is also a very important matter. SMPTE is a standards organization that also develops Recommended Practices (RPs). As emergency management is very significantly an operational matter, such matters are also appropriate there, where this can be a resource to be applied as best as can be to local situations. For example, the quality expectations of ENCODER/DECODERs are not only those that are normally applicable. Power supplies SHOULD be redundant, fans replaceable during operation, electrolytic capacitors rated 105C or higher, and a reasonable radiation resistance level. This last item is normally only a military or space requirement, but as the lives of many people are being entrusted to the setting of numerous bits in registers, then these SHOULD be reliable registers. This is also important as some emergencies could be accompanied by higher radiation levels.

Part 11 Aspects:

Part 11 is the basis of this protocol, but a binary redefinition considerably extends the capabilities beyond the current CAP standard. By using one of the three forms below, the software would be able to accept a variety of additions to the CAP or EDXL-DE standard.

<item1=*item1*> in the text is a way to transport item1 without it being displayed to the public.

<item2> *item2* is a way to add to the text the *item2* material and flag it as part of the <item2> data.

<itemList3 <item4=*item4*> <item5=*item5*> <item6=*item6*>> is a way to transport the itemList3 list of items without it being displayed to the public.

If a newer version of CAP or EDXL-DE adds items that are unrecognized by software implementing this standard, these SHALL be forwarded in the sequence as grouped items e.g.

<<newItem> newData>

This way the text does not appear in the alerting message displayed, but can be made use of by CAP or EDXL-DE software that recognizes the newly defined item.

The ECIG have developed a specification for carrying CAP message alerts on EAS. This is incorporated in the draft below (SECTION IV), and any improvements to that specification SHALL be considered as incorporated in this document. Also a mechanism to seamlessly transition to the extended capabilities is included. As the default values for EAS+ are the same as the Part 11 ASCII definition, there SHOULD be no problem even if EAS+ were activated unintentionally beforehand. To confirm this, a check that unexpected behavior of the software e.g. by receiving bit 7 with a value of 1 instead of 0, is RECOMMENDED.

There are numerous significant additions beyond Part 11. A few major ones are;

a) The ability to carry the data separately from the audio, and at a much higher speed than current EAS.
b) The ability to carry the audio on a separate PID or PIDs (Program ID), This MAY be the ongoing program audio for the benefit of those listeners in the general public for whom the alert is not intended. It MAY be to convey the EAS audio to First Responders or to other broadcasters when the alert is not for the general public in the broadcasters' coverage area.
c) The Event Codes are assigned priorities. Priority 1 is immediate override, without any record and delay transmit time. The others are given timeout values such that if the broadcast station automation system does not assign a playout of the message before the timeout, then the encoder/decoder SHALL override the program. As more than one alert MAY arrive before an earlier alert is transmitted, the priority value is part of a decision making process to decide which message gets transmitted first, or if there is a basis for terminating a message before the transmission is complete. This then makes the program flow smoother and acceptable to the public, as well as incorporating EAS in the as-run log from the automation system.
d) Considerations that are in preparation for the use of an improved EAS on DBS, SDARS, Cable and Telephone Company, and also Tribal or Regional level emergency Management.
e) The approach of "one size does not fit all" is taken. E.g. an event code for School Weather Closing is added as broadcasters MAY prefer to let Emergency Management generate the message so that the broadcaster can continue with normal programming.
f) Selectivity is considerably improved by a number of means, e.g. the improved use of polygons. This is in appreciation that smaller and more frequent emergencies are also what local First Responders are dealing with, and their nature is different also. This has the benefit that the system is suitable for such more frequent use and so is more valuable. While this is not a Federal requirement, the applicability to local first responders is not only a policy matter, it also has implications for the architecture of the system.
g) The EAS-CAP Industry Group (ECIG) has made numerous specifications as to how to implement EAS derived from CAP messages. These are after "Selection of EAS and EAS+ Mode", and the basis of this is the limitations of Part 11. The selection process in in the flowchart in fig. 1a. The following items in SECTION I are extensions based on an improved definition that uses Part 11 as a basic protocol and where the extensions are applicable, these SHALL apply. Otherwise the ECIG specification SHALL apply. A final version SHOULD much more effectively combine the two sets of criteria, this is a first version of such a combination. The analog implementation of EAS+ would be similar to the ECIG specification because a considerable amount of information is discarded.
h) The nature of public alerting is discussed elsewhere, and in a previous submission, and the point is also made that a well defined market research exercise is quite appropriate as there are a number of known unknowns that is can elucidate as well as find some more

unknown unknowns. This is in part to have data to show stakeholders that the system is valuable and therefore worthy of support even if the political process has already made the relevant decisions.

i) A provision (as an event code) is made to permit the technology to be applied to a limited selectivity type of advertising. The acceptability of that is likely to be a State decision, and noted in the State Plan. As the revenue related to that is more likely to be through the broadcaster, it is not anticipated that emergency management would have this as a revenue source. Any such usage initially SHOULD only be on a trial basis to determine the acceptability and if there is any conflict with emergency management or alerting responsibilities and performance.
j) While not a technical item, the transition to a system that is normally fully automated at the broadcaster, and for some events, e.g. earthquakes and tsunamis, MAY become automated from the sensor system forward, the aspect of liability is somewhat unclear. While it can be argued that the broadcaster is in the situation of a common carrier, elsewhere the FCC rules assign the responsibility for the content, including EAS messages, to the broadcaster. While that was reasonable when all EAS messages were under master control operator control, in a fully automated alert system this is no longer the case. The addition of an event code for False Alarm Warning (FAW) would provide a means of correcting such situations, the origination of such a message would primarily be a responsibility of the emergency management.
k) Various vendors have developed improvements relevant to emergency alerting. Examples are Ibiquity (FIPS selectivity and text to HD radio screens), Dolby (emergency audio channel) and RDBS (text to analog radio screens). These SHOULD be provided for in encoder/decoder software or other design considerations as applicable.
l) Provision for TSO use SHALL be permitted. www oasis-fp6.org, also IEEE 1512 and CAP-CP or other standardized relevant items. This is a provision for future standards development.
m) One key technical improvement is to have an alternative audio option. This MAY carry multiple channels, which could be different languages for alerts. There are two main ways of using the alternative audio;
    1) When the alert is on the primary audio, then the regular program audio can be carried on the alternative audio. Consumer receivers with EAS+ selectivity and for whom the message is not intended e.g. different jurisdiction, would be able to switch the audio output to be from the alternative audio.
    2) When the alert is carried on the alternative audio, then it is not for the general public in the broadcasters' coverage area. It MAY be for special receivers, e.g. for first responders, or it MAY be a tunneling mode to carry the alert to another broadcaster where the general public MAY be the intended recipient. While this can be explained in the eventually adopted standard, there MAY be some regulatory statement appropriate to cover modes of operation such as these.
n) Provision for IEEE 1512 emergency codes and vehicle ID term provided for.
o) Provision for CAP Canadian Profile alerts provided for.
p) Any suggestion, corrections and constructive criticisms would be welcome.

The definition for Part 11 purposes SHOULD be that the basis of a standard SHOULD be the protocol as described in the current Part 11. However that this standard as defined by a primary standards body with liaison with other standards bodies and manufacturers would be the definition. Current rules otherwise are expected to apply, but the improved technology MAY provide more acceptable solutions on a case by case basis. Also that States, Regions, Tribes,

Counties and Cities MAY adopt the technology to suit their circumstances, and for this reason there are capabilities provided for that MAY NOT be adopted by the Federal Government. Also the incorporation of a country code and a language coding system provides for jurisdictions outside the Federal Government but MAY be used by other jurisdictions e.g. Canada.

System Branding

EAS and the Emergency Alert System are recognized brands by the public. For their ease of recognition, it is proposed that this be taken advantage of. The alphabet soup that the professionals recognize would be adding too much complexity. Therefore CMAS = “cellphone EAS”, ETN = “phone EAS”, EAS+ TV= “TV EAS”, Twitter alerts= “Twitter EAS”, radio EAS+=”radio EAS, analog or digital”, direct alerts to computers= “computer EAS” (not a current implementation), cable EAS+= “cable EAS”, satellite EAS+ (DBS or SDARS)= “satellite EAS, radio or TV”, IPAWS= “EAS source”. If this is a simpler terminology that is promoted, then communications from the public to the professionals will be more standardized.

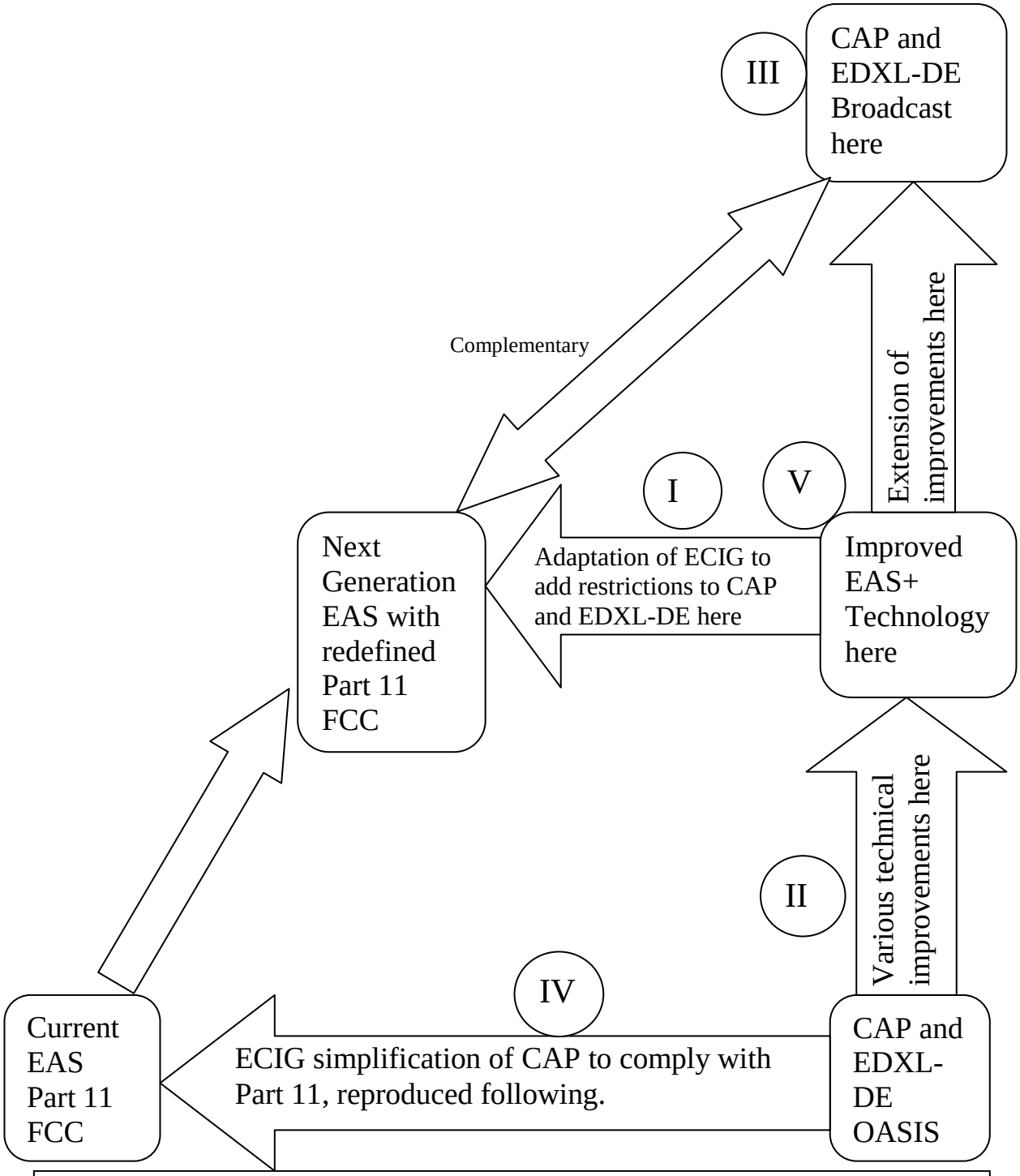
Message Writing

The theory of writing messages is not a subject for a standard, but any examples SHOULD follow what is referred to as the 3-3-30 rule. This means make a maximum of three points, using a maximum of three sentences, and a maximum of 30 words. This does not apply to CAP or EDXL-DE Broadcast.

Hyperlink Format

In this document, hyperlinks starting with www SHALL have a space after instead of a stop. Also any in the form :// SHALL have a space immediately following the :// . This is to render the hyperlink inoperable and to make the document acceptable by security checking applications.

A Conceptual Map of the Components of EAS+



The four items "here" are draft components for a standard to be developed, perhaps with OASIS, and MAY be named "EASplus Standard".
The Roman numerals refer to the section of this document. ECIG developed the section IV and it is proposed for this to be part of the standard, primarily for the transition compatibility.

Terminology: Clarification on terms used in this document:
A. The Key words REQUIRED, SHALL, SHALL NOT,
SHOULD, SHOULD NOT, RECOMMENDED, MAY, and OPTIONAL in this document are to be interpreted as described in RFC2119. SHALL is not used.

The selection of EAS and EAS+ mode is after the EAS+ section following. Then the EAS section follows.

Contents

Version modifications since FCC filing 2010-4-26 2
Introduction 3
Part 11 Aspects: 3
System Branding 6
Message Writing 6
Hyperlink Format 6
A Conceptual Map of the Components of EAS+ 7
SECTION I 12
1 Limitations of this section 12
2 General Requirements and Specifications 12
2.1 RECOMMENDED Additions to the IPAWS CAP Profile Requirements 12
2.1.1 Specific mimeTypes 12
2.1.2 New EASText <parameter> Element 12
2.2 RECOMMENDED Modifications to the IPAWS CAP Profile Requirements. 12
3 Implementation Guide Requirements and Specifications 13
3.1 Introduction 13
3.2 EAS Alert Activations 14
Fig. 1 General CAP-to-EAS Processing 19
Fig 1a. EDXL-DE and CAP Broadcast Processing 20
3.3 General Processing Rules 20
3.3.1 Multiple Parameters 20
3.4 Constructing an EAS Header Code from CAP IPAWS v1.0 Profile 20
3.4.1 EAS Header and CAP IPAWS v1.0 Profile 20
3.4.1.1 ORG (Originator) 20
3.4.1.2 EEE (Event code) 20
3.4.1.3 PSSCCC (Location Code) 21
3.4.1.4 TTTT (Duration) and Language Codes 21
3.4.1.5 JJJHHMM (Time), Primary Language, Severity, Urgency, Certainty, AudienceType, Audio Duration, Repetition 21
3.4.1.6 LLLLLLLL (EAS Station ID) 21
3.4.1.7 Governors MUST Carry 22
3.5 CAP EAS Audio from CAP IPAWS v1.0 Profile 22
3.5.1 Using or constructing EAS Audio during a CAPtoEAS alert activation 22

During a CAP-to-EAS alert activation, an EAS Audio message will be used or constructed as follows: 22
Audio EAS Processing *fig 2* 23
3.5.2 Constructing EAS Recorded Audio from CAP IPAWS v1.0 Profile 24
EAS Recorded Audio Processing *fig. 3* 25
3.5.3 Constructing EAS Streaming Audio from CAP IPAWS v1.0 Profile 26
Streaming Audio EAS Processing *fig 4* 27
3.5.4 Constructing TexttoSpeech from the CAP IPAWS v1.0 Profile 28
3.6 Constructing Alert Text from CAP IPAWS v1.0 Profile for EAS activations 28
3.6.1 White space rule 28
3.6.2 EASText element 28
3.6.3 CAP/EAS Alert Text with the FCC Required Text 29
3.6.4 Alert Text construction details 29
3.6.4.1 The FCC Required text 29
3.6.4.2 Sender (optional) 30
3.6.4.3 Descriptive text 31
3.6.4.4 Maximum character size enforcement 31
Alert Text Processing Diagram Figure 5 on next page 31
3.6.4.5 RECOMMENDED Maximum Human Text Message Length 34
3.7 Languages 34
3.8 CAP/EAS msgType handling 36
3.9 Test messages 36
3.10 Standards for the older CAP protocol version omitted here 37
3.11 Reception of an Alert in Both the CAP And the EAS Domain 37
4 Notes for Originators and Origination Software 38
5 CAP/EAS Examples of the CAP IPAWS v1.0 Profile 39
5.1 Anatomy of an EAS compatible CAP Alert Hazardous Materials Warning 39
5.2 Hypothetical Test Alert: Required Monthly Test 42
5.3 Hypothetical National Alert Notification: 43
5.4 Hypothetical National Alert Termination: 44
5.5 Test CAP/EAS message for the CAP IPAWS v1.0 profile 45
6 CAPtoEAS Validation Criteria 46
6.1 Introduction 46
6.2 Validation Philosophy 46
6.3 Error Signaling Philosophy 46
6.4 Validation Overview 47
6.4.1 CAP Required Elements 47
6.4.2 EAS+CAP Required Elements 47
6.4.3 Logging 48
Figure 6: CAP v1.2 Message Structure [4] and EAS-CAP Implementation Guide Required Elements 48
6.5 EAS+CAP Message Validation Procedure 49
B2 EAS+CAP Message Validation Procedure 49
6.6 EAS+CAP Message Result States 50
Timing and Interference Immunity 50
6.7 CAP to EAS+ Required Elements 51
Figure 8: Minimum EAS+CAP Translation Elements 51
A. Details Extracted from the EAS-CAP Profile Specification Applicable to EAS+ (full details are incorporated later) 52
CAP to EAS+ Validation Table 53
Non-IPAWS compliant element handling in the CAP to EAS Validation Table 59
SECTION II 60
CAP V1.2 60
Terminology 60
Normative References 60
3.2.1 "alert" Element and Sub-elements 61
3.2.2 "info" Element and Sub-elements 63
audienceType: Receiver audienceType for Additional Selectivity 68
EAS Event Codes. 70
CAP Canada Event Codes 80

3.2.3 "resource" Element and Sub-elements....90
3.2.4 "area" Element and Sub-elements....91
3.3 Implementation Notes....94
3.4 XML Schema....94
3.5 User Interface Considerations....95
EDXL Distribution Element Structure....97
3. EDXLDistribution Element Structure (normative)....97
3.1 Document Object Model....97
3.2 Data Dictionary....97
3.2.1 EDXL Distribution Element and Sub-elements....97
3.2.5 xmlContent Element and Sub-elements....109
3.2.6 List and Associated Value(s)....109
3.2.7 Reply to Type....109
3.2.8 Authentication Type....110
3.2.9 Explicit Addressing....110
EAS+ AS A COMPLEMENT OF CAP AND EDXL....111
A COMPARISON OF EAS AND EAS+;....112
RECEIVER CATEGORY FOR ADDITIONAL SELECTIVITY <audienceType>....115
ENCODER/DECODER SELECTIVITY AND TRANSMISSION MODE RELATED....117
QUALITY MONITORING;....119
Audio Level Setting....122
Consumer Receiver Feature Impact....123
HD Radio Interface Considerations....123
Energy Consumption Considerations....123
MONITOR MESSAGES....125
SECTION III....126
CAP Broadcast (includes EDXL-DE)....126
SECTION IV....127
Selection of EAS and EAS+ Mode See Fig. 1 for the flowchart.....127
ECIG Recommendations....128
For a....128
CAP EAS Implementation Guide....128
Contents....129
1 Introduction....131
1.1 Purpose....131
1.2 Disclaimer of Intellectual Property Claims....131
1.3 Copyright....131
1.4 Terminology....131
1.5 References....132
2 General Requirements and Specifications....133
2.1 Recommended Additions to the IPAWS CAP Profile Requirements....133
2.1.1 Specific mimeTypes....133
2.1.2 New EASText <parameter> Element....133
2.2 Recommended Modifications to the IPAWS CAP Profile Requirements.....134
3 Implementation Guide Requirements and Specifications....135
3.1 Introduction....135
3.2 EAS Alert Activations....135
Figure 1. General CAP-to-EAS Processing3.3 General Processing Rules....137
3.3 General Processing Rules....138
3.3.1 Multiple Parameters....138
3.4 Constructing an EAS Header Code from CAP IPAWS v1.0 Profile....138
3.4.1 EAS Header and CAP IPAWS v1.0 Profile....138
3.5 CAP EAS Audio from CAP IPAWS v1.0 Profile....140
3.5.1 Using or constructing EAS Audio during a CAPtoEAS alert activation....140
Figure 2 - Audio EAS Processing....141
3.5.2 Constructing EAS Recorded Audio from CAP V1.2 IPAWS v1.0 Profile....142
Figure 3: EAS Recorded Audio Processing....143
3.5.4 Constructing TexttoSpeech from the CAP V1.2 IPAWS v1.0 Profile....146

3.6 Constructing Alert Text from CAP V1.2 IPAWS v1.0 Profile for EAS 146
activations 146
3.6.1 White space rule 146
3.6.2 EASText element 146
3.6.3 CAP/EAS Alert Text with the FCC Required Text 147
3.6.4 Alert Text construction details 147
Figure 5: EAS Alert Text Processing 150
3.8 CAP/EAS msgType handling 152
3.8.1 Alert 152
3.8.2 Update 152
The Update message is processed in the normal way for air. 152
3.8.3 Cancel 153
3.8.4 Ack and Error 153
3.9 Test messages 153
3.10 Standards for older CAP protocol versions. 154
3.11 Reception Of An Alert in Both the CAP And The EAS Domain 154
4 Notes for Originators and Origination Software 156
5 CAP/EAS Examples of the CAP V1.2 IPAWS v1.0 Profile 157
5.1 Anatomy of an EAS compatible CAP Alert Hazardous Materials Warning 157
Version 1.0 159
5.2 Hypothetical Test Alert: Required Monthly Test 161
5.3 Hypothetical National Alert Notification: 163
5.4 Hypothetical National Alert Termination: 165
5.5 Test CAP/EAS message for the CAP IPAWS v1.0 profile 166
6 CAPtoEAS Validation Criteria 167
6.1 Introduction 167
6.2 Validation Philosophy 167
6.3 Error Signaling Philosophy 167
6.4 Validation Overview 167
6.4.1 CAP Required Elements 168
6.4.2 EASCAP Required Elements 168
6.4.3 Logging 169
Figure 6: CAP v1.2 Message Structure [4] and EAS-CAP Implementation Guide Required Elements 169
6.5 EASCAP Message Validation Procedure 170
B2 EAS-CAP Message Validation Procedure 171
6.6 EASCAP Message Result States 172
Timing and Interference Immunity 172
6.7 CAP to EAS Required Elements 173
Figure 8: Minimum EAS-CAP Translation Elements 173
Non-IPAWS compliant element handling in the CAP to EAS Validation Table 179
SECTION V 180
Compression Systems and Transition Aspects 180
EAS+ to CAP or EDXL-DE Conversion 182
EAS+ Graphics Protocol 183
Appendix K: Glossary 184
Emergency Alert System proposed plan outline responses. 193

EAS+ SHALL use ISO 8859-1 (derived partly from Microsoft ASCII) to maximize the number of languages without character set switching. However this SHALL remain ANSI ASCII for the header. The use of ISO 8859-1 for LLLLLLLL is reserved for future non-US use.

SECTION I

1 Limitations of this section

The EAS-CAP Interoperability Group recommendation v1.0 is being adapted in this section. So if there is some duplication and lack of consideration of the finished version, my apologies as this is a work in progress. Also apologies if the CAP version 1.2 is not fully incorporated here.

2 General Requirements and Specifications

The FEMA IPAWS Program Management Office submitted the draft IPAWS CAP Profile Requirements document is 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 mimeTypes

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 it is considered that if these mimeTypes included the actual file type name it would be very beneficial. Thus, it is recommended that “-wav” and “-mp3” be appended to the existing OASIS mimeTypes when FEMA implements its IPAWS Profile. By incorporating this, the mimeTypes 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 mimeTypes. 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

It is recommended 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, a description is 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. Also see the areaDesc section of SECTION II.

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 and 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 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. Therefore it is thus considered out of scope for this Implementation Guide. However a proposal to improve audio level consistency is later.
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[1]. At this point in time, it is considerd the only solution is for message originators to provide matching audio and text within the message when it is authored. Therefore, it is considered that 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. The <eventCode> list has been extended as can be noted later.

[1] 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 SHALL create CAP messages that are constructed in accordance with the CAP v1.2 IPAWS v1.0 Profile[2] . Likewise, equipment manufacturers SHALL 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/textidx?c=ecfr&tpl=/ecfrbrowse/Title47/47cfr11_main_02.tpl However this is the current Part 11 and one aspect to be considered is to what definition they will eventually be changed. The intent of the Implementation Guide is two-fold:
1) All CAP-to-EAS devices SHALL 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[3], so we SHALL take EAS rules into account. However with EAS+, the CAP <identifier> AND <sender> or EDXL-DE <distributionID> AND <senderID> is included so this is providing a means of checking for message duplication.
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 comprise 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 analog "daisy-chain" SHALL be phased out and replaced with a digital "daisy mesh" which is described later. The audio alert consists of up to four elements:

1) A header code. All EAS activations SHALL include a header code data burst. The header code SHALL be sent three times, with a one-second pause after each transmission, to ensure proper reception by EAS devices. This SHALL be the analog audio FSK data. However if the data is transmitted as data separately and the audio is digitally transmitted, this SHOULD be replaced by the SEWS (Australian) alert signal as it is attention getting and unique. Apart from training and exercises for first responders, or for evidence purposes in court, there SHALL be no other use of this audio signal, nor SHALL distribution of this audio be permitted other than as part of EAS equipment and services by bona-fide vendors of such equipment and services. A penalty SHALL be levied as per copyright violation penalties.

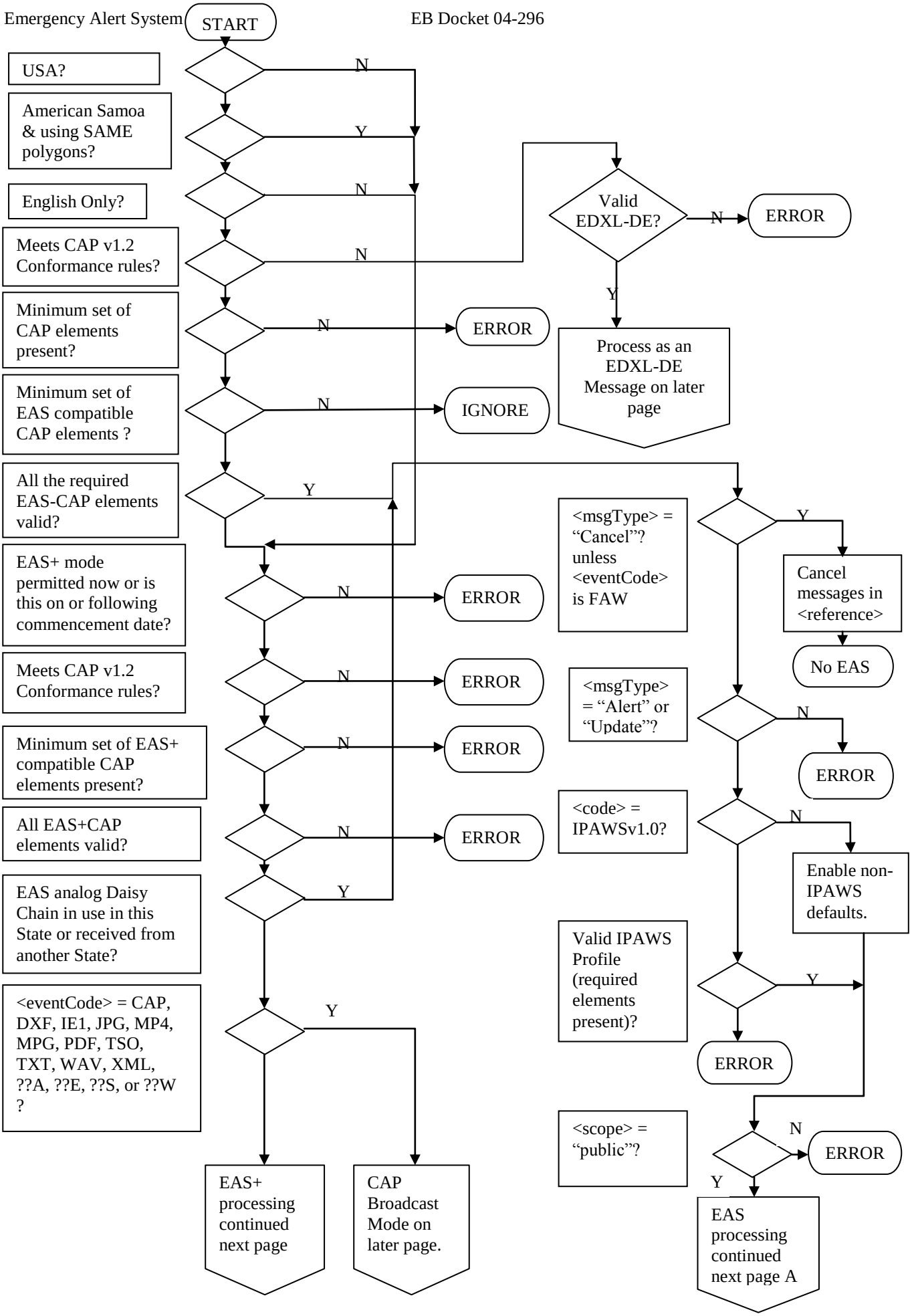
[2] The full name is Common Alerting Protocol, v. 1.2 USA Integrated Public Alert and Warning System Profile Version 1.0. Please see Appendix A for an overview of CAP v1.2

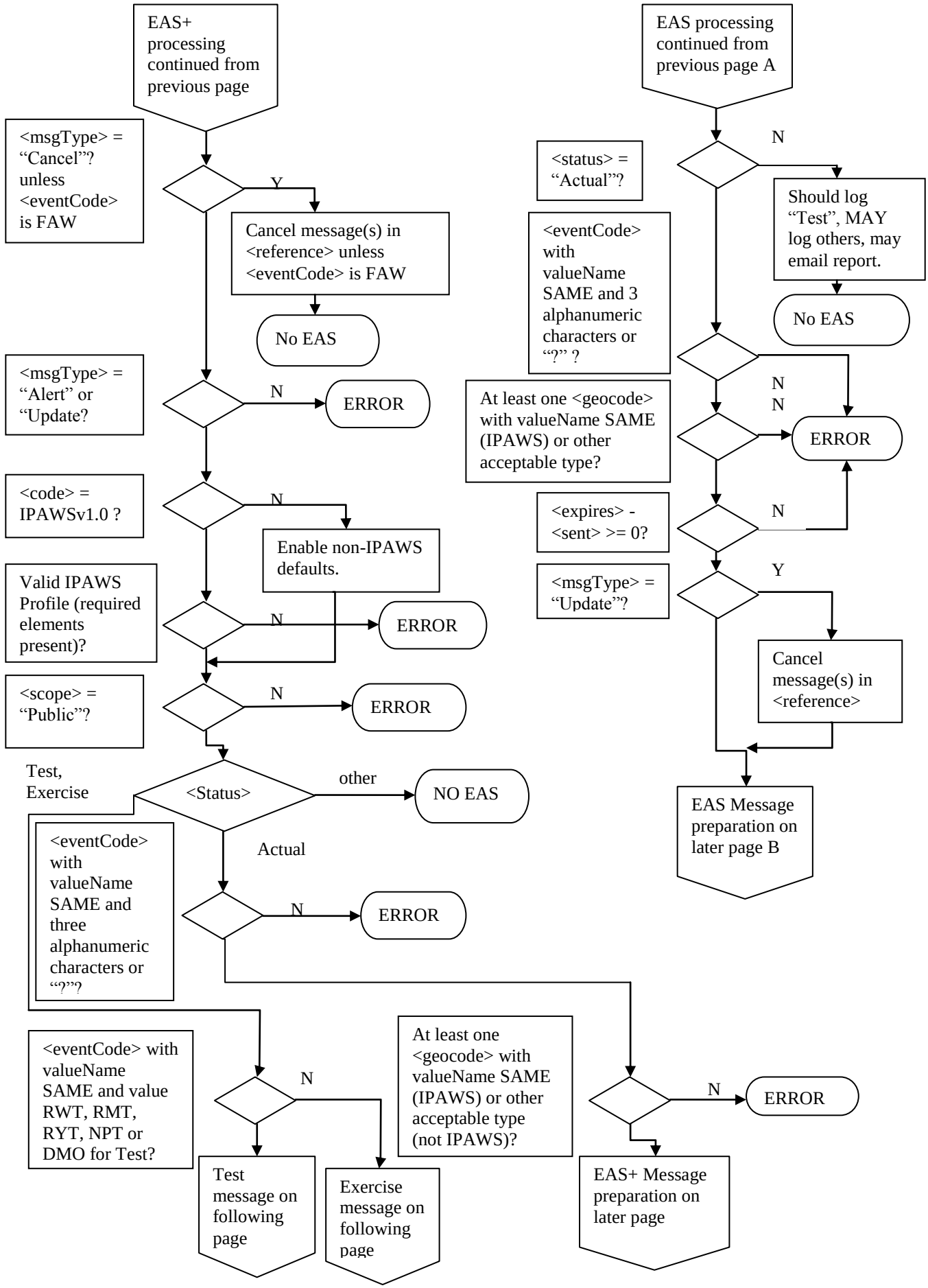
[3] "… it is likely that the existing EAS will continue to function as a critical alerting system for the foreseeable future",
Second Further Notice of Proposed Rule Making, FCC 10-11, released January 14, 2010.

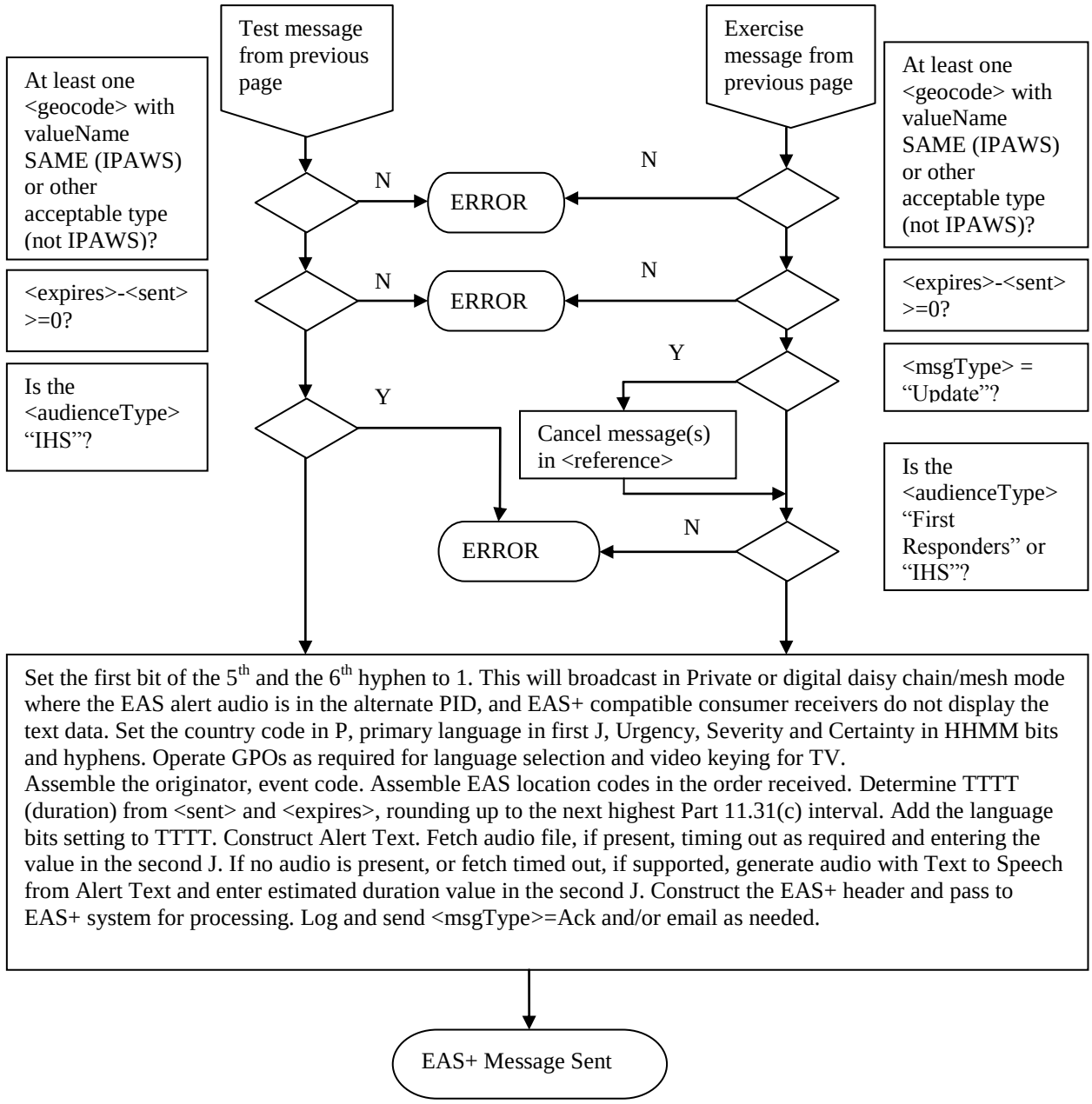
2) An attention signal. Following the header code, a two-tone attention signal is used to alert listeners and viewers that EAS activation has occurred and that a message will follow. The attention signal SHOULD be used if, and only if, a message will be included as part of the alert. This MAY be replaced by the SEWS (Standard Emergency Warning Signal, Australia) signal when digital audio is transmitted. If the header tones and attention signal are both replaced with SEWS, this SHOULD result in a reduced time to start the message, which is critical if earthquake alerts are going to be practical. The SEWS or other tones or attentions signals SHOULD be interrupted with the word "EARTHQUAKE" if the event code is EQW.

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 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 if present, otherwise it is the text. The audio message, when present, follows the attention signal. EAS encoder/decoders handle attention signal and audio message insertion during an EAS activation. With EAS+, the text and pictures are transmitted as data.

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 legacy 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. This limitation does not apply to EAS+, where all the data is transmitted.


START
USA?
N
American Samoa & using SAME polygons?
Y
English Only?
N
Meets CAP v1.2 Conformance rules?
N
Valid EDXL-DE?
N
ERROR
Y
Process as an EDXL-DE Message on later page
Minimum set of CAP elements present?
N
ERROR
Minimum set of EAS compatible CAP elements ?
N
IGNORE
All the required EAS-CAP elements valid?
Y
EAS+ mode permitted now or is this on or following commencement date?
N
ERROR
Meets CAP v1.2 Conformance rules?
N
ERROR
Minimum set of EAS+ compatible CAP elements present?
N
ERROR
All EAS+CAP elements valid?
N
ERROR
EAS analog Daisy Chain in use in this State or received from another State?
Y
<eventCode> = CAP, DXF, IE1, JPG, MP4, MPG, PDF, TSO, TXT, WAV, XML, ??A, ??E, ??S, or ??W ?
Y
EAS+ processing continued next page
CAP Broadcast Mode on later page.
<msgType> = “Cancel”? unless <eventCode> is FAW
Y
Cancel messages in <reference>
No EAS
<msgType> = “Alert” or “Update”?
N
ERROR
<code> = IPAWSv1.0?
N
Enable non-IPAWS defaults.
Valid IPAWS Profile (required elements present)?
Y
ERROR
<scope> = “public”?
N
ERROR
Y
EAS processing continued next page A


EAS+ processing continued from previous page
<msgType> = "Cancel"? unless <eventCode> is FAW
Y
Cancel message(s) in <reference> unless <eventCode> is FAW
No EAS
<msgType> = "Alert" or "Update?
N
ERROR
<code> = IPAWSv1.0 ?
N
Enable non-IPAWS defaults.
Valid IPAWS Profile (required elements present)?
N
ERROR
<scope> = "Public"?
N
ERROR
Test, Exercise
<Status>
other
NO EAS
Actual
<eventCode> with valueName SAME and three alphanumeric characters or "?"?
N
ERROR
<eventCode> with valueName SAME and value RWT, RMT, RYT, NPT or DMO for Test?
N
Test message on following page
Exercise message on following page
EAS processing continued from previous page A
<status> = "Actual"?
N
Should log "Test", MAY log others, may email report.
No EAS
<eventCode> with valueName SAME and 3 alphanumeric characters or "?" ?
N
At least one <geocode> with valueName SAME (IPAWS) or other acceptable type?
N
ERROR
<expires> - <sent> >= 0?
N
<msgType> = "Update"?
Y
Cancel message(s) in <reference>
EAS Message preparation on later page B
At least one <geocode> with valueName SAME (IPAWS) or other acceptable type (not IPAWS)?
N
ERROR
EAS+ Message preparation on later page


Test message from previous page
Exercise message from previous page
At least one <geocode> with valueName SAME (IPAWS) or other acceptable type (not IPAWS)?
N
ERROR
N
At least one <geocode> with valueName SAME (IPAWS) or other acceptable type (not IPAWS)?
<expires>-<sent> >=0?
N
ERROR
N
<expires>-<sent> >=0?
Y
<msgType> = "Update"?
Is the <audienceType> "IHS"?
Y
Cancel message(s) in <reference>
Is the <audienceType> "First Responders" or "IHS"?
ERROR
N
Set the first bit of the 5th and the 6th hyphen to 1. This will broadcast in Private or digital daisy chain/mesh mode where the EAS alert audio is in the alternate PID, and EAS+ compatible consumer receivers do not display the text data. Set the country code in P, primary language in first J, Urgency, Severity and Certainty in HHMM bits and hyphens. Operate GPOs as required for language selection and video keying for TV.
Assemble the originator, event code. Assemble EAS location codes in the order received. Determine TTTT (duration) from <sent> and <expires>, rounding up to the next highest Part 11.31(c) interval. Add the language bits setting to TTTT. Construct Alert Text. Fetch audio file, if present, timing out as required and entering the value in the second J. If no audio is present, or fetch timed out, if supported, generate audio with Text to Speech from Alert Text and enter estimated duration value in the second J. Construct the EAS+ header and pass to EAS+ system for processing. Log and send <msgType>=Ack and/or email as needed.
EAS+ Message Sent

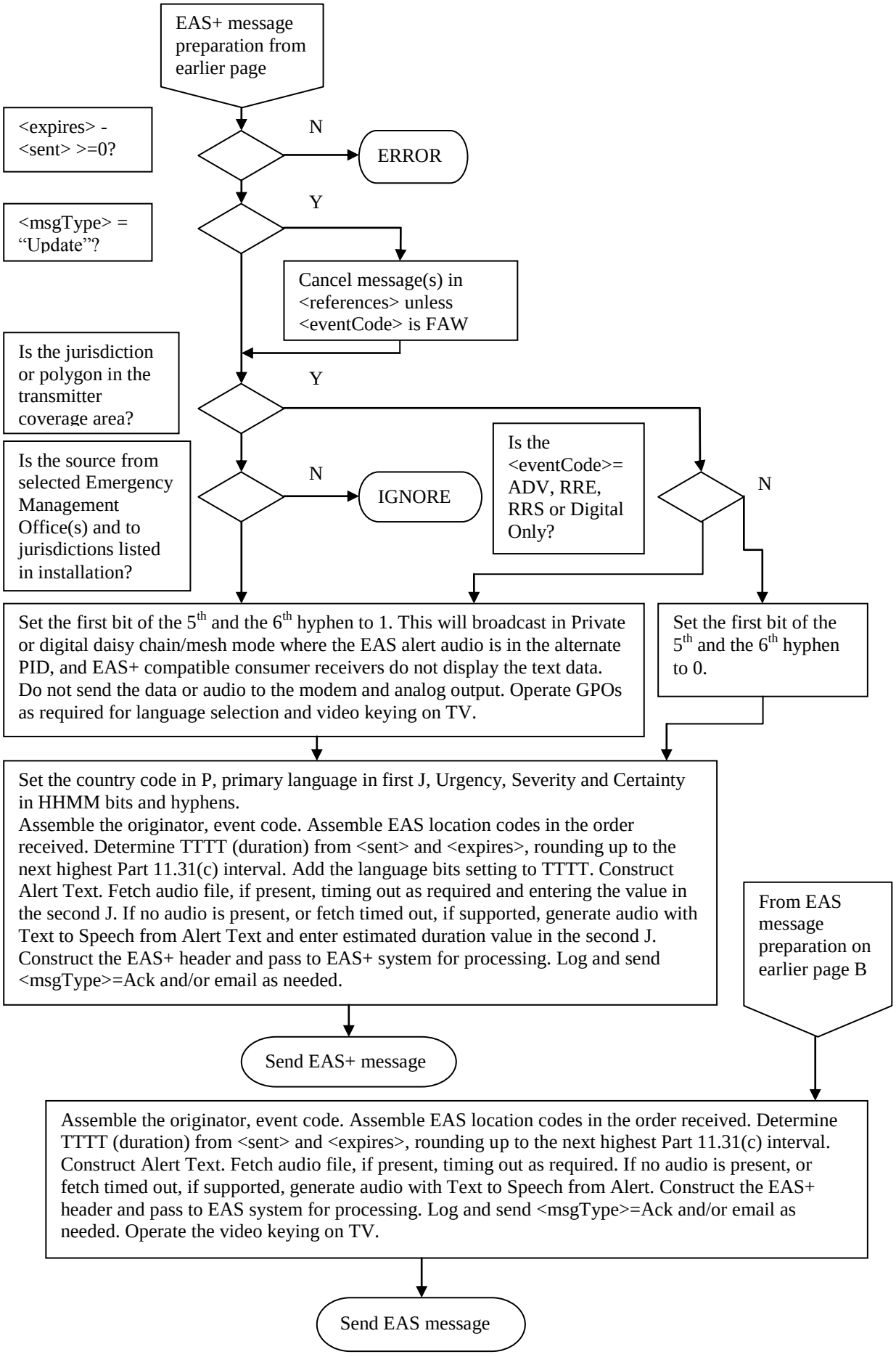
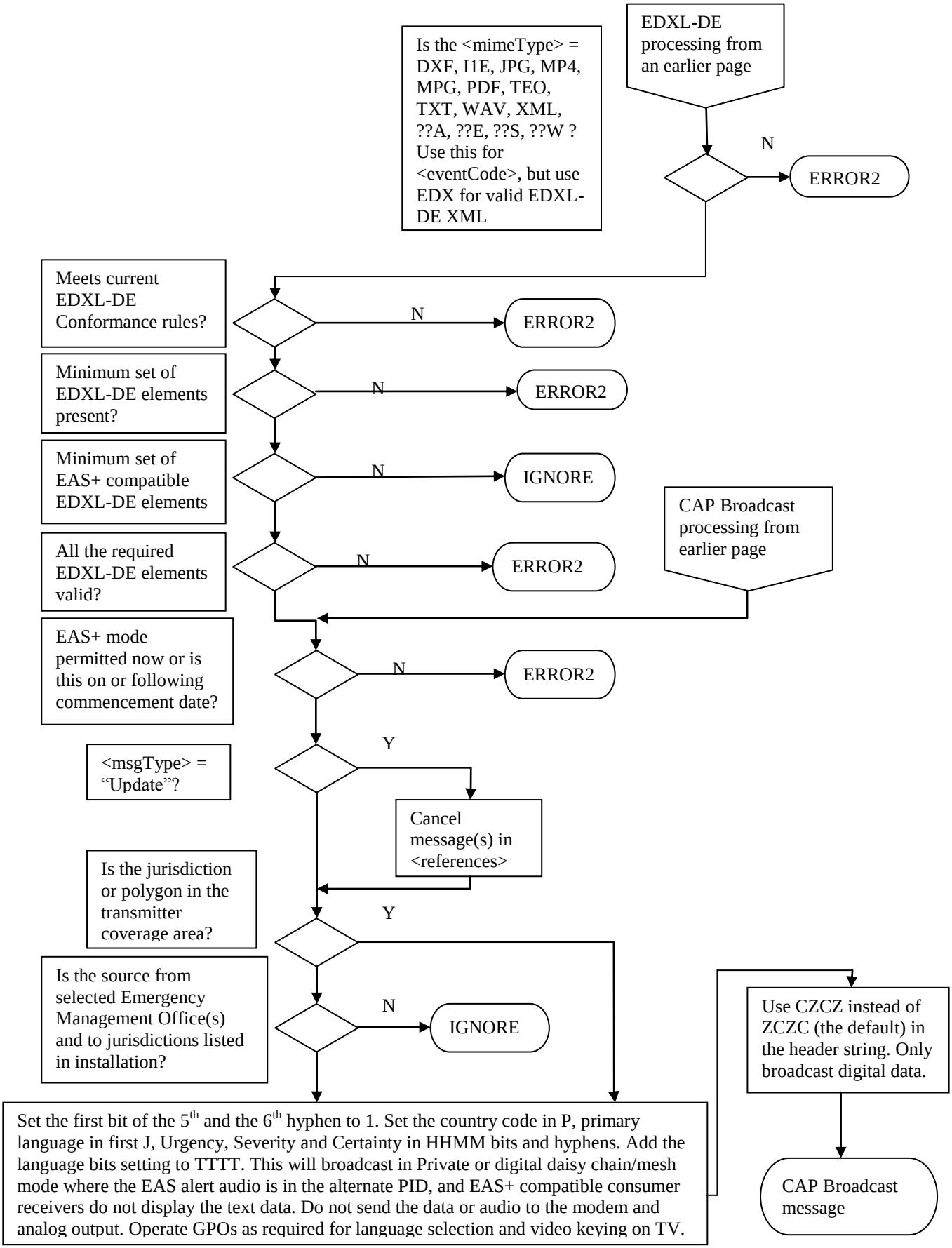

EAS+ message preparation from earlier page
<expires> - <sent> >=0?
N
ERROR
<msgType> = "Update"?
Y
Cancel message(s) in <references> unless <eventCode> is FAW
Is the jurisdiction or polygon in the transmitter coverage area?
Y
Is the source from selected Emergency Management Office(s) and to jurisdictions listed in installation?
N
IGNORE
Is the <eventCode>= ADV, RRE, RRS or Digital Only?
N
Set the first bit of the 5th and the 6th hyphen to 1. This will broadcast in Private or digital daisy chain/mesh mode where the EAS alert audio is in the alternate PID, and EAS+ compatible consumer receivers do not display the text data. Do not send the data or audio to the modem and analog output. Operate GPOs as required for language selection and video keying on TV.
Set the first bit of the 5th and the 6th hyphen to 0.
Set the country code in P, primary language in first J, Urgency, Severity and Certainty in HHMM bits and hyphens.
Assemble the originator, event code. Assemble EAS location codes in the order received. Determine TTTT (duration) from <sent> and <expires>, rounding up to the next highest Part 11.31(c) interval. Add the language bits setting to TTTT. Construct Alert Text. Fetch audio file, if present, timing out as required and entering the value in the second J. If no audio is present, or fetch timed out, if supported, generate audio with Text to Speech from Alert Text and enter estimated duration value in the second J. Construct the EAS+ header and pass to EAS+ system for processing. Log and send <msgType>=Ack and/or email as needed.
From EAS message preparation on earlier page B
Send EAS+ message
Assemble the originator, event code. Assemble EAS location codes in the order received. Determine TTTT (duration) from <sent> and <expires>, rounding up to the next highest Part 11.31(c) interval. Construct Alert Text. Fetch audio file, if present, timing out as required. If no audio is present, or fetch timed out, if supported, generate audio with Text to Speech from Alert. Construct the EAS+ header and pass to EAS system for processing. Log and send <msgType>=Ack and/or email as needed. Operate the video keying on TV.
Send EAS message

Fig. 1 General CAP-to-EAS Processing



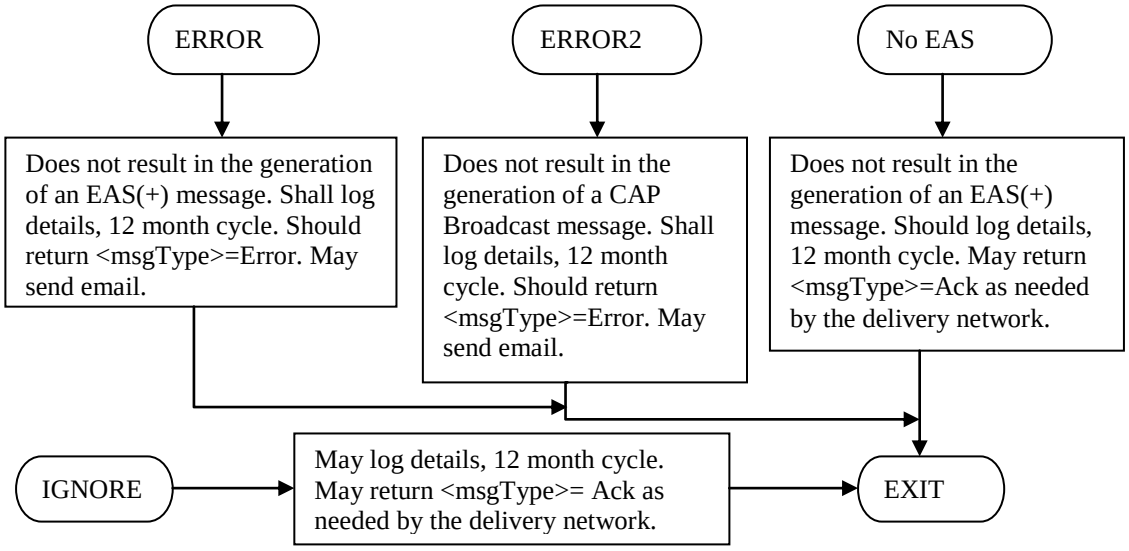


Fig 1a. EDXL-DE and CAP Broadcast Processing

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

Additional capabilities have been added to the header items in this section, refer to the details following in section II. 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[4]:
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. See SECTION III for further details.

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 1/9th area sub-division. The geocodes SHALL be placed into the EAS ZCZC string. At least one <geocode> SHALL 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" SAME 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 implementation, or an All-In-One CAP/EAS device, MAY use the 000000 code, the action taken by a legacy EAS device receiving such a SAME code varies from vendor to vendor. This SHALL be rectified as this software upgrade is implemented, but the analog audio FSK tones data SHALL NOT use this code UNTIL there are known to be no downstream devices that do not recognize this code. Therefore it SHALL be a configuration item, with the default OFF until this is known not to be an issue. See SECTION III for the expanded use of P and State and Country sector use.

3.4.1.4 TTTT (Duration) and Language Codes

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 equal to or greater than one hour, the valid range permitted for EAS Duration SHALL be in half-hour increments from 0100 to 9930. See SECTION III for the expanded use of TTTT.

3.4.1.5 JJJHHMM (Time), Primary Language, Severity, Urgency, Certainty, AudienceType, Audio Duration, Repetition

The EAS Time Alert Issued (JJJHHMM) SHALL be represented using the CAP <alert><sent> element in the ISO 8601 format per the OASIS CAP 1.2 specification. See SECTION III for the expanded use of JJJHHMM.

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.

[4] 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 SHALL not be used.

3.4.1.7 Governors MUST Carry

The Governors "MUST Carry" information is reflected as an EAS+ Event Code STA. The CAP/EAS device SHALL air a message so marked in accordance with FCC 11. revised. 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." The use of MUST here is defined by FCC rules, and is an exception to the normal standards use of SHALL.

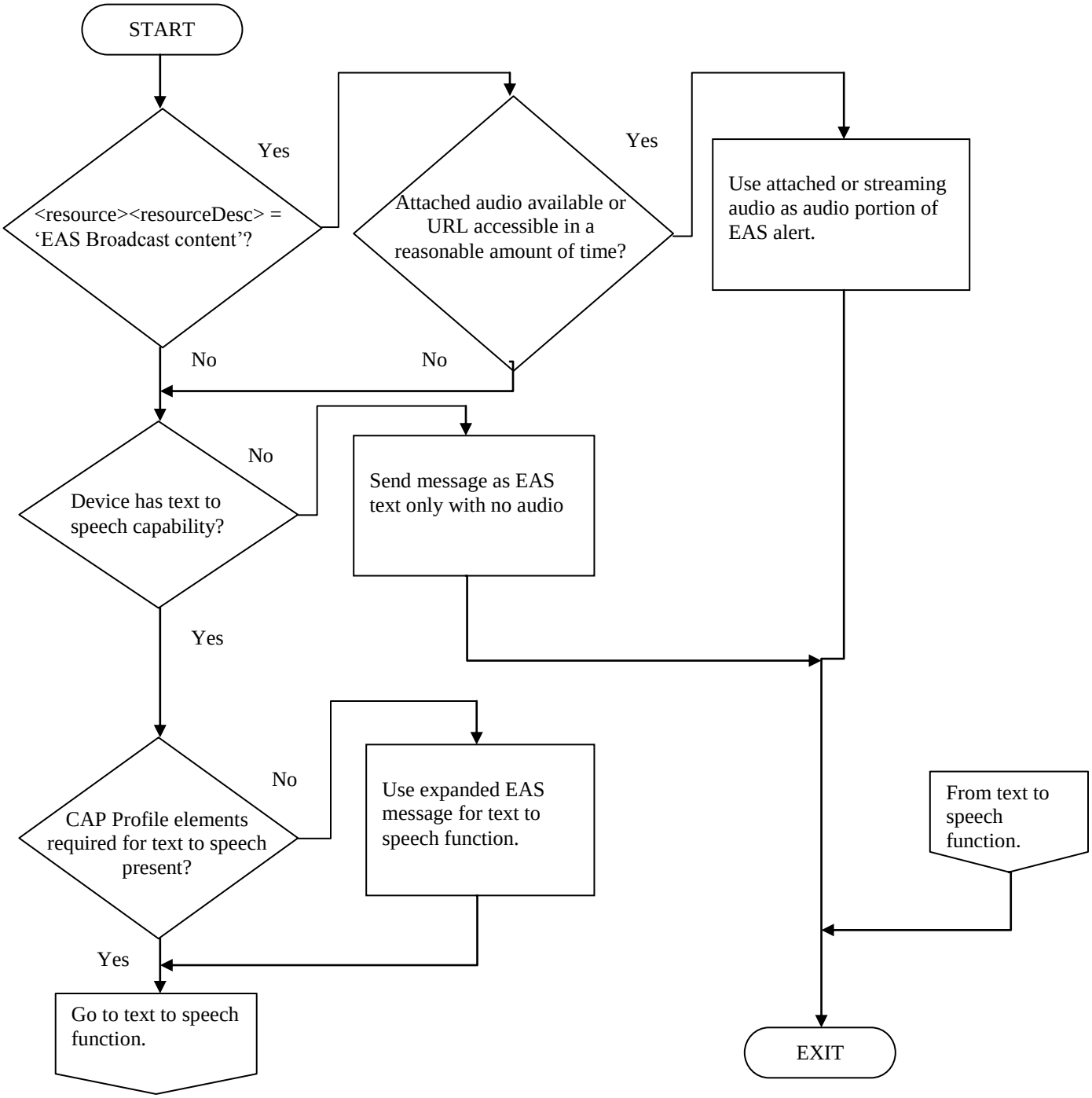
3.5 CAP EAS Audio from CAP IPAWS v1.0 Profile

3.5.1 Using or constructing EAS Audio during a CAPtoEAS alert activation

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

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-tospeech.
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. The default value SHOULD be 2 seconds.
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 textto-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. While this is stated here for these durations, and the time is much longer than 2 seconds, this lengthy duration can cost lives in some types of events. Also as the audio being downloaded may be at the same time as for numerous other broadcasters and cable systems, so while this may perform well in a single demonstration, this is likely to be unacceptable in the network congestion and failures of a real emergency.

Audio EAS Processing *fig 2*



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 or mono 16 bit samples at 48 kHz as TV requires.

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 mimeTypes do not specify the codec or container format. The EAS rendering device SHALL determine the content of a file by inspection. ECIG strongly recommends that new mimeTypes be added to the profile to resolve audio format ambiguity, by appending –wav or –mp3 to the end of the defined mime types.

4) A message MAY include a video resource, but it SHALL 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 SHALL be used to identify the location of the file on a network, or on a local file system.

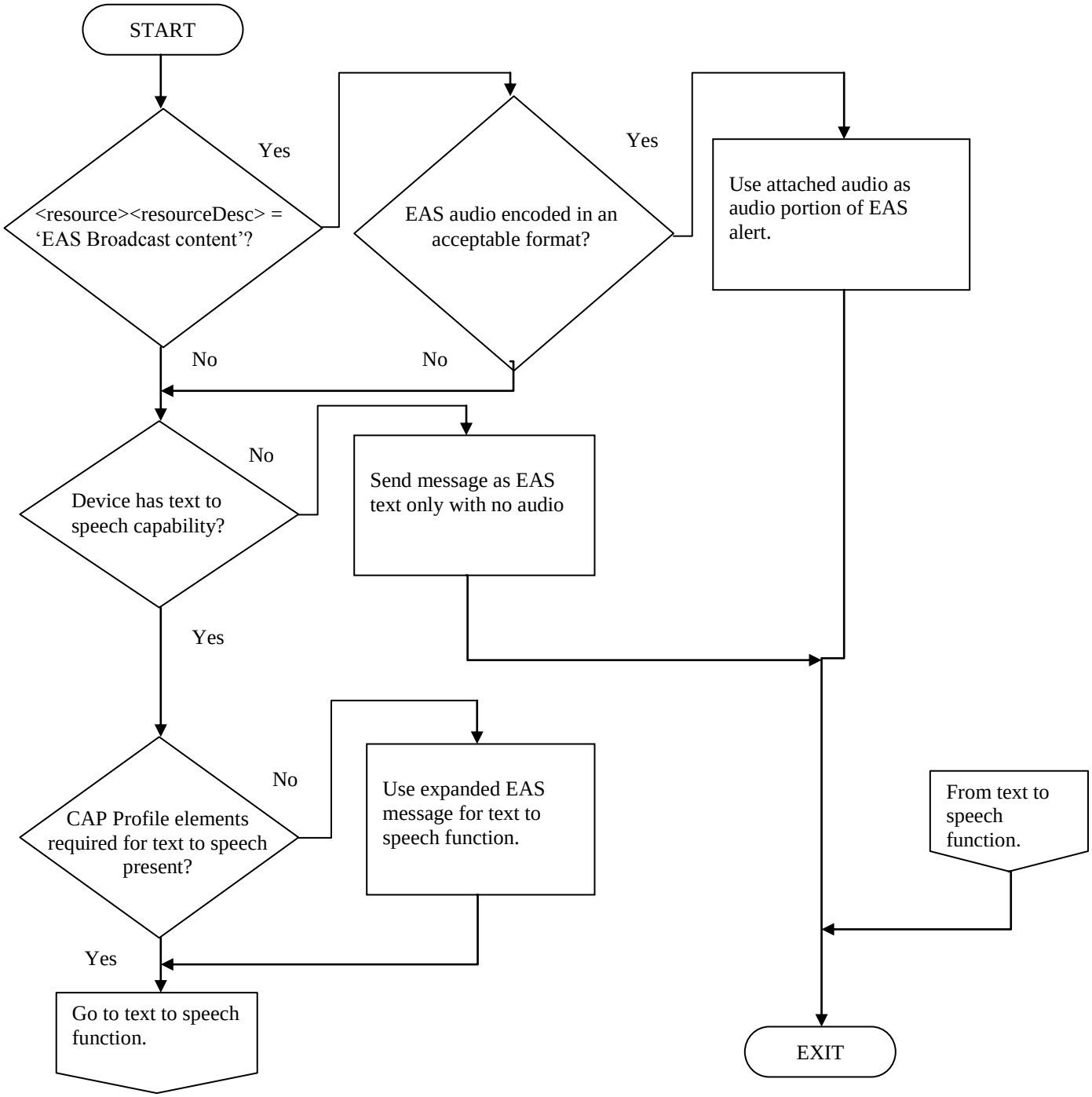
6) Support for the <derefUri> element is NOT required for CAP/EAS devices**.**

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 matches 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 SHALL be enforced for all alerts except the EAN, STA or SWC 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.

EAS Recorded Audio Processing *fig. 3*



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."

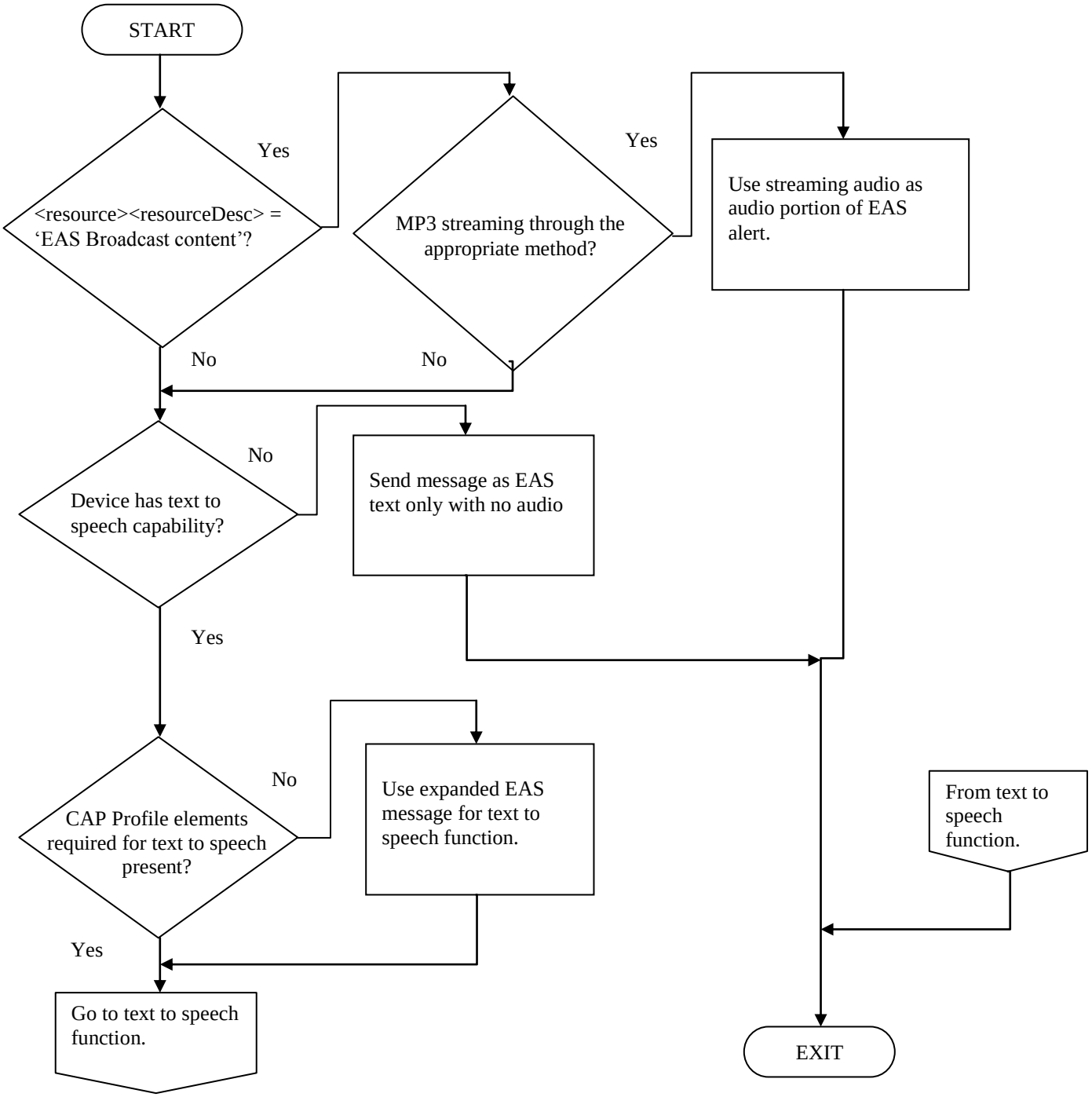
2) The audio SHALL use one of the following streaming methods:

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.

Streaming Audio EAS Processing *fig 4*



3.5.4 Constructing TexttoSpeech 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 SHALL 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 to1800 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.

In order to simplify operational use, if EASText is used, it is RECOMMENDED that the default contents be derived by rule processing from the source entry. Then if it is not considered necessary to modify such text, the derived text SHALL be included in the CAP message. Also machine translation of the EASText to other languages SHOULD be provided for, and the default text in each language displayed for checking.

The areaDesc text MAY be included in the EAS+ text message preceded by <areaDesc>. Initially it SHALL be used, but as selectivity becomes effectively implemented it SHOULD be replaced

by <areaDesc=*areaDesc*> to reduce the text that the public is expected to process and remember. Analog radio SHOULD include the areaDesc text if the selected area is smaller than the transmitter coverage area.

3.6.3 CAP/EAS Alert Text with the FCC Required Text

Presently, the FCC requires that alert text accompanying EAS alerts SHALL 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 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.

The header is transmitted three times. As the burst errors from lightning are normally less than 100 ms, there SHALL be an interval of 250 ms minimum and 350 ms maximum between the starts for the headers when transmitted digitally. The higher data rates make this specification

necessary. If the first two headers are identical, the processing SHOULD then proceed. This means that there is likely to be a minimum pass through delay of about 300 ms. This adds to the timing from sensor to the public of a priority 1 message, e.g. earthquake, but only a small amount compared with the budget. The computer and operating system SHOULD be optimized for rapid CAP, EDXL-DE and EAS+ message processing so as not to delay significantly the alert transmission.

The budget for sensor to public time for the most rapid message e.g. earthquake is as follows;

Sensor to Emergency Management (MAY include a satellite hop)	1 s
Emergency Management processing time	from 10 ms to 1 s
Emergency Management to broadcaster transmission time (if satellite)	1 s
Broadcaster EAS+ processing and compression (may be reduced below)	1 s
Broadcaster to public (if satellite is used)	1 s
Public receiver processing time (selectivity processing MAY be needed)	1 s (during 1s pause)
TOTAL	=6 s

The Broadcaster compression time of 1 sec is with normal compression systems, and that is not a precise amount. However by using the Baseball Mode for HD radio and the EAS+ Mode for digital TV, this time can be reduced to nearer 200 ms. Details are in the section on Compression System Considerations. Eliminating all but one satellite hop leaves the shorter time budget as below;

Sensor to Emergency Management (MAY include a satellite hop)	1 s
Other processing	0.5 s
Public receiver processing time (selectivity processing MAY be needed)	1s (during 1s pause)
TOTAL	=2.5 s

The processing time of each step is important. The architecture of having nationwide CAP processing has advantages, but some states may prefer to bypass this step for selected message types such as tsunamis and earthquakes to reduce this processing time, especially if satellite hops can be avoided.

A way to reduce the public receiver second would be to include the audio “EARTHQUAKE” and reproduce it when the header indicated during the 1s pause. Now can this feature addition sell? This time is lengthy when considering that seismic shock waves travel at about 7 km (5 miles) per second. However as the duration of an earthquake is considerably longer, it begins to be useful as an early warning system. Any time reduction in the budget items is an improvement. The use of the “Baseball mode” in HD radio is an example. As there is consideration being given to install sensors deep underground e.g. for the San Andreas fault, this can aid detection before the shock wave reaches the surface at the epicenter. As errors in systems could lead to false alarms, there is an event code FAW for human oversight of this automated system to address any such false alarms. False alarms for fires are an accepted risk for the benefit of having the fire alarm systems

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 SHALL start with the FCC required text, use of a headline is inconsistent with its intention of being an introductory announcement.

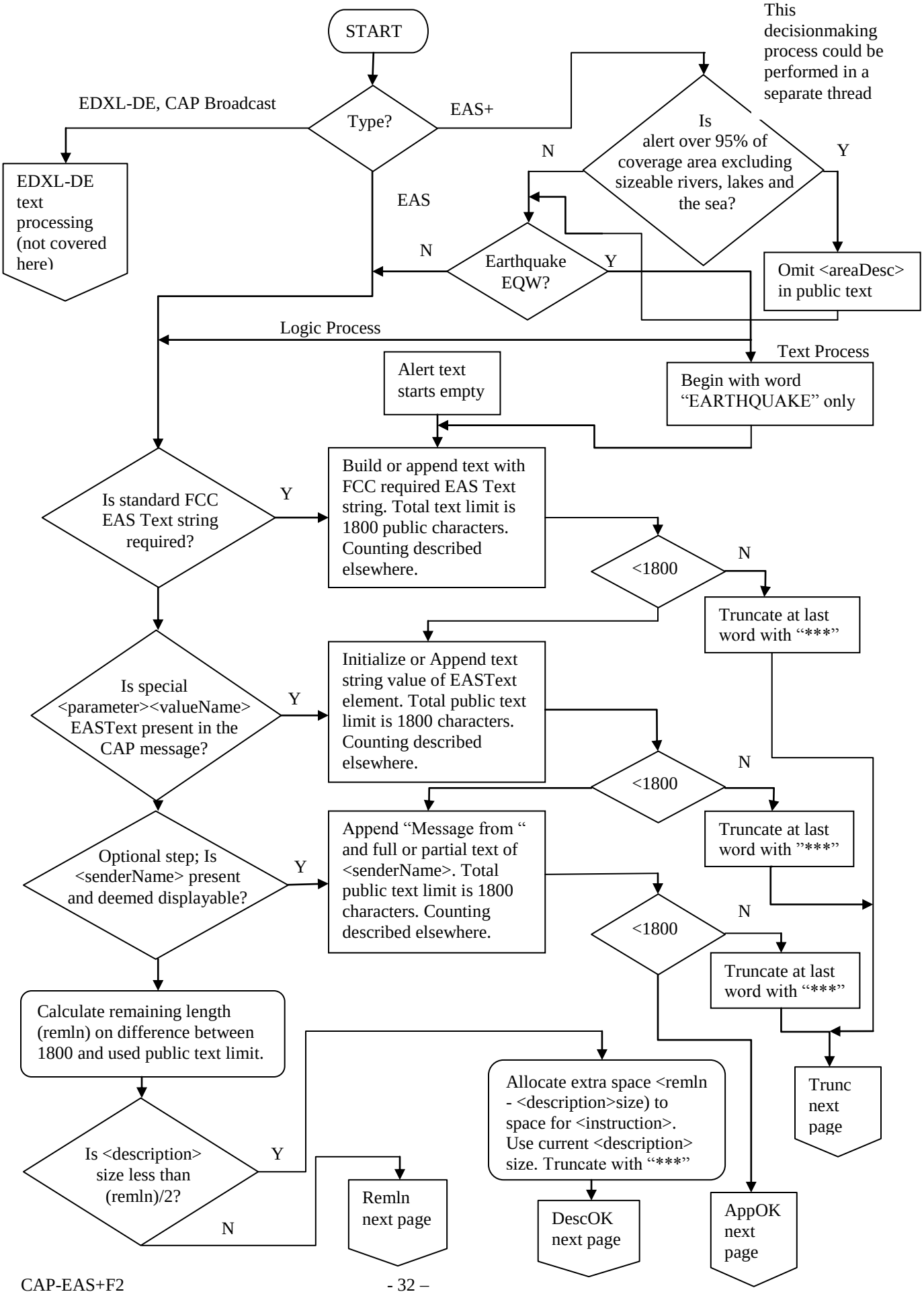
3.6.4.4 Maximum character size enforcement

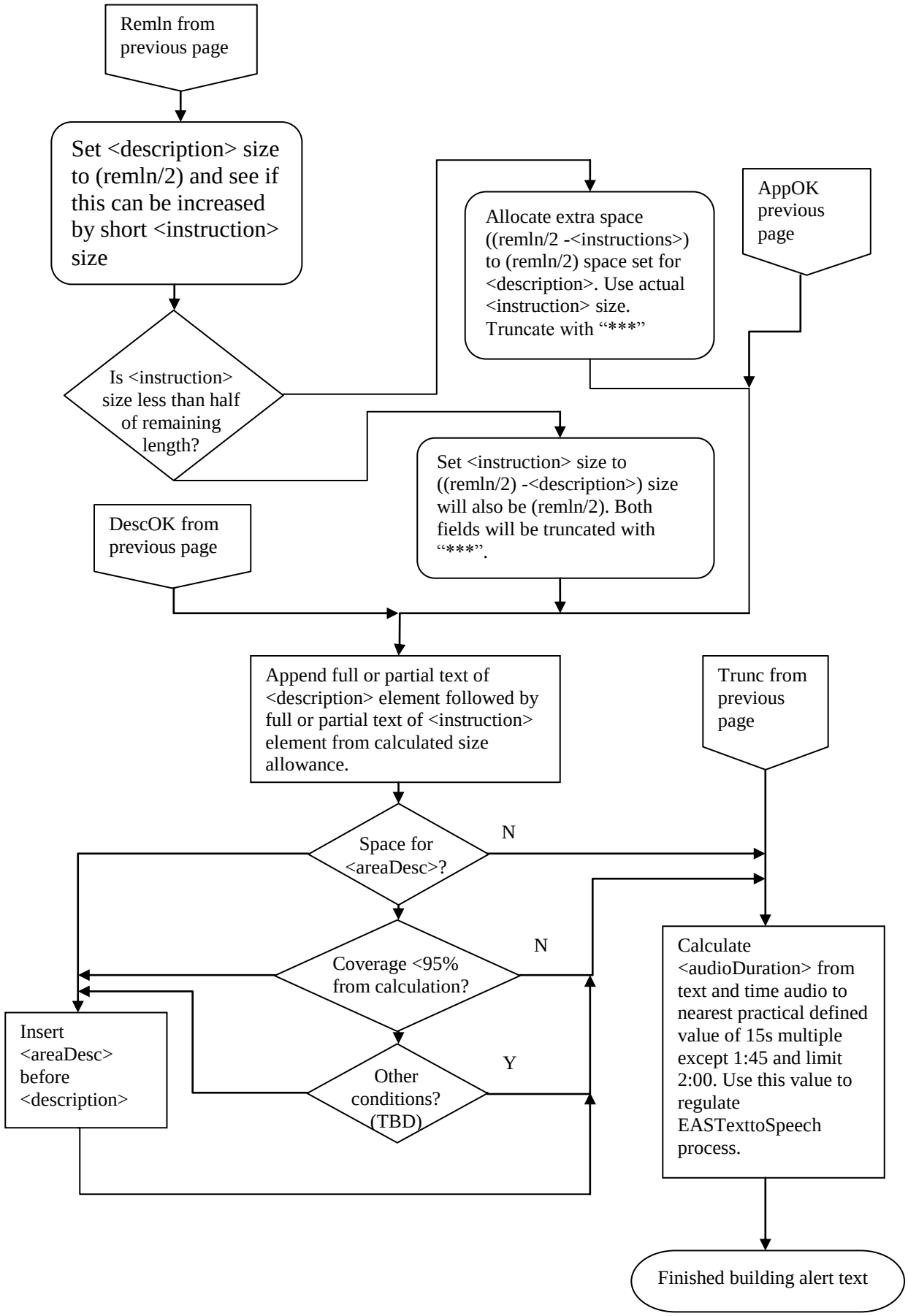
The limit for the text display is 1800 characters. This includes the FCC required text string and the Sender. Obviously, the amount of space left available after rendering the FCC required text will vary in every instance of alert text construction. If the combined size of the <description> and <instruction> 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
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

This calculation cannot be performed until the whole message is received so as to have a character count. In a highest priority message, the algorithm SHALL be to count the applicable characters and truncate at the end of the word before with "…".

Alert Text Processing Diagram Figure 5 on next page


START
Type?
EDXL-DE, CAP Broadcast
EAS+
EDXL-DE text processing (not covered here)
This decisionmaking process could be performed in a separate thread
Is alert over 95% of coverage area excluding sizeable rivers, lakes and the sea?
N
Y
EAS
N
Earthquake EQW?
Y
Omit <areaDesc> in public text
Logic Process
Text Process
Alert text starts empty
Begin with word "EARTHQUAKE" only
Is standard FCC EAS Text string required?
Y
Build or append text with FCC required EAS Text string. Total text limit is 1800 public characters. Counting described elsewhere.
<1800
N
Truncate at last word with "***"
Is special <parameter><valueName> EASText present in the CAP message?
Y
Initialize or Append text string value of EASText element. Total public text limit is 1800 characters. Counting described elsewhere.
<1800
N
Truncate at last word with "***"
Optional step; Is <senderName> present and deemed displayable?
Y
Append "Message from " and full or partial text of <senderName>. Total public text limit is 1800 characters. Counting described elsewhere.
<1800
N
Truncate at last word with "***"
Calculate remaining length (remln) on difference between 1800 and used public text limit.
Is <description> size less than (remln)/2?
Y
N
Remln next page
Allocate extra space <remln - <description>size) to space for <instruction>. Use current <description> size. Truncate with "***"
DescOK next page
AppOK next page
Trunc next page


Remln from previous page
Set <description> size to (remln/2) and see if this can be increased by short <instruction> size
Is <instruction> size less than half of remaining length?
Allocate extra space ((remln/2 -<instructions>) to (remln/2) space set for <description>. Use actual <instruction> size. Truncate with "***"
AppOK previous page
Set <instruction> size to ((remln/2) -<description>) size will also be (remln/2). Both fields will be truncated with "***".
DescOK from previous page
Append full or partial text of <description> element followed by full or partial text of <instruction> element from calculated size allowance.
Trunc from previous page
Space for <areaDesc>?
N
Coverage <95% from calculation?
N
Insert <areaDesc> before <description>
Other conditions? (TBD)
Y
Calculate <audioDuration> from text and time audio to nearest practical defined value of 15s multiple except 1:45 and limit 2:00. Use this value to regulate EASTexttoSpeech process.
Finished building alert text

3.6.4.5 RECOMMENDED Maximum Human Text Message Length

Based on Mental Noise Theory, the RECOMMENDED maximum length for messages is to use the 3-3-30 rule. This means to convey no more than three main points in three sentences with a maximum of 30 words. In an emergency situation, people will not likely remember additional items. A RECOMMENDED item for alert messages is to tell people to avoid using the phone or cellphone. This is to avoid "tying up the lines" or creating congestion on the network so important messages can go through. This SHOULD therefore be a middle sentence item.

As current alert messages usually have a description of the location that the message is intended for, this is information that can be phased out as the selectivity of the system is improved, so helping reduce the message duration.

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, the following guidelines, rules, and comments are offered.
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 SHALL refer to the same alert, and SHALL contain the same content, in the coded fields, such as, <category>, <responseType>, <urgency>, <severity>, etc. The <info> block SHALL 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 SHALL 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:
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, SHALL 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.

See Language in Section II. In brief, the language(s) are identified in the header. On digital TV all the four (maximum) languages are aired simultaneously, but on HD radio they are aired sequentially, with the language identifier and text data for the language text transmission started 100 ms +/- 40 ms before the language audio. Audio for unused languages SHALL be AES mute.

3.8 CAP/EAS msgType handling

3.8.1 Alert

The message is always processed.

3.8.2 Update

The CAP/EAS device SHALL 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 SHALL be sent if any EAS headers have been sent. If the message is halted, it SHALL 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 SHALL 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 to the public. 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 or audio). Similarly, messages with "exercise" or "draft" <status> will NOT be forwarded for purposes of EAS activation to the public. Private mode forwarding MAY occur in EAS+.

Therefore, for purposes of EAS activation, EAS test messages (RMT and RWT) SHOULD have a <status> of "ACTUAL". RMT messages – the only EAS test message to commonly go over the air – SHALL have an "ACTUAL" <status> to do so. To avoid confusion in the EAS domain, the best choice appears to be to not to give RMT (and the other EAS test codes, such as RWT, DMO, NPT, NMN) a special status by deviating from the <status> element of "ACTUAL" for normal use. To reach the public, i.e. to go over the air, the status SHALL be "ACTUAL". In EAS+, the <status> MAY be "TEST" for these messages, however the message will then be transmitted in private mode. Such messages SHALL NOT be transmitted over analog EAS. Also the <status> "EXERCISE" SHALL NOT result in public receivers receiving the message, though the selectivity MAY select First Responders as the receiver type. Such messages SHALL NOT be transmitted over analog EAS.

If a message is not transmitted to the public as audio, the corresponding text message SHALL NOT be displayed in the crawl.

The indication of the <*status*> in the header is given by the following;
The - before EEE is bit "1" below and is the 2nd hyphen, and SHALL be used as below.

Binary 00101101 normal hyphen
Binary 10101101 Soft hyphen, bit 1 below
The - after EEE is bit "0" below and is the 3rd hyphen, and SHALL be used as below.
Binary 00101101 normal hyphen
Binary 10101101 Soft hyphen, bit 0 below
1 0 which bit from above
00 ACTUAL
01 EXERCISE
10 TEST
11 reserved

To avoid confusion in the CAP domain, it is recommend that originators use the following CAP fields for EAS on air tests: In Section II the following four statuses are allowed other values.
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 SHALL NOT place that alert on the air to the public. It SHALL log it, but SHALL 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 the older CAP protocol version omitted here

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 SHALL NOT be relayed automatically". Additional complications arise if an alert is received in both the CAP and the EAS domains. [5]
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.[5]

5 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.

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. However as EAS+ adds the CAP <identifier> AND <sender>, and EDXL-DE <distributionID> AND <senderID>, this is not possible.
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. As there are error checking methods, it is possible to determine this and sometimes correct errors when both messages have different errors. The system is free to optionally allow an operator to determine which is best. Only one of the duplicate alerts or the most error free version 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 SHALL 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 SHALL NOT automatically air both. It is 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. However with EAS+ this is permitted if the CAP <identifier> AND <sender>, or EDXL-DE <distributionID> AND <senderID> is identical.

4 Notes for Originators and Origination Software

Originators of CAP alerts that will trigger the EAS system SHALL provide all the information required for use within the IPAWS system and SHALL 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 SHALL be provided.
2) A SAME event code SHALL be provided.
3) At least one <geocode> with value name of SAME SHALL 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 transmitted. The <geocode> may contain <circle>, in which case this shall be translated to a 32 point polygon. Multiple circles and polygons may be in the <geocode>, but they SHALL be combined to an equivalent 32 point maximum polygon. If the resulting polygon intersects the broadcast coverage area, then the alert MAY be broadcast to the public providing other relevant criteria are met. If the alert is from an authorized source for the destination, then the message otherwise SHALL be transmitted in the private mode if the destination is in a county or sector of the state where there are receiving encoder/decoders tuned to this station as per the state plan.
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 may be 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. In future, the location information in <description> MAY be reduced or removed as the selectivity of location in practical implementation becomes effective.
7) The total length of the text message SHALL 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. For TV use, 48 kHz 16 bit mono audio is also accepted as other formats would have to be converted to this format.
9) EAS messages will be aired to the public only if the scope is Public.
10) EAS messages will be aired to the public 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 to the public if the status is "Actual", for example, if a CAP system is to generate a Required Monthly Test in an area, the status SHALL be Actual. To avoid other CAP users from treating an RMT as an actual event, it is 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
12) 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 in EAS. However in EAS+, the <identifier> AND <sender> of the message is included, and when the <references> refer to an alert that has not yet aired, then the Cancel message SHALL result in the alert cancellation.

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

5.1 Anatomy of an EAS compatible CAP Alert Hazardous Materials Warning

Key: Violet: CAP 1.2 and EAS+CAP required, Red: CAP 1.2 required and EAS+CAP optional or not used, Blue: CAP 1.2 optional but EAS+CAP required, Dk Yellow: CAP 1.2/EAS+CAP conditionally required, Green: optional for both

<?xml version="1.0" encoding="UTF-8"?>	<- Standard xml header
<alert xmlns="urn:oasis:names:tc:emergency:cap:1.2">	<- The required alert tag with attributes
<identifier>EASCAP-14-20090311173400</identifier>	<- Unique CAP message identifier>
<sender>testcap.com@100.0.0.101</sender>	<-CAP message sender s name
<sent>2009-03-11T17:34:00-6:00</sent>	<-sent time value. This encodes the start time of the alert,
<status>Actual</status>	<-CAP message status. See CAP 1.2 reference.
<msgType>Alert</msgType>	<-CAP message type. See CAP 1.2 reference.
<source>EASAUTH</source>	<-source sender. See CAP 1.2 reference.
<scope>Public</scope>	<-scope of alert. See CAP 1.2 reference.
<code>IPAWSv1.0</code>	<-IPAWS compliant CAP message
<info>	<- start of single info block
<event>HAZARDOUS MATERIALS WARNING</event>	<- Event name. Textual label naming the alert
<category>Safety</category>	<- Event category. See CAP 1.2 reference

<urgency>Immediate</urgency> <severity>Severe</severity> <certainty>Unknown</certainty> <audience>All</audience> <senderName>CAP alert central</senderName> <expires>2009-03-11T18:34:00-6:00</expires> <parameter> <valueName>EAS-ORG</valueName> <value>CIV</value> </parameter> <eventCode> <valueName>SAME</valueName> <value>HMW</value> </eventCode> <area>	<- Event urgency. See CAP 1.2 reference <- Event severity. See CAP 1.2 reference <- Event certainty. See CAP 1.2 reference <- Event audience. See CAP 1.2 reference <- Name of sender. <- Expiration time of the alert. For non-IPAWS, if not provided then it is defaulted to be 1 hour after <sent> time. <- Special parameter, unique to EAS CAP messages, to specify the EAS ORG code. Required for IPAWS compliance. For non-IPAWS, if not provided, may default EAS ORG code to CIV. <- Alert event code to identify type of alert. <- the valueName field allows any encoding scheme. SAME is the only scheme compatible with EAS. <- Start of area block. Can have multiple geocode blocks.
<areaDesc>Downtown Washington, DC and District of Columbia</areaDesc> <geocode> <valueName>SAME</valueName> <value>011001</value> </geocode> </area> <resource> <resourceDesc>EAS Broadcast Content </resourceDesc> <mimeType>audio/x-ipaws-audio </mimeType> <uri>http://100.0.0.101/EASCAP-14-20090311173400.mp3</uri> </resource>	<- Specific Textual description of alert area ignored <- geocode blocks. Each geocode defines one location. CAP-EAS requires SAME type FIPS codes. <- start of resource block for audio message <- resource description name <- mimeType to identify resource file format <- location of audio file on network

<headline>Hydrochloric Acid Leak Hazard Emergency</headline> <description> A dangerous chemical spill has created a hazard potentially threatening downtown Washington, DC and areas immediately south of downtown from 10:45AM until at least 11:45AM. A train derailment at 10:40AM, 1 mile south of the Capitol, has resulted in a large hydrochloric acid leak. A northerly breeze will disperse some volatile hydrogen chloride gas towards downtown Washington, DC and all areas of the capitol within 10 minutes. Crews are working now to neutralize the acid and quickly mitigate the hazard. </description> <instruction>Liquid hydrochloric acid releases toxic hydrogen chloride gas fumes. This gas is extremely irritating to the lungs and has a sharp and very irritating odor. All people south of the capitol and south of downtown Washington, DC within 1/2 mile if the railroad track, should evacuate street areas by walking steadily to the north immediately. Seek fresh air and place a dripping wet cloth over your mouth to breathe. Affected areas should be safe within one hour as the acid is neutralized and the gas disperses. Copious amounts of water can be sprayed in the air to reduce the immediate hazard. Stay tuned for further information.	<- headline element . This is a short headline style announcement for the alert. This should be compelling and very brief. Details are provided in the <description> and <instruction> fields. Not used by the ECIG profile. <- description of the alert This description provides the essential details about where the alert is, what it is and who is affected. This has 78 words and 513 letters. <- instruction for the public concerning the alert This section is designed to provide instructions to the public for eliciting a rational response and reaction to the alert. This is example is somewhat lengthy for broadcast but is to the point and provides the most immediate advice to those citizens in the area. It would translate via a text-to-speech engine quite well. This has 107 words and 633 letters. The amount of text is well within the limits of EAS broadcast systems. The total text from the three informational fields is under 1200 characters and 200 words.

</instruction>	
</info> </alert>	<- end of info block < end of CAP alert

Translation Notes:
Using Implementation Guide recommendations, this CAP alert is translated into the following EAS header
for the EAS audio activation:
Header = ZCZC-CIV-HMW-011001+0100-0702334-LLLLLLLL–
Note that the LLLLLLL station ID derivation is open. ECIG recommends using a string, up to eight characters long, assigned to the CAP to EAS translator. This is the only part of the header string that can be variable among different implementations of translators.
The CAP message translates into the following alert text:

> A CIVIL AUTHORITY HAS ISSUED A HAZARDOUS MATERIALS WARNING FOR THE FOLLOWING COUNTIES/AREAS: District of Columbia, DC; AT 5:34 PM ON MAR 11, 2009 EFFECTIVE UNTIL 6:34 PM. Message from CAP alert central. A dangerous chemical spill has created a hazard potentially threatening downtown Washington, DC and areas immediately south of downtown from 10:45AM until at least 11:45AM. A train derailment at 10:40AM, 1 mile south of the Capitol, has resulted in a large hydrochloric acid leak. A northerly breeze will disperse some volatile hydrogen chloride gas towards downtown Washington, DC and all areas of the capitol within 10 minutes. Crews are working now to neutralize the acid and quickly mitigate the hazard. Liquid hydrochloric acid releases toxic hydrogen chloride gas fumes. This gas is extremely irritating to the lungs and has a sharp and very irritating odor. All people south of the capitol and south of downtown Washington, DC within 1/2 mile if the railroad track, should evacuate street areas by walking steadily to the north immediately . Seek fresh air and place a dripping wet cloth over your mouth to breathe. Affected areas should be safe within one hour as the acid is neutralized and the gas disperses. Copious amounts of water can be sprayed in the air to reduce the immediate hazard. Stay tuned for further information.

This text could be sent to a text crawl, scroll, or paging device for broadcast. This text consists of 218 words and 1350 characters. As one can see, use of this many words provides plenty of room for informative alerting. Limiting alert information to 1800 characters is a realistic goal.

Below is a description of the exact assembly formula used.

1. Automatic translation of the FCC Part 11 so called “ZCZC”EAS warning string.

> *“A CIVIL AUTHORITY HAS ISSUED A HAZARDOUS MATERIALS WARNING FOR THE FOLLOWING COUNTIES/AREAS: District of Columbia, DC; AT 5:34 PM ON MAR 11, 2009 EFFECTIVE UNTIL 6:34 PM.”*

It is presumed that until the FCC rules otherwise, this style of automatic translation must still be included in the broadcast of the alert. This style of translation is not without it's benefit. The style provides a consistent format and serves as a useful introduction to the alert information that follows. The negative aspect of this statement is if it is redundant to other information taken from the CAP alert.

2. A sentence auto-constructed from the <senderName> element.

> *“Message from 'CAP alert central.'”*

3.The contents of the <description> element.

> *“A dangerous chemical spill has created a hazard potentially threatening downtown Washington, DC and areas immediately south ....”*

4.The contents of the <instruction> element.
“*Liquid hydrochloric acid releases toxic hydrogen chloride gas fumes. This gas is extremely irritating to the lungs...”*

Note that the space allocation algorithm did not have to be used since the size of both the <description> and <instruction> text could fit in the space remaining after using the FCC Required text and the <senderName> field. The size of the FCC Required text and the <senderName> is 205 characters. This left almost 1600 characters for the descriptive text. Note that usually there are a few more county codes in an alert, so this example is a shorter than average. But even another 200 characters allocated to the Required string would still allow for 1400 characters of descriptive text.

Other comments regarding text elements:
It is interesting to note that the informative elements of <description> and <instruction> are all optional elements. The minimally required elements are only those needed to create a basic compliant EAS message.
The cost of omission of the descriptive elements would be the lost opportunity for providing better alert details at the CAP-EAS translation node. *Note that the EAS downstream daisy chain activations will only receive the standard EAS header information. None of the enhanced descriptive information at the CAP reception node can be inserted into the EAS FSK audio transmission stream by using the basic standard EAS* transmission method.

Audio Notes:
This particular CAP example illustrates the use of an audio resource to provide the EAS alert audio voice track. The example shows the <mimeType> element that indicates that the file is an MPEG 1 MP3 file, and the <uri> element that gives the location of the alert on a network. The receiver of this CAP message can attempt to download this audio file for play out as part of the EAS alert. Other CAP messages could reference other types of audio, such as WAV files, or streaming audio such as streaming MP3. If no audio resource is given, the recommendation describes using the translated text as input to a text-to-speech engine in order to create the EAS audio voice track.

5.2 Hypothetical Test Alert: Required Monthly Test

Monthly tests are a required part of testing of the Emergency Alert System. The IPAWS CAP network could be used to activate Required Monthly Tests. Here is an example.

```
<?xml version="1.0" encoding="UTF-8"?>
<alert xmlns="urn:oasis:names:tc:emergency:cap:1.2">
<identifier>CAPNET-100-20100125130000</identifier>
<sender>laciv.com@192.168.0.210</sender>
<sent>2010-01-25T13:00:00-6:00</sent>
<status>Actual</status>
<msgType>Alert</msgType>
<source>HSTEC</source>
<scope>Public</scope>
<code>IPAWSv1.0</code>
<info>
   <event>EAS Monthly Test </event>
   <category>Safety</category>
   <urgency>Unknown</urgency>
   <severity>Minor</severity>
   <certainty>Unknown</certainty>
   <audience>All</audience>
   <senderName>Hypothetical Seattle Test Emergency Center</senderName>
   <expires>2010-01-25T14:00:00-6:00</expires>
   <parameter>
      <valueName>EAS-ORG</valueName>
      <value>CIV</value>
   </parameter>
   <eventCode>
      <valueName>SAME</valueName>
      <value>RMT</value>
   </eventCode>
   <area>
      <areaDesc> All of Island, Jefferson, Kitsap, King, Pierce, and Snohomish Counties, Washington</areaDesc>
```

```
      <geocode>
        <valueName>SAME</valueName>
        <value>053029</value>
      </geocode>
      <geocode>
        <valueName>SAME</valueName>
        <value>053031</value>
      </geocode>
      <geocode>
        <valueName>SAME</valueName>
        <value>053035</value>
      </geocode>
      <geocode>
        <valueName>SAME</valueName>
        <value>053033</value>
       </geocode>
      <geocode>
         <valueName>SAME</valueName>
         <value>053061</value>
      </geocode>
   </area>
   <headline>Required Monthly Test</headline>
   <description>This is a coordinated Monthly Test of the integrated CAP/EAS Alert system. This is only a test. Had this been
a real alert, important information would have followed. This is only a test.</description>
   <resource>
      <resourceDesc>EAS Broadcast Content</resourceDesc>
      <mimeType>audio/x-ipaws-audio </mimeType>
      <uri>http://100.0.0.111/EAS/EASaudios.wav</uri>
   </resource>
   </info>
</alert>
```

This demonstrates an actual Monthly Test of the Emergency Alert System injected via the CAP network. It is important to note that this is an actual test alert that is meant to be broadcast by EAS participants. It is not just an internal, hidden test of the CAP / EAS infrastructure. This explains why the value of the CAP <status> element is Actual rather than Test.

This CAP message translates into the following EAS header string :

ZCZC-CIV-RMT-053029-053031-053035-053033-053061+0100-0252000-LLLLLLLL

5.3 Hypothetical National Alert Notification:

CAP alerts can also be used to announce the EAS National Emergency alerts.

```
<?xml version="1.0" encoding="UTF-8"?>
<alert xmlns="urn:oasis:names:tc:emergency:cap:1.2">
<identifier>CAPNET-69-20090315165600</identifier>
<sender>natexample@example.com</sender>
<sent>2009-03-15T16:56:00-6:00</sent>
<status>Actual</status>
<msgType>Alert</msgType>
<source>DEMO</source>
<scope>Public</scope>
<code>IPAWSv1.0</code>
<info>
   <event>NATIONAL EMERGENCY ACTION NOTIFICATION</event>
   <category>Safety</category>
   <urgency>Immediate</urgency>
   <severity>Extreme</severity>
   <certainty>Unknown</certainty>
   <audience>All</audience>
   <senderName>DEMO</senderName>
   <expires>2009-03-20T16:56:00-6:00</expires>
   <parameter>
```

```
      <valueName>EAS-ORG</valueName>
      <value>PEP</value>
   </parameter>
   <eventCode>
      <valueName>SAME</valueName>
      <value>EAN</value>
   </eventCode>
   <area>
      <areaDesc>United States</areaDesc>
      <geocode>
         <valueName>SAME</valueName>
         <value>000000</value>
      </geocode>
   </area>
   <headline>National Emergency Action Notification Announcement</headline>
   <description>A state of national emergency has been declared for the United States. Listen for an important live
announcement.</description>
   <instruction>Stay tuned for further instructions.</instruction>
   <resource>
      <resourceDesc>EAS Broadcast Content</resourceDesc>
      <mimeType>audio/x-ipaws-streaming- audio</mimeType>
      <uri>http://100.0.0.111:8000/liveeas.mp3</uri>
   </resource>
   </info>
</alert>
```

This CAP message translates into the following EAS header string :
ZCZC-PEP-EAN-000000+9930-0742256-LLLLLLLLA
CAP alert announcing the dire circumstances of a National Emergency would for the most part look like any other CAP alert. The descriptive text in this example is left minimized to reduce clutter. An actual national alert message may or may not include important details in the descriptive text elements. But the earlier above examples suffice to demonstrate the use and utility of the relevant descriptive CAP elements.

The audio resource can have a very important difference in a National Alert. The EAN and EAT National alerts are designed to broadcast live (they can of course still be pre-recorded audio) from the White House to the American public. A CAP alert can reference a slightly delayed, progressively downloaded live audio stream carrying this alert message. The audio stream SHOULD be able to start from the beginning in order that none of the important message be lost. The example shows how an audio resource could be constructed to provide this reference.

Further EAN CAP alert updates can be sent later as details emerge and develop. The EAS system would automatically forward these alerts and the associated live audio.

5.4 Hypothetical National Alert Termination:

A National Emergency Action Notification would hopefully be followed eventually by a termination of the emergency. A new CAP alert could be used to announce the national emergency termination.

```
<?xml version="1.0" encoding="UTF-8"?>
<alert xmlns="urn:oasis:names:tc:emergency:cap:1.2">
<identifier>CAPNET-70-20090316160000</identifier>
<sender>natexample@example.com</sender>
<sent>2009-03-16T16:00:00-6:00</sent>
<status>Actual</status>
<msgType>Alert</msgType>
<source>DEMO</source>
<scope>Public</scope>
<code>IPAWSv1.0</code>
<info>
   <event>NATIONAL EMERGENCY ACTION TERMINATION</event>
   <category>Safety</category>
   <urgency>Immediate</urgency>
```

```
   <severity>Extreme</severity>
   <certainty>Unknown</certainty>
   <audience>All</audience>
   <senderName>DEMO</senderName>
   <expires>2009-03-16T16:26:00-6:00</expires>
   <parameter>
      <valueName>EAS-ORG</valueName>
      <value>PEP</value>
   </parameter>
   <eventCode>
      <valueName>SAME</valueName>
      <value>EAT</value>
   </eventCode>
   <area>
      <areaDesc>United States</areaDesc>
      <geocode>
         <valueName>SAME</valueName>
         <value>000000</value>
      </geocode>
   </area>
   <headline>National Emergency Action Termination Announcement</headline>
   <description>The national state of emergency has ended. Here is an important live announcement.</description>
   <instruction>Stay tuned for further instructions.</instruction>
   <resource>
      <resourceDesc>EAS Broadcast Content</resourceDesc>
      <mimeType>audio/x-ipaws-streaming-audio</mimeType>
      <uri>http://100.0.0.111:8000/liveeas.mp3</uri>
   </resource>
   </info>
</alert>
```

This CAP message translates into the following EAS header string :

ZCZC-PEP-EAT-000000+0030-0752200-LLLLLLLL

5.5 Test CAP/EAS message for the CAP IPAWS v1.0 profile

Test messages may be sent from CAP originators into the CAP/EAS translator nodes. See Section 3.9 for a discussion of CAP test messages. Here is an example:

```
<?xml version="1.0" encoding="UTF-8"?>
<alert xmlns="urn:oasis:names:tc:emergency:cap:1.2">
<identifier>CAPNET-101-20100126130000</identifier>
<sender>laciv.com@192.168.0.210</sender>
<sent>2010-01-26T13:00:00-6:00</sent>
<status>Test</status>
<msgType>Alert</msgType>
<source>HSTEC</source>
<scope>Public</scope>
<code>IPAWSv1.0</code>
<info>
   <event>CAP System Test </event>
   <category>Safety</category>
   <urgency>Unknown</urgency>
   <severity>Minor</severity>
   <certainty>Unknown</certainty>
   <audience>All</audience>
   <senderName>Hypothetical Seattle Test Emergency Center</senderName>
   <expires>2010-01-26T14:00:00-6:00</expires>
   <eventCode>
      <valueName>SAME</valueName>
      <value>ADR</value>
   </eventCode>
<parameter>
      <valueName>EAS-ORG</valueName>
      <value>CIV</value>
   </parameter>
```

```
  <area>
    <areaDesc> Island County, Washington</areaDesc>
    <geocode>
      <valueName>SAME</valueName>
      <value>053029</value>
    </geocode>
  </area>
  <headline>CAP/EAS Internal System Test</headline>
  <description>This is an internal system test of the integrated CAP/EAS Alert system. This test message is not meant to be
broadcast. This is only a system test.</description>
  </info>
</alert>
```

This demonstrates an internal system Test of the CAP/Emergency Alert System network. The value of the CAP <status> element determines if the message is Actual or a Test A test message is never meant to be broadcast into the EAS system and does not need to generate an EAS header string. Instead, it is intended to test the reception, parsing, validation, and translation of IPAWS CAP messages in the CAP/EAS reception nodes. The <eventCode> field can be anything since by definition a Test <status> message MUST NOT be broadcast. This example includes a SAME eventCode of ADR, the Administrative Message. Missing or non-conforming elements can be used to test CAP/EAS translator nodes. Translator nodes will log Test alerts and include information on the validation of the CAP/EAS message.

6 CAPtoEAS Validation Criteria

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

6.1 Introduction

Incoming CAP messages SHALL be subjected to a validation step prior to acceptance for translation to an FCC Part 11 EAS alert. The purpose of this step is to determine whether or not to continue the translation based upon basic syntax and semantic requirements. It is recommended that the EAS-CAP Decoder log any useful information about message validation.
This step does not address message authentication. The source will be trusted based upon other authentication steps taken in a different layer of the communication.

6.2 Validation Philosophy

In this document is the discussion of the rules for validation of EAS-CAP messages. There are assumed rules for basic CAP validation, “conformance rules” defined by [5], and rules defined by the EAS-CAP Industry Group.
This validation section and the Implementation Guide in general follows the OASIS IPAWS 1.0 profile conformance definitions, but notes a few differences between strict conformance to that profile and reasonable alternatives that may have application where IPAWS conformance is not required or where IPAWS may choose to change the OASIS recommendations.

6.3 Error Signaling Philosophy

We realize that EAS-CAP and EAS+CAP is a part of the larger CAP community, and that messages that are in error for EAS renderers are not necessarily errors to the CAP community. Therefore, the approach that has been taken is that there will not be a signal of signal an error unless a message is erroneous with respect to the CAPv1.2 standard.. If the message is in error only to an EAS-CAP or EAS+CAP Decoder, there SHALL be a signal of acceptance of the message, but do not act on it. The intent is that the CAP community is not subjected to what they would consider to be erroneous Error messages. See the discussion on “EAS-CAP Message Result States” below to see how this is implemented. The result states optionally involve the generation of a return CAP 1.2 message with a <msgType> element of Error or Ack. The EAS-CAP Implementation Guide does not mandate the implementation of this facility.

Furthermore, a particular [4] based CAP source may not require or accept these messages. [4] based CAP servers that accept return messages will allow an EAS-CAP Decoder a ready mechanism to support server side validation of processed alert messages. If return messages are generated, they SHALL conform to the syntax rules in section 6.6 – "EAS+CAP Message Result States". This does not infer that other methods may or may not be used in addition to or instead of the [4] based CAP Ack/Error facility. This methodology will be reviewed by the EAS-CAP Industry Group before further recommendation.

6.4 Validation Overview

The CAP-to-EAS message validation procedure described below details the minimum requirements to enforce basic message verification. Specifically, the purpose of this validation step is to:
1) reject improperly formatted, improperly constructed, or damaged CAP messages.
2) ignore messages that do not contain sufficient information for the generation of a unique EAS message as defined by [5]and/or by ECIG recommendations.
3) ignore CAP messages that are not intended for EAS translation.
Once a CAP message passes the validation step, it may be subjected to an additional set of filters that will decide if a particular alert is to be placed on the air by a particular user. This step in the process is not further addressed in this document.
The EAS+CAP validation procedure gives the order of the validation steps. The intent of the entire EASCAP Implementation is to ensure that any EAS+CAP Decoder will respond to a CAP message in the same manner– in the rendering of the message as well as error signaling. The validation order is an important part of that process.

6.4.1 CAP Required Elements

In the EAS+CAP Implementation, there is NOT a requirement that all CAP-required elements be present. It is assumed that a processing element in the chain before the EAS-CAP Decoder has verified the format of the alert, and that the authentication scheme has delivered an intact message to the EAS-CAP Decoder. Specific CAP message elements are defined by [4]as required, as shown in BOLD in Figure 6 below. A minimum subset of these elements is applicable to EAS translation, as indicated by "**" in Figure 6 below.
Not all CAP required elements are relevant to EAS translation in the manner prescribed by FCC Part 11. Therefore, the validation does not base this step upon strict adherence of a CAP message, based upon CAP required elements, to the CAP standard (though device certification may require it.) This guide requires that any element that is needed by the EAS+CAP Implementation is valid if it is present.

6.4.2 EAS+CAP Required Elements

In order to translate a CAP message into an EAS message, a small set of optional CAP elements are required. These elements have been defined in the EAS+CAP Implementation in order to guarantee consistent translation into an EAS message. These elements of the CAP message are not necessarily required as elements in CAP, but are required by EAS or EAS+ (e.g. <info>). Some elements are required for proper translation into an EAS message, and thus are included in a specific minimum set of EAS+CAP required elements.
Other elements may be considered of lesser importance. Reference [5]defined a slightly larger set of required elements. Most of these elements are matched by the ECIG recommendation. Differences between the OASIS IPAWS profile [5] and ECIG recommendations are noted in the discussions that follow.
If any of the minimum set of Required EAS compatible CAP elements are present, they are examined for validity; if any are invalid, the message is in error. If the elements are missing, and a proper EAS alert cannot be generated, the message is ignored. The rationale is that such a message may not be intended for EAS, and therefore, missing EAS elements are not considered an error condition in the non-EAS-CAP community. See the discussion in "EAS+CAP Message Result States" below to see how this is implemented.
An example of a message that is correct based on the CAP schema, but is not correct for the EAS-CAP

Implementation Guide, is an Area block that contains a <geocode> with value name of SAME but has a value not matching the format of the [3] based PSSCCC code.

6.4.3 Logging

Logging is an implementation detail for each vendor. Logging requirements for CAP messages are not yet defined by the FCC or other certification authorities. It is recommended that an EAS+CAP Decoder SHALL log all received CAP messages, along with a notation of the CAP message result states, as defined later in this document.

Figure 6: CAP v1.2 Message Structure [4] and EAS-CAP Implementation Guide Required Elements

Alert**	Info**	Resource***	Area**
	Language*** <language>		
	Event Category <category>		
	Event Type <event>		
Message ID <identifier>**	Response Type <responseType>		
Sender ID <sender>**	**Urgency <urgency>**	**Resource Description*** <resourceDesc>**	Area Description <areaDesc>
Sent Date/Time <sent>	**Severity <severity>**	**MIME Type*** <mimeType>**	Area Polygon <polygon>
Message Status <status>**	**Certainty <certainty?**	File Size <size>	Area Circle <circle>
Message Type <msgType>**	Audience <audience>	URI*** <uri>	Area Geocode** <geocode>
Source <source>	Event Code** <eventCode>	Dereferenced URI <derefUrl>	Altitude <altitude>
Scope <scope>**	Expiration Date/Time* <expires>	Digest <digest>	Ceiling <ceiling>
Info** <info>	Effective Date/Time <effective>		
Handling Code* <code>	Onset Date/Time <onset>		
Note <note>	Area** <area>		
Reference IDs <references>	Sender Name <senderName>		
Incident IDs <incidents>	Headline <headline>		
Restriction <restriction>	Event Description <description>		
Addresses <addresses>	Instructions <instructions>		
	Information URL <web>		
	Contact Info <contact>		
	Parameter* <parameter> <valueName>EAS-ORG		
	Resource <resource>		
*<elements>	Required for conformance by OASIS IPAWS,	but not strictly needed for CAP to	EAS translation.
** <elements>	Required for CAP to EAS translation		
*** <elements>	Conditionally Required		
	Elements in **BOLD**	Indicate CAP v1.2	Required elements

6.5 EAS+CAP Message Validation Procedure

Each of the following validation steps results in a new message state. The default is that the message is passed to the next verification step. The three states are Rejected, Ignored, or Accepted. The action taken in those states is the following section of this document. For information on validation of specific elements, see the notes column under the "CAP to EAS Validation Table" below.

EAS+CAP validation is performed in the following order:
1) CAP conformance.
a. Check for legal XML format.
b. There is no requirement for receivers to validate CAP messages to the CAP schema, so it is recommended that only elements required for translation to EAS be validated.
But, there may be other entities that impose message validation requirements on a CAP+EAS device. Check for the presence and validity of ALL CAP elements required by any applicable certification authority or national, state, or local authority.
c. If a message fails this step, the message SHALL be Rejected.

2) CAP / EAS validation:
a. *Minimum set of CAP Required elements:* If a CAP element that is required by CAP and is also required by the EAS-CAP Implementation Guide is missing, the message SHALL be Rejected. See Figure 6 above to determine the CAP Required and EAS Required elements.
b. *Minimum set of Required EAS compatible CAP elements*: If any of the minimum set of Required EAS compatible CAP elements are present, they are examined for validity, and if any are invalid, the message SHALL be Rejected. Validity in general means that the value is a recognized CAP or EAS+CAP Implementation value. If any of these required elements are missing, the message SHALL be Ignored. Note: A missing optional EAS+CAP element will have a default defined by the guide and is not cause for a Reject or an Ignore.

3) Acceptance:
A message that has passed the previous validation steps SHALL be Accepted. Once the message is accepted, in most implementations it will be further subjected to various EAS rendering filters to decide if the alert is to be aired by a particular user. Such filters are in the EAS rendering domain only, and are beyond the scope of this work.
Figure 7: is not reproduced here, but is combined into Fig. 1a and 1b.

B2 EAS+CAP Message Validation Procedure

Each of the following validation steps results in a new message state. The default is that the message is passed to the next verification step. The three states are Rejected, Ignored, or Accepted. The action taken in those states is the following section of this document.
For information on validation of specific elements, see the notes column under the "CAP to EAS Validation Table" below.

EAS+CAP validation is performed in the following order:
1) CAP conformance.
a) Check for legal XML format.
b) If required by rules specified by a certification authority, check for the presence and validity of ALL CAP required elements.
If a message fails this step, the message SHALL be rejected.
2) CAP / EAS validation:
a) *Minimum set of CAP Required elements:* If a CAP element that is required by CAP and is also required by the EAS+CAP Profile is missing, the message SHALL be rejected. See Figure B-1 above to determine the CAP Required and EAS Required elements.

6.6 EAS+CAP Message Result States

Based on the procedure above, the validation steps result in three states, Rejected, Ignored, or Accepted. The resulting actions that MAY be taken are described below. Returning a result provides a valuable mechanism for message validation to the sender, but note that CAP servers are not required to support this option. If the EAS+CAP Decoder does send the optional return message, it SHALL conform to the syntax rules described below. This methodology will be further reviewed before further recommendation.

Rejected:

An EAS+CAP Decoder SHALL NOT further process or render a rejected message. It MAY generate a return message and the syntax SHALL be a <msgType> of "Error", a <note> element describing the issue, and a <references> element containing the extended message identifier (in the form <*sender*>,<*identifier*>,<*sent*>) of the Rejected message.

Ignored:

An EAS+CAP Decoder SHALL NOT further process or render an ignored message. It MAY generate a return message and the syntax SHALL be a <msgType> of "Ack", a <note> of "Ignored" ("Ignored" MAY be followed by a colon (":") and a text description of the issue), and a <references> element containing the extended message identifier (in the form <*sender*>,<*identifier*>,<*sent*>) of the Ignored message.

Accepted:

An EAS+CAP Decoder MAY generate a return message and the syntax SHALL be a <msgType> of "Ack", a <note> of "Accepted", and a <references> element containing the extended message identifier (in the form <*sender*>,<*identifier*>,<*sent*>) of the Accepted message.

If the EAS-CAP Decoder places the alert on the air, it MAY generate an additional return message with a <msgType> of "Ack", a note of "Aired on" followed by the FCC Call Sign(s) of the stations(s) that the alert was sent on, and a <references> element containing the extended message identifier (in the form <*sender*>,<*identifier*>,<*sent*>) of the aired message. This may result in multiple "Ack" messages in the case where an EAS-CAP Decoder controls more than one broadcast outlet.

Timing and Interference Immunity

Analog EAS at the standard baud rate takes a significant time to transmit the header. This duration and the triple redundancy provide immunity to impulse noise. Digital TV and radio data transmission rate is much faster. Therefore when the baud rate is in excess of 2400 baud, the sections of the header SHALL be with pauses of duration of 0.25 +/- 0.05 sec minimum between starting points.

6.7 CAP to EAS+ Required Elements

Below in summary are the minimum elements required within a valid EAS-CAP or EAS+CAP message. If any of these elements is missing, the message translation to EAS SHALL be ignored; if invalid, the message SHALL be rejected.
<alert> , <identifier> , <sender> , <sent> , <status> , <msgType> , <scope>
<info> , <eventCode>
<area> , <geocode>
Note that an <info> block can be present or missing when <alert><msgType> is Cancel. Handling such a CAP message does not require CAP translation into EAS, so the <info> block is irrelevant.
In addition there are two conditional required elements if the optional <resource> element is used. If any of these elements is missing, the message SHALL be ignored; if invalid, the message SHALL be rejected.
<resourceDesc> , <mimeType>, <uri>
The OASIS IPAWS CAP/EAS profile [5] also defines three more elements that must be present in CAP messages for IPAWS conformance. These are <alert><code>, with a specific value that must contain the version string of the IPAWS profile ("IPAWSv1.0"), <info><expires>, and <info><parameter> <valueName>EAS-ORG. CAP messages that do not contain these elements do not conform to the OASIS IPAWS v1.0 profile. Strict IPAWS conformance requires rejection of CAP / EAS messages that do not contain these extra elements. The Implementation guide provides a simple method to default these values if IPAWS conformance is not required. See the second table below.

Figure 8: Minimum EAS+CAP Translation Elements

Alert**	Info**	Resource***	Area**
Message ID <identifier>**	Event Code** <eventCode>		
Sender ID <sender>**	Expiration Date/Time* <expires>	**Resource Description*** <resourceDesc>**	Area Geocode** <geocode>
Sent Date/Time <sent>	Parameter* <parameter> <valueName>EAS-ORG	**MIME Type*** <mimeType>**	
Message Status <status>**		URI*** <uri>	
Message Type <msgType>**			
Scope <scope>**			
Handling Code* <code>			
*<elements>	Required for conformance by OASIS IPAWS,	but not strictly needed for CAP to	EAS translation.
** <elements>	Required for CAP to EAS translation		
*** <elements>	Conditionally Required		
	Elements in **BOLD**	Indicate CAP v1.2	Required elements

A. Details Extracted from the EAS-CAP Profile Specification Applicable to EAS+ (full details are incorporated later).

Note: The remainder of this section is part an earlier adaptation of an earlier ECIG version, but this section is retained for additional reference information.

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. With CAP Broadcast mode, this is the CZCZ string, and EAS only devices SHOULD not further process the message.

D. An EAS+CAP Profile Decoder has extended capabilities described in SECTIONS II and V .

V. **Source of each reference used in this document:**

A. EAS-CAP Industry Group website: www eas-cap.org

B. OASIS Common Alerting Protocol (CAP) Version 1.1 Specification: www oasis-open.org/committees/download.php/15135/emergency-CAPv1.1-Corrected_DOM.pdf. This is replaced now by; http:// dosc.oasis-open.org/emergency/cap/v1.2/pr03/CAP-v1.2-PR03.pdf as a provisional CAP v1.2 document pending final approval.

C. RFC2119: www ietf.org/rfc/rfc2119.txt

D. FCC EAS Rules (CFR 47 Part 11): http:// ecfr.gpoaccess.gov/cgi/t/text/textidx?c=ecfr;sid=7ffc540bc692d9481e0439c7e8d5ed9e;rgn=div5;view=text;node=47%3A1.0.1.1.11;idno=47;cc=ecfr

E. XML 1.0 Specification: www w3.org/2001/XMLSchema

F. Date and Time + Time Zone Format used in CAP Messages:

1. “dateTime” in XML Schema Part 2, Section 3.2.7: www w3.ort/TR/xmlschema-2/#dateTime

2. ISO 8601 Specification: http:// isotc.iso.org/livelink/livelink/4021199/ISO_8601_2004_E.zip?func=doc.Fetch&nodeid=4021199

G. MP3 Licensing Information: www mp3licensing.com

VI. **Discussion:** After careful consideration, certain items were either omitted or included in this Profile document. The following is a discussion of items that the Industry Group wishes to provide background details on:

A. In the rendering of both text-to-speech and video display of EAS alerts from CAP messages, the Industry Group interprets FCC Rules Part 11.51(d) to still require the use of a sentence containing the Originator, Event, Location and the valid time period of the EAS message constructed from the EAS ZCZC Header Code, or CZCZ Header Code in the case of CAP Broadcast.

CAP to EAS+ Validation Table

R = Required; O = Optional; E = Extension; ND= Not specifically discussed in IPAWS profile, so subject to CAP constraints; NU = Not Used; U = Used; C = Conditional
***** = Items that map into the EAS ZCZC string.
CAP fields in this table:
1) Are in the EAS+CAP validation process
or
2) Have RECOMMENDED values meant to be useful to non-EAS user – in particular, those used in conjunction with the various EAS "test" messages. See the discussion on EAS Test messages elsewhere in this document.
** = Items that have non-IPAWS conformance entries in a second table.

CAP Standard Element Name and Definition	CAP 1.2/ OASIS-IPAWS 1.0 constraint	EAS+CAP Constraint for IPAWS	CAP to EAS Mapping and Validation Notes
Alert Block			
<alert> Identifies XML message as a CAP Standard message.	R/R	R	SHALL follow CAP defined syntax. SHALL be version 1.2. Example: <alert xmlns="urn:oasis:names:tc:emergency:cap:1.2">
<identifier> Each message SHALL contain a number or string uniquely identifying that message.	R/R	R	The identifier value SHALL be stored as state information for an active CAP message in the EAS-CAP Profile Decoder. SHALL be used with <sender> and <sent> to match an existing alert during <msgType> Update, Cancel, Ack, or Error.
<sender> Identifies the originator of an alert. Guaranteed by assigner to be unique globally. Can be an email address.	R/R	R	The sender value SHALL be stored as state information for an active CAP message in the EAS-CAP Profile Decoder. SHALL be used with <identifier> and <sent> to match an existing alert during <msgType> Update, Cancel, Ack, or Error.
<sent> Sent time. Format: "2007-05-24T16:49:00-07:00" = 24 MAY 2007 at 16:49 PDT	R/R	R	*****SHALL be converted to EAS **JJJHHMM** Effective Date/Time. If cannot be converted due to missing time zone or a syntax error then message SHALL be rejected. Note, higher order bits have values assigned for purposes elsewhere.
<status> Alert handling code. Possible Values: Actual, Exercise (for participants), System (internal functions), Test (all other event codes SHALL be ignored), Draft (not actionable).	R/R	R	"Actual" SHALL be used for any alert destined for EAS forwarding – including all public EAS test messages such as RWT, RWW, RMT, NPT, DMO, and NMN. "Test" MAY be used to test CAP reception and private mode only for RWT, RMT, RYT, NPT, DMO and NMN. "Exercise" SHALL generate an appropriate EAS+ message but the receiver category in <audienceType> SHALL be First Responders via digital TV or radio. Either the first responders SHOULD be notified beforehand or the message contains "Exercise". A Private Mode is also detailed later in this document. Use of the other CAP defined values is not defined yet.
<code> The IPAWS profile version string	O/R	R	According to [5], the value SHALL include the IPAWS version string "IPAWSv1.0" is defined as the initial version string value. CAP without a <code> element, or whose code value does not include any defined IPAWS version string, SHALL not be used as an IPAWS compliant CAP to IPAWS EAS or EAS+ trigger. ** See table below for non-IPAWS handling.
<msgType> Nature of alert. Possible Values: Alert, or Update, Cancel, Ack, Error. (The latter four are applied to the alert identified in <references> below, and explained in <note> below.)	R/ND	R	Valid range for values SHALL be "Alert" or "Update", or "Cancel". Messages missing <msgType> SHALL be rejected; messages with incorrectly valued <msgType> SHALL be ignored.

CAP Standard Element Name and Definition **Alert Block elements**	CAP 1.2/ OASIS-IPAWS 1.0 constraint	EAS+CAP Constraint for IPAWS	CAP to EAS Mapping and Validation Notes
<source>	R/ND	R	The source data SHALL generate an entry <source=*source*>
<scope> Intended distribution. Possible Values: Public, Restricted, Private.	R/ND	R	Messages with a value other than Public SHALL be Private mode if permitted. Public SHALL be public mode.
<restriction>	O/ND	NU	MAY be the EAS+ message category or others. If it is further restricted, then it is best that such a message is sent by CAP broadcast and not an EAS+ alert.
<addresses>	O/ND	NU	SHALL be handled as scope "Private". It is best that such a message is sent by CAP broadcast and not an EAS+ alert.
<note>	O/ND	NU	Where the msgType is "Exercise", this SHALL be inserted into the EAS+ message text following the addition <note>. If "Error" is the msgType, no EAS+ message is generated.
<references>	O/O	O	Not used directly for EAS. Used to find earlier CAP messages based on <identifier, <sender>, and <sent> in order to implement <msgType> Update and Cancel
<incidents>	O/ND	O	the EAS+ text SHALL include <incidents=*data*>. The data is the group listing naming the referent incident(s) of the alert message. If multiple incident identifiers are referenced, they SHALL be separated by whitespace. Incident names including whitespace SHALL be surrounded by double-quotes. The character count SHALL NOT add to the character count limit
Info Block elements			Only the information in the first info block will be used unless there are different languages.
<info> CAP and the EAS-CAP Implementation Guide allows multiple Info Blocks to support multiple languages. See below for Info Block elements.	O/O	C	At least one <info> block is Required for translation into EAS. A special case is <msgType> of Cancel, where no <info> block is required and no translation to EAS is needed. Multiple <info> blocks may be used to encode alert information in multiple languages. If the same language is defined for multiple <info> blocks, then only the first block SHALL be processed. Data SHALL encode data for the same alert. See below for Info Block elements.
<language> Code denoting the language the alert is in. CAP assumes "en-US" if blank.	O/O	C	Usage is defined in the detail section following. Usage is required when supporting multiple languages with multiple <info> blocks. There is a maximum of 4 languages simultaneously on digital TV.
<category>	O/ND	O	Information shall be passed, see detail section.
<event> Text denoting type of event of the alert.	R/ND	NU	Used in construction of crawl text or other visual display. See CAP Message Processing section.
<responseType>	O/ND	O	Information shall be passed, see detail section.
<urgency> Possible values: Immediate, Expected, Future, Past, Unknown	R/ND	R	For test alerts (RWT, RMT, NPT, DMO, and NMN) value SHOULD be set to *Unknown* by originator. If it is set to *Immediate*, the priority number is reduced by 1 except for priority 1 or 0. CAP to EAS+ translation details are in the detail section following. Reference [5] does not place any constraint on use of <urgency> values, but the presence of this element is REQUIRED by [4].
<severity> Possible values: Extreme, Severe, Moderate, Minor, Unknown.	R/ND	R	For test alerts (RWT, RMT, NPT, DMO, and NMN) value SHOULD be set to *Minor* by originator. CAP to EAS+ translation details are in the detail section following. Reference [5] does not place any constraint on use of <urgency> values, but the presence of this element is REQUIRED by [4].

CAP Standard Element Name and Definition **Info Block elements**	CAP 1.2/ OASIS-IPAWS 1.0 constraint	EAS+CAP Constraint for IPAWS	CAP to EAS Mapping and Validation Notes
<certainty> Possible values: Observed, Likely, Possible, Unlikely, Unknown.	R/ND	R	For test alerts (RWT, RMT, NPT, DMO, and NMN) value SHOULD be set to *Unknown* by originator. CAP to EAS+ translation details are in the detail section following. Reference [5] does not place any constraint on use of <urgency> values, but the presence of this element is REQUIRED by [4].
<status>	R/R	ND	Shall be "Actual", "Exercise" or "Test".
<audience>	O/ND	O	Information shall be passed, see detail section.
<audienceType>	NU/ND	R	See detail section following
<eventCode> System-specific code for event. Subfields <valueName> of SAME and <value> define the code, a 3 letter code.	O/R	R	*One and only one eventCode, with a valueName of SAME and a 3 letter value is required. Maps to EAS **EEE** Event Code field. Range is any uppercase alphanumeric characters. Depending upon the specific EAS-CAP Profile Decoder implementation, message validation MAY or MAY NOT validate against the FCC defined EAS codes. Provisions for state defined EEE values can be handled optionally. Example: <eventCode> <valueName>SAME</valueName> <value>CAE</value> </eventCode> If the implementation does not handle the EEE code, the message SHALL be ignored. Numerical characters are special cases used in CAP Broadcast.
<effective>	R/R	R	If this is used, it SHALL set the transmission time of the EAS+ message. Otherwise it will be immediate
<onset>	O/ND	O	Information shall be passed, see detail section following
<expires> Expiration time of the information of the alert.	O/R	R	*Used to derive **EAS Valid Time Period (TTTT)** by subtracting from <sent> to derive a duration Round the resulting duration up to next valid EAS Duration length. EAS Duration Range: If greater than 0 and less than or equal to 45 minutes, '15, 30, 45 mins' else every half hour from '1hr' to '99hrs 30 mins'. If duration is less than or equal to 0 then the message is expired and SHALL be ignored. Required for IPAWS conformance. **See table below for non-IPAWS handling errors, the message SHALL be accepted.
<senderName> Human-readable name of agency or authority.	O/O	O	Used in construction of crawl text or other visual display. See CAP Message Processing section.
<headline> Direct and actionable brief human-readable headline.	O/O	R	Used in construction of crawl text or other visual display. See CAP Message Processing section.
<description> Extended human-readable description of event.	O/O	R	Used in construction of crawl text or other visual display. See CAP Message Processing section.
<instruction> Extended human-readable RECOMMENDED action for targeted alert recipients.	O/O	R	Used in construction of crawl text or other visual display. See CAP Message Processing section.
<audioDuration>	NU/ND	R	Audio Duration for automation systems, the longest duration of the multilingual messages. Se detail section following
<repetition>	NU/ND	O	Repetition provision, see detail section following.
<web>	O/ND	O	Website for further information, further detail section follows
<contact>	O/ND	O	Contact information shall be passed as detailed later

CAP Standard Element Name and Definition **Info Block elements**	CAP 1.2/ OASIS-IPAWS 1.0 constraint	EAS+CAP Constraint for IPAWS	CAP to EAS Mapping and Validation Notes
<parameter> Any system-specific datum associated with alert.	O/E	E	EAS-CAP Profile defines three <valueName> fields: 1. **EAS-ORG (***from* [5]) *2.* **EASText** (*ECIG recommendation)* *3.* **EAS-Must-Carry** (*from* [5] *below*) **See below**
Special EAS parameter <parameter> <valueName> **EAS-ORG** </valueName> <value> EAS, CIV, WXR, or PEP </value>	O, E/O, C, E	R	*****Maps to 3 letter **EAS ORG** code. Range is; EAS, CIV, WXR, or PEP. Example <parameter> <valueName>EAS-ORG </valueName> <value>CIV </value> </parameter> Required for IPAWS profile conformance: Messages missing <parameter> <valueName>EAS-ORG SHALL be rejected. Messages with an incorrect value for EAS-ORG as defined above, SHALL be rejected. **See table below for non-IPAWS use.
Special EAS parameter. <parameter><valueName> **EASText** </valueName> <value> Originator authored alert text </value>	O, E/NU	O	*Recommended by ECIG:* If this parameter is present the value is used verbatim to construct alert text or other visual display. [5] *does not define this extension, but does include something similar for CMAS (Mobile phone alerts).*
<parameter> <valueName> **EAS-Must-Carry** </valueName> <value> TRUE </value>	O, E/O, E	O	If this parameter is present and the value is TRUE, then the CAP message has come from a state governor's office and the EAS system SHALL place the message on air according to the rules of the state plan.
<resource> CAP allows multiple Resource Blocks.	O/O	O	Multiple resource block instances allowed. See below for Resource Block elements.
<area> CAP allows multiple Area Blocks. The EAS+CAP Profile will use multiple adjacent blocks to define a single polygon. See below for Area Block elements.	O/R	R	Up to 31 area blocks only for jurisdiction selection. Note the extension of the use of P for sectors of states and a whole country. This is for message routing purposes if there is a subsequent area block that is a polygon. Circles SHALL be translated into polygons. Multiple circles and polygons SHALL be translated into one polygon. Unless the jurisdiction defined area is large, and therefore spans multiple broadcaster coverage areas, the jurisdiction area SHOULD be also translated into a polygon especially for vehicle receiver/navigation system use. The presence of more than one area block SHALL NOT cause the message to be rejected or ignored. Basic syntax example (also see below): <area> <areaDesc>Arlington, VA </areaDesc> <geocode> <valueName>SAME </valueName> <value>022292 <value>022293 </value> </geocode> </area> See below for Area Block elements.

Resource Block elements Refers to additional file with supplemental info			Only needed if audio file or stream is sent.
<resourceDesc> Human-readable description of resource, e.g. “map”, or “photo”.	C/C	C	Required if there is a **Resource Block**, e.g. mp3, wav or streaming asset. Valid value for CAP IPAWS is: “EAS Broadcast Content”
<mimeType> Identifies MIME content type describing resource.	R/R	R	Valid values for OASIS CAP IPAWS are : “audio/x-ipawsaudio", "audio/x-ipaws-streaming-audio", "video/x-ipawsvideo" and "video/x-ipaws-streaming-video" . *ECIG allows testing for the file format after download of a file deemed audio/x-ipaws-audio in order to determine if the file is WAV or MP3. ECIG recommends extension to “audio/x-ipawsaudio-wav", audio/x-ipaws-audio-mp3", etc.*
<size> Approximate size of resource file in bytes.	O/O	O	
<uri> Hyperlink to the resource file; URL on the Internet, or reference to <derefUri> location within the message.	O/O	C	Needed if alert data is referenced. Required if <info><resource> is present.
<derefUri> The actual resource file data, if sent within the message. Data is sent as Base64 ASCII.	C/C	C	Needed if alert data is sent within message. *ECIG does not recommend using this feature to send multimedia resource data within CAP, due to the enormous expansion of the CAP file length. This method has use in a system where only the CAP message can be sent and received.*
<digest> Digital digest “hash” code	O/O	O	

CAP Standard Element Name and Definition **Area Block elements** CAP permits more than one.	CAP 1.2/ OASIS-IPAWS 1.0 constraint	EAS+CAP Constraint for IPAWS	CAP to EAS Mapping and Validation Notes
<areaDesc> Text describing the affected area. Example: <areaDesc>Fifth Street overpass</areaDesc>	R/ND	C	Used in construction of crawl text or other visual display. See CAP Message Processing section. Example: <areaDesc>Contra Costa</areaDesc> ECIG does NOT recommend using this field in construction of alert text or other visual display. Originators SHOULD include pertinent area information in the <description> or <instruction> fields. EAS encoded areas are taken from SAME FIPS <area><geocode> list. Reference [5] does not place any constraint on use of <areaDesc> values, but the presence of this element is REQUIRED by [4].
<geocode> Any geographically-based code to describe target area. valueName = user-defined domain of code. value = string denoting the value itself.	O/R	R	*****At least one <geocode> with <valueName> of SAME (IPAWS conformance requires "SAME". **See table below for non-IPAWS use.) and one <value> string representing the 6-digit EAS Location code must be defined. The location code must be constructed as defined in CFR 47 Part 11, that is a 5-digit **FIPS** code and a leading digit indicating no subdivision or the 1/9th area sub-division (6 total digits). Each one maps to one EAS Location Code defined as **PSSCCC.** Up to 31 geocodes SHALL be placed into the EAS ZCZC string in the order that they are encountered in the CAP message. This is required to allow duplicate EAS messages to be detected. Example of <geocode> <geocode> <valueName>SAME </valueName> <value>006013 <value>006014 </value> </geocode> A message with no geocodes, or a message with geocodes but an invalid valueName SHALL be ignored. A message with a valid valueName where the value is not in PSSCCC format SHALL be rejected. [5] has also defined the <geocode> <value> of 000000 as referring to all of the United States and US Territories. As of this writing the FCC has not adopted this code for Part 11.
<circle> A circle on spherical surface	O/O	NU	Circles SHALL be translated to polygons using rhumb lines. Radii normally kiloyards or km.
<polygon>	O/O	O	Polygons MAY have up to 32 points and use rhumb lines.
<altitude>	O/O	O	MAY be up to 99999 (feet) or 99999.9m
<ceiling>	O/O	O	MAY be up to 99999 (feet) or 99999.9m
<vehicle>	NU/ND	O	Vehicle data information group, see detail section following.
<vehicleGroup>	NU/ND	O	AMBER, other values not defined but SHOULD be passed
<Identity-plate-origin>	NU/ND	O	The State, Province or Country issuing the vehicleID
<vehicleID>	NU/ND	O	The Vehicle ID or number plate, VIN if no plate on.

Non-IPAWS compliant element handling in the CAP to EAS Validation Table

CAP fields in this table are required by IPAWS but may have different constraints outside of an IPAWS system.

CAP Standard Element Name and Definition	CAP 1.2/ OASIS-IPAWS 1.0 Constraint	EAS+CAP I.G. Constraint For IPAWS	CAP to EAS Mapping and Validation Notes
<code> The IPAWS profile version string	O/R	R	According to [5], the value SHALL include the IPAWS version string "IPAWSv1.0" is defined as the initial version string value. CAP without a <code> element, or whose code value does not include any defined IPAWS version string, SHALL not be used as an IPAWS compliant CAP to IPAWS EAS or EAS+ trigger. CAP without a <code> element, or whose code value does not include any defined IPAWS version string, SHALL not be used as an IPAWS compliant CAP to IPAWS EAS or EAS+ trigger except that it SHALL pass when in a CAP or EDXL-DE message when the <status> is "System" and the <scope> is "Restricted" and the <restriction> is "polygon" the data MAY be forwarded to the SAME area selected.
<alert><code> Handling code string.	O/R	C	ECIG notes that vendors may choose to offer EAS triggering of non-IPAWS messages from CAP sources, depending on Local and State emergency plans. In this case, <code> may be ignored or have a different requirement.
<alert><info><expires> Expiration time of the information of the alert.	O/R	O	***Used to derive **EAS Valid Time Period (TTTT) by subtracting from <sent>.** For non-IPAWS compliant systems, ECIG recommends that if this field is not present, the EAS-CAP Decoder SHALL assume that the expired time is one hour greater than the value in the <sent> element, and the value of the EAS Valid Time Period SHALL be 0100, and if there are no other errors, the message SHALL be accepted.
Special EAS parameter. <alert><info> <parameter> <valueName> **EAS-ORG** </valueName> <value> EAS, CIV, WXR, or PEP </value>	O, E/O, C, E	O	***Maps to 3 letter **EAS ORG** code. For non-IPAWS compliant systems, ECIG recommends messages missing <parameter> <valueName>EAS-ORG SHALL assume that the originator is CIV, and if there are not other errors, the message SHALL be accepted.
<alert><info><area><geocode> valueName = user-defined domain of code. value = string denoting the value itself.	O/R	R	* Each one maps to one EAS Location Code defined as **PSSCCC.** Non-IPAWS conforming systems may also use the value "FIPS6" for <valueName>.
<plume>	ND/NU	NU	Plume modeling is yet to be defined as a standard item, but is relevant to this use, so the data should be passed as <<plume> <plumeDescription> *plumeDescription* <plumeParameter1> *plumeParameter1* <plumeValue1>*plumeValue1* <plumeUnits1>*plumeUnits1* <plumeParameter2> *plumeParameter2* <plumeValue2>*plumeValue2* <plumeUnits2>*plumeUnits2* <plumeParameter3> *plumeParameter3* <plumeValue3>*plumeValue3* <plumeUnits3>*plumeUnits3*

SECTION II

CAP V1.2

2.3.5 Repudiating a False Alarm. Such a CAP message can result in either a Statement of the appropriate type for the original message, or a FAW (False Alarm Warning), which is an EAS+ event code that is not in EAS currently.

Unless otherwise stated, the CAP message received and the EAS+ message(s) SHALL be logged and emailed to the QC recipient. Whether the originator SHOULD by default send the email with a read receipt required is a matter to consider. This is to automatically confirm the receipt of the email by the receiving application. If such a receipt is required, but not received within 30 minutes, the email SHALL be retransmitted. If the QC email recipient application receives an email with a read receipt required, it SHALL send such a receipt.

EAS+ is not assuming any formatting capabilities of the output device. Longer lines than the display width SHALL either scroll horizontally or start a new line if [CR][LF] are present in the main text. Any <content [CR][LF] content> shall ignore everything inside and including <> for the output display.

Terminology

The key words “SHALL”, “SHALL NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” in this document are to be interpreted as described in **[RFC2119]**.

The words *warning*, *alert* and *notification* are used interchangeably throughout this document. The term “coordinate pair” is used in this document to refer to a comma-delimited pair of decimal values describing a geospatial location in degrees, unprojected, in the form “[latitude],[longitude]”. Latitudes in the Southern Hemisphere and longitudes in the Western Hemisphere are signed negative by means of a leading dash. While this is the CAP and EDXL-DE standard, the EAS+ format SHALL be using N, E, for + and S, W, for -. A means altitude and C means ceiling.

Normative References

[RFC2119]	S. Bradner, *Key words for use in RFCs to Indicate Requirement Levels*, http:// www ietf.org/rfc/rfc2119.txt, IETF RFC 2119, March 1997.
[dateTime]	N. Freed, XML Schema Part 2: Datatypes Second Edition, http:// www w3.org/TR/xmlschema-2/#dateTime, W3C REC-xmlschema-2, October 2004.
[FIPS 180-2]	National Institute for Standards and Technology, Secure Hash Standard, http:// csrc.nist.gov/publications/fips/fips180-2/fips180-2withchangenotice.pdf, August 2002.
[namespaces]	T. Bray, Namespaces in XML, http:// www w3.org/TR/REC-xml-names/, W3C REC-xml-names-19990114, January 1999.
[RFC2046]	N. Freed, Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types, http:// www ietf.org/rfc/rfc2046.txt, IETF RFC 2046, November 1996.
[RFC3066]	H. Alvestrand, Tags for the Identification of Languages, http:// www ietf.org/rfc/rfc3066.txt, IETF RFC 3066, January 2001.
[WGS 84]	National Geospatial Intelligence Agency, Department of Defense World Geodetic System 1984, http:// earth-info.nga.mil/GandG/tr8350_2.html, NGA Technical Report TR8350.2, January 2000.
[XML 1.0]	T. Bray, Extensible Markup Language (XML) 1.0 (Third Edition), http:// www w3.org/TR/REC-xml/, W3C REC-XML-20040204, February 2004.

[XMLSIG]	Eastlake, D., Reagle, J. and Solo, D. (editors), *XML-Signature Syntax and Processing*, http:// www w3.org/TR/2002/REC-xmldsig-core-20020212/, W3C Recommendation, February 2002.
[IEEE 1512]	IEEE 1512 standard modules for Computer Aided Dispatch
[ISO 8859-1]	ISO ASCII set, expanded from Microsoft Windows Latin-1.
[ISO 10646-1]	ISO Unicode
[ITU-T X.680]	ITU-T Recommendation X.680, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation*.
[ITU-T X.691]	ITU-T Recommendation X.691, *Information technology – ASN.1 encoding rules: Specification of Packed Encoding Rules (PER)*.
[ITU-T X.693]	ITU-T Recommendation X.693, Information technology – *ASN.1 encoding rules: Specification of XML Encoding Rules (XER)*.
[ITU-T X.694]	ITU-T Recommendation X.694, *Information technology – ASN.1 encoding rules: Mapping W3C XML schema definitions into ASN.1*.
[Oasis-fp6]	Oasis-fp6.org Tactical Situation Objects.

3.2.1 "alert" Element and Sub-elements

alert; This SHALL follow CAP defined syntax, and SHALL be required for an EAS+ message to be generated.

identifier; This identifier SHALL be stored as state information for an active CAP message in the EAS+CAP Profile Decoder. This SHALL be used with <sender> and <sent> to match an existing alert during <msgType> Update, Cancel, Ack or Error. This identifier SHALL be logged and the corresponding EAS+ message(s) generated logged. This log entry SHALL be emailed to the QC monitoring. An EAS+ message SHALL have a unique header code. The identifier SHALL NOT include spaces, commas or the restricted characters < or &. The EAS+ text SHALL include <identifier=*identifier*>. All text including and within the < and > characters SHALL NOT be displayed on consumer receivers. This display constraint SHALL apply to all instances, not just this example. Any text including and within the < and > SHALL NOT be added to the character count limit.

sender; The sender value SHALL be stored as state information for an active CAP message in the EAS+CAP Profile Decoder. The sender value SHALL be used with <identifier> and <sent> to match an existing alert during <msgType> Update, Cancel, Ack or Error. The sender SHOULD be identified by the corresponding EAS+ identifier code. If a code is not listed, this SHALL result in either an EAS+ identifier code being added or the EAS+ message not being sent. A manual selection of the call sign of the radio/TV/cable/telco for other unlisted senders in the ENCODER/DECODER SHALL be permitted. The sender is a unique identifier e.g. an email address. As the LLLLLLLL identifier code is limited, if the sender is not uniquely and obviously identified, the string <sender=*sender*> SHALL be added to the text.

sent; The CAP date and time SHALL be converted to the corresponding -JJJHHMM Julian day and UTC time. **dateTimeSent**; For the EAS+ messages the local time offset is not included, so this shall be added to the text as <timeOffset=*timeOffset*>. If it cannot be converter due to missing time zone or a syntax error, then the message SHALL be rejected

status; "Actual" SHALL generate an appropriate EAS+ message, including all public EAS and EAS+ test messages such as RWT, RWW, RMT, RYT, NPT, DMO and NMN.

"Exercise" SHALL generate an appropriate EAS+ message but the receiver category in <audienceType> SHALL be First Responders via digital TV or radio. Either the first responders SHOULD be notified beforehand or the message contains "Exercise". A Private Mode is also detailed later in this document.

"System" These SHALL be logged, emailed to QC, and brought to the attention of ENCODER/DECODER operators. NMN activation code MAY apply. See also code below.

"Test" EAS+ has DMO, RWT, RMT, RYT and NPT which with this status SHALL be sent in private mode. RYT SHALL go to the public, NPT can be digital and not result in a message from a receiver.

"Draft" These SHALL be ignored.

code; SHALL be logged, and emailed. This item SHALL be passed in the form <code=*code*> when it is in an EAS+ alert. According to [5], the value SHALL include the IPAWS version string “IPAWSv1.0” is defined as the initial version string value. CAP without a <code> element, or whose code value does not include any defined IPAWS version string, SHALL not be used as an IPAWS compliant CAP to IPAWS EAS or EAS+ trigger except that it SHALL pass when in a CAP or EDXL-DE message when the <eventCode> is “TXT”, the <status> is “System”, the <scope> is “Restricted” and the <restriction> is “polygon” the data SHALL be forwarded to the SAME area selected.

msgType; "Alert" and "Update" SHALL generate appropriate EAS+ messages.

"Cancel" SHALL cancel the message(s) in <identifier> unless the eventCode is FAW in which case it SHALL generate a FAW, false alarm warning.

"Error" SHALL be logged only and emailed to QC only.

"Ack" SHALL be logged and emailed to QC only, unless used to acknowledge. Messages missing <msgType> SHALL be rejected; messages with incorrectly valued <msgType> SHALL be ignored.

source; The sender is handled as above, the source data SHALL generate an entry <source=*source*>.

scope; "Public" SHALL generate a Public category EAS+ message.

"Restricted" SHALL generate an appropriate EAS+ message category where one exists, or SHALL be logged, emailed to QC, and brought to the attention of the ENCODER/DECODER operator only. Details of the restriction are next in “restriction”.

"Private" SHALL be logged and emailed to QC only. This is not to be confused with the private mode of EAS+

restriction; MAY be the EAS+ message category or others. If it is further restricted, then it is best that such a message is sent by CAP broadcast and not an EAS+ alert.

addresses; SHALL be handled as scope "Private". It is best that such a message is sent by CAP broadcast and not an EAS+ alert.

note; where the msgType is "Exercise", this SHALL be inserted into the EAS+ message text following the addition <note>. If "Error" is the msgType, no EAS+ message is generated.

references; SHALL be logged and emailed to QC. Not used directly for EAS or EAS+. Used to find earlier CAP messages based on <identifier, <sender>, and <sent> in order to implement <msgType> Update and Cancel
incidents; SHALL be logged and emailed to QC. Also the EAS+ text SHALL include <incidents=*data*>. The data is the group listing naming the referent incident(s) of the alert message. If multiple incident identifiers are referenced, they SHALL be separated by whitespace. Incident names including whitespace SHALL be surrounded by double-quotes. The character count SHALL NOT add to the character count limit.

3.2.2 "info" Element and Sub-elements

info; At least one <info> block is Required for translation into EAS. A special case is <msgType> of Cancel, where no <info> block is required and no translation to EAS is needed. Multiple <info> blocks may be used to encode alert information in multiple languages. If the same language is defined for multiple <info> blocks, then only the first block SHALL be processed. Data SHALL encode data for the same alert.
See below for Info Block elements (1) Multiple occurrences are permitted within a single <alert>. If targeting of multiple <info> blocks in the same language overlaps, information in later blocks MAY expand but MAY NOT override the corresponding values in earlier ones. Each set of <info> blocks containing the same language identifier SHALL be treated as a separate sequence. This text SHALL be included in the EAS+ message text as <info>.

(2) In addition to the specified sub-elements, MAY contain one or more <resource> blocks and/or one or more <area> blocks which SHALL be handled as per the appropriate section following.

language; A language selection scheme is defined within the constraints of the EAS protocol, and translation between RFC 3066 is either achievable or it is a single nation language and can be handled by the Unicode standard. The details are in the EAS+ documentation. If this is not specified, then "en-US" SHALL be assumed
-JJJHHMM-. This header code block identifies the Julian calendar date and the time the message was originally disseminated in hours and minutes using the 24-hour Universal Time Coordinated (UTC) clock.

An implication of the New Orleans experience of EAS performance is the desirability to be able to carry different languages. Also an implication of specific message coding is to be able to select appropriate language messages by different users. This means that language identification SHOULD be in the EAS header. While the header has everything assigned, a redefinition is proposed for the first J of JJJ, the Julian calendar day of the year. This J at present can only have the ASCII values of 0, 1, 2 or 3. So the proposal is to keep this the same for English. The date only requires the last two bits. So use the first six bits as follows

Binary 000000 Octal 00 Use for National or local language, ASCII 8 bit. “Local1”
Binary 000001 Octal 01 Use for National or local language, Unicode extended data after Lat-Long. “Local1”

Binary 000010 Octal 02
To To be assigned to multi-country or major languages, 10 codes
Binary 001011 Octal 13

Binary 001100 Octal 14 English
Binary 001101 Octal 15 Spanish
Binary 001110 Octal 16 French

Binary 001111 Octal 17
To To be assigned to multi-country or major languages, 17 codes

Binary 011111 Octal 37

Hexadecimal 0x80
To Reserved to keep 7 bit ASCII format
Hexadecimal 0xFF

These characters will read as ASCII "0", "1", "2", "3" for English, "4", "5", "6", "7" for Spanish (i.e. subtract 4 for the date value). "8", "9", ":", ";" for French as the date hundreds change. The rest are more difficult and not a current concern for the U.S. EAS system. However a few examples of multi-country languages are:
German is the language of Germany, Austria and Switzerland, so it needs a code.
Korean is the language of the Republic of Korea and the Democratic Peoples' Republic of Korea, so it needs a code as it is multi-country.
Chinese has many languages/dialects with one writing system. It is used widely in Singapore for example. So to provide the local language option for another spoken language, Chinese needs a code.
Russian and Arabic are multi-country languages. Japanese is an important language, and they have an extensive alert system also.
Latin is the international language of botany and zoology, so it needs a code.
Esperanto is neither a national or local language, but it is an official language of the U.N. so it needs a code.
Greek is an historical language and is used in more than one country, so it needs a code.

As Unicode has been proposed, perhaps the languages can be grouped into those that would use extended ASCII and those that would use Unicode for the extended data. However U.S. ASCII SHALL be the basis for the header code e.g. event codes, originators, etc. unless otherwise specified later.
The first H SHALL have the first 6 bits defined with a default of 001100 and reserved with the last two bits used for tens hour value. The second H SHALL have the first 4 bits defined with a default value of 0011 and reserved with the last four bits used for units hour value. The first M SHALL have the first 5 bits defined with a default of 00110 and reserved with the last three bits used for the tens minutes value. The second M SHALL have the first 4 bits defined with a default of 0011 and reserved with the last four bits used for the units minutes value. If Unicode is mixed with ASCII in the text, the start delimiter SHALL be =?. The exit of the Unicode mode appears to be defined by ISO 2022 and 6049 as ?=. This SHALL be done before the pause and end of the message.

Multiple languages MAY be used on radio and TV. The bandwidth of TV permits a maximum of four AES streams, therefore with two, four mono languages to be transmitted simultaneously, or in parallel. As legacy TVs will not distinguish languages, they SHALL still be in serial for the interim. Dolby Digital MAY provide a solution for legacy TVs. The limited bandwidth of HD radio would only permit one language after the other, or in serial mode. The identification of the language 1 is as above. The other languages are indicated as below;

+TTTT-. This header code block identifies the PURGE time of the message expressed in a delta time from the issue time in 15-minute segments up to one hour. Then in 30 minutes segments beyond one hour up to six hours; i.e. **+0015-, +0030-, +0045-, +0100- +0430-, 0600-.** This delta time, when added to the issue time, specifies then the MESSAGE is no longer valid and SHOULD be purged from the system, not to be used again. It is important to note that the valid or purge time of the MESSAGE will NOT always equal the event expiration time. For most short-term events such as tornadoes and severe thunderstorms, the two times will most often be identical. For longer duration events such as a hurricane or winter storm that MAY NOT end for many hours or days, the valid time of the code only applies to that message, and is not an indicator of when the threat is over.
The TTTT SHALL be MAY be referred to as T^1, T^2, T^3, and T^4 individually.
T^1 SHALL be used to define a secondary language, as per the method for the first J following. The default SHALL be English. Where English is also the primary language, the audio message SHALL be taken from channel 1. Channel 2 SHALL be AES mute otherwise channel 2 is another secondary language.
T^3 and T^4 MAY be used to define a tertiary and quaternary language. The default SHALL be English. AES channels 3 and 4 SHALL be carrying these languages unless Dolby Digital is used. Otherwise AES mute SHALL be on those channels. The maximum value of T^3 and T^4 for purge time SHALL be 5 and 7 respectively, this uses 3 bits. The assignment of the previous bits SHALL be as follows.
Binary 01000 Octal 4+00
To Reserved
Binary 01001 Octal 4+01

Binary 01010	Octal 4+10 Local language “Local1” for T^3 , “Local2” for T^4
Binary 01011	Octal 4+11 Italian
Binary 01100	Octal 5+00 English (default value)
Binary 01101	Octal 5+01 Spanish
Binary 01110	Octal 5+10 French
Binary 01111	Octal 5+11 German
Binary 10000	
To	Reserved to keep 7 bit ASCII format.
Binary 11111	

T^2 has the first four bits set at 0110 , any other value SHALL be reserved for future use. The value of the units of hours SHALL be determined from the last four bits.

This will accommodate the Swiss situation, which has 3 official languages and also uses English.
Multiple languages MAY be used on radio and TV. The bandwidth of TV permits at least three AES streams, therefore four mono languages to be transmitted simultaneously, or in parallel. As legacy TVs will not distinguish languages, the selected language of the broadcaster SHALL be inserted into the program audio on channels 1 and 2 as left and right when stereo PCM is used. The EAS audio for all the languages shall rebroadcast on the same PID, and the program audio SHOULD be rebroadcast on another PID for the duration of the alert. When one language is being used, a third PID is not needed, but SHOULD be kept in a standard for simplicity. AES mute on all channels in the PID SHOULD result in the PID data not being transmitted. Dolby Digital MAY provide a solution for legacy TVs. The limited bandwidth of HD radio would only permit one language after the other, or in serial mode. The identification of the languages is as above. The crawl on TV or radios with text displays shall carry all language text. At a speech readable speed, this may take longer to display than the two minutes limit provided for the audio. The use of the closed captioning subsystem for crawl display also provides for the ability for the user to select larger text and slow the crawl, though this requires liaison with EIA standard 708.

In the case of radio, the indication of the language SHALL be by languages after the first having their start point indicated by <language=n> where n is 2,3 or 4 in the data transmitted 110 ms +/- 30 ms before the start of the corresponding audio. Then the text for that language SHALL follow. For TV there SHALL be no delay of the text for each language. If a recipient has selected a language that is not in the transmission, then English SHALL be selected as this is the most international language. This is except if English is not being transmitted, then language 1 SHALL be selected.

As downstream compression equipment might not be able to process the PID switching data, an audio switcher MAY be necessary. This SHALL be a device that has GPIs (General Purpose Inputs) and to provide for that the ENCODER/DECODER SHALL provide the required GPOs (General Purpose Outputs) #1 for language 1, #2 for language 2, #3 for language 3 #4 for either a) language 4 or b) video key and closed captioning relocation, #5 for case a) when it is for video key and closed captioning relocation.

category; Except for vehicle or IHS for "Transport" this is not the EAS+ receiver category which is <audienceType>. The EAS+ event codes mostly are in these categories, but EVI and EVW can be used in other categories. Comments on this are welcome. The EAS+ text SHALL include <category=*category*>. For multiple values e.g. <category=*category, category*>

event; This text SHALL be added to the EAS+ text, preceded by <event>. See later eventCode and EASText also.

responseType; "Shelter" applies to BZW,.SPW, SSA, SSW, SVA, SVR,TOA, TRA, TRW, WSA, WSW, and SHALL be included in the EAS+ message text with <responseType> Shelter <instructions> *instructions.*

"Evacuate" applies to CFA, CFW, FFA, FFW, FFS, FLA, FLW, FLS, HUA, HUW, HUS, LAS, LSW, TRA, TRW, TSA, TSW, AVA, EVI, EVW, FRW, IPW, NUW, RHW, SBA, SBW, VOW, and SHALL be included in the EAS+ message text with <responseType> Evacuate <instructions> *instructions.*

"Prepare" SHALL be included in the EAS+ message text with <responseType Prepare <instructions> *instructions*.

"Execute" SHALL be included in the EAS+ message text with <responseType> Execute <instructions> *instructions*

“Avoid” SHALL be included in the EAS+ message text with <responseType> Avoid <instructions> *instructions*.

"Monitor" SHALL be included in the EAS+ message text with <responseType> Monitor <instructions> to attend to information sources as described in *instructions*.

"Assess" SHALL NOT be used in EAS+ except for messages to first responders only.

“AllClear” SHALL be included in the EAS+ message text with <responseType> All Clear. <instructions> MAY follow with any advised follow on action.

"None" SHALL be logged and emailed to QC only.

Multiple instances of responseType MAY occur in the info block.

When an EAS+ message is generated, the **<responseType**>, **<headline>**, **<description>**, **<parameter>, <instructions>**, **<web>**, **<contact>,** <**note>, <url>,** <**event>** sections SHALL be preceded by the bold text and both <> characters. This is so that an EAS+ message is capable of being translated back into a CAP message that effectively resembles the original. This is not intended as a substitute for a CAP or DEAS network, but as a backup technology in the event of some failure of the primary technology networks. The < and > characters are special and SHALL ONLY be used for this purpose in pairs EXCEPT when followed by an = e.g. <= (less than or equal to) or >= (greater than or equal to). The <> symbols and their contents SHALL NOT be included in the message length count or displayed in the consumer electronics crawl or included in the text to speech conversion.

urgency; "Immediate" SHALL result in the assigned priority code being decreased by 1, except for priority 1. Some situations have event codes added where the only difference between the two is that two is added to the priority.

"Expected" SHALL result in a warning type event code.

"Future" SHALL result in a statement type event code.

"Past" MAY result in a statement type event code if a previous alert was transmitted.

"Unknown" SHALL result in a statement or warning type event code.

Note the NPRM on Mobile Commercial Radio "cellphones" did not provide for all the above.

severity; "Extreme"

"Severe"

"Moderate"

"Minor"

"Unknown"

certainty; "Observed"
"Likely" (p>50%)
"Possible" (p<=50%)
"Unlikely" (p~0%)
"Unknown"

status; “Actual”
“Test”
“System”
“Exercise”
“Draft”
The entry <status=*status*> SHALL be included in the text because the header version of the data does not provide for all the choices.

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 to the public. 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 or audio). Similarly, messages with “exercise” or “draft” <status> will NOT be forwarded for purposes of EAS activation to the public.
Therefore, for purposes of EAS activation, EAS test messages (RMT and RWT) SHOULD have a <status> of “ACTUAL”. RMT messages – the only EAS test message to commonly go over the air – SHALL have an “ACTUAL” <status> to do so. To avoid confusion in the EAS domain, the choice is not to give RMT (and the other EAS test codes, such as RWT, DMO, NPT, NMN) a special status by deviating from the <status> element of “ACTUAL” for normal use. To reach the public, i.e. to go over the air, the status SHALL be “ACTUAL”. In EAS+, the <status> MAY be “TEST” for these messages, however the message will then be transmitted in private mode. Such messages SHALL NOT be transmitted over analog EAS. Also the <status> “EXERCISE” SHALL NOT result in public receivers receiving the message, though the selectivity MAY select First Responders as the receiver type. Such messages SHALL NOT be transmitted over analog EAS.

If a message is not transmitted to the public as audio, the corresponding text message SHALL NOT be displayed in the crawl.

The indication of the <*status*> in the header is given by the following;
The - before EEE is the 2nd hyphen, or “1” below, and SHALL be used as below.
Binary 00101101 normal hyphen
Binary 10101101 Soft hyphen, bit 1 below
The - after EEE is the 3rd hyphen, or “0” below, and SHALL be used as below.
Binary 00101101 normal hyphen
Binary 10101101 Soft hyphen, bit 0 below
10 which bit from above
00 ACTUAL
01 EXERCISE
10 TEST
11 reserved

1) **SEVERITY, URGENCY, CERTAINTY**
SEVERITY: Allowed values; Unknown, Extreme, Severe, Moderate, Mild

Deriving this value requires processing, probably by people. This adds to the response time which MAY be unacceptable by the highest priority events. An Extreme or Severe severity will result in 1 being added to the priority, except for 1 which remains the same, and 0 which would become 9. This SHALL be encoded in the units of minutes in the header as follows, where C is the value indicating certainty below;
The last 4 bits are the units of minutes, the previous bits SHALL be used as below;
Bits 0xE000 reserved
Bits 0xE001Extreme
Bits 0xE010 Severe
Bits 0xE011 Unknown
Bits 0xE100 Moderate
Bits 0xE110 Minor (this is the only allowed value in the CAP v1.1 EAS)
Bits 0xE111 reserved
Where E is used below
URGENCY: Allowed values; Unknown, Immediate, Expected, Not urgent. (Unknown only in CAPv1.1 EAS)
In EAS+, this is the assignment of the priority of the event codes. Priority 1, 2 or 3 is for Unknown or Immediate. Priority 4,5,6 or 7 is Expected. Priorities 8,9 or 0 are Not Urgent. This is prior to the severity addition noted above.
The first 5 bits of the tens of minutes
0xCD000 reserved
0xCD001 reserved
0xCD010 Immediate
0xCD011 Expected
0xCD100 Unknown (this is the only value allowed in the FEMA CAP v1.1 EAS)
0xCD101 Past
0xCD110 Future
0xCD111 reserved
CERTAINTY: Allowed Values; Observed, Likely, Possible, Unlikely, Unknown.
C bit is 0, D bit is 0, E is 0 Observed
C bit is 0, D bit is 1, E is 0 Unknown (this is the only value allowed in the FEMA CAP v1.1 EAS),
C bit is 1, D bit is 0, E is 0 Likely (p>50%) (Very Likely in CAP v1.0)
C bit is 1, D bit is 1, E is 0 Possible (p<=50%)
C bit is 0, D bit is 0, E is 1 Unlikely (p ~ 0)
C or D is 1, and E is 1 reserved
While the detail in the codes above is not much used in EAS+ except as noted above, it is carried so that the data is present so that it can be used to generate a CAP message from an EAS+ one where such details can be critical. Although this is not a normal application, it is to provide a backup path in the event that the CAP network is disrupted.
If this proposal is inadequate as a backup requirement for transmission to towers, this can be addressed following discussion. (A possible use is that the values are such that the EAS allowed one is the default that gives ASCII numbers for the minutes, to make transition simpler.) For analog EAS, Severity Certainty and Urgency are not communicated, and the minutes only use ANSI ASCII values.
STATUS: Allowed values, Actual, Test. This is addressed by the selection of the Event Code and the transmission mode e.g. private mode for exercises described elsewhere. Actual is the only allowed value in the FEMA CAP v1.1 EAS.

In a previous submission the first M was used differently, now it SHALL be as above.

audience; If this is used, and the text corresponds to the EAS+ receiver audienceType, this SHALL be used. Otherwise unless selected elsewhere, "Public" will be selected.

audienceType: **Receiver audienceType for Additional Selectivity**

<audienceType> is not in CAP V1.2.
In addition to location, the category of the receiver can provide additional selectivity for EAS+ messages. The categories are assigned as follows;
0x000000 to

0x001011 reserved
0x001100 Public (Except First Responders, IHS)
0x001101 Vehicle receivers (including first responders and trains)
0x001110 Domestic or household receivers (business if purchased as a domestic model)
0x001111 First Responders special receivers.
0x010000 Telephone company #1 subscriber
0x010001 Telephone company #2 subscriber
0x010010 Telephone company #3 subscriber
0x010011 Telephone company #4 subscriber
0x010100 to
0x010110 reserved for other telephone or cable TV company.
0x010111 Cable TV company subscriber
0x011000 Cellphone company #1 subscriber
0x011001 Cellphone company #2 subscriber
0x011010 Cellphone company #3 subscriber
0x011011 Cellphone company #4 subscriber
0x011100 to
0x011110 reserved for other radio transmission company.
0x011111 Messaging Company (e.g. RIM) subscriber
0x100000 to
0x101011 Reserved for compatibility with 7 bit ASCII, to be for ISPs later.
0x101100 Everyone
0x101101 Intelligent Highway Signs special receivers (perhaps backup system)
0x101110 to
0x111111 Reserved for compatibility with 7 bit ASCII

CAP has an audience selection which is flexible. EAS+ has limitations, so this audienceType is a table which is implemented by the provider or manufacturer so the end user does not need to configure this.

These six bits would be applied to the bits before the last two in the tens of hours of HH in the header. The Public category would display the tens as 0, 1 or 2 in ASCII. The Vehicle category would display the tens as 4, 5 or 6 in ASCII. The Domestic category would display as the tens as 8, 9 or : in ASCII. The First Responders would display the tens as <, = or > in ASCII. The first 3 bits are defines as 001 in 8 bit ASCII. This SHALL be a category programmed into the receivers at the time of manufacturing. Only First Responders receivers MAY need configuring in this respect as they MAY be some model(s) or other receiver.

The allocation of company name to the assignments above would be on a statewide basis, with unused assignments in border counties where there are companies not present in both states.

By making this additional selectivity, then except for basic receivers which are not EAS+ compatible or compliant, the messages for other than everyone can be deselected. Vehicle receivers could be selected for AMBER ALERT messages. School weather closings could be selected for domestic receivers. Messages for First Responders could be selected by their specially coded or configured receivers. User menus could add configuration with a minimum of one choice. If more categories are needed, there are four more available.

Currently available "emergency style" receivers are basically cheap or low quality receivers with a manual generator added. They are not digital, usually not even stereo. There is a market gap for something bigger than the current mini FM receivers that can deliver louder headphone levels like a mini-boombox can and is also stereo or HD radio compatible, yet is portable and be EAS+ compatible. Disasters happen where people are, which MAY be distant from the "emergency style" receiver that is collecting dust in a closet. As power consumption reduces, digital EAS+ TVs that have emergency power source or option MAY become available before long.

These selection mechanisms might also be applicable for more targeted advertising, but the design of EAS+ is not optimized for that application. An event code of ADV with a priority of 0 would be reserved for this application. There are other mechanism(s) implemented in relevant standards that are optimized for this application. Any such advertising SHALL be restricted to the single broadcast coverage area and any cable/telco carriage. This would also apply to any broadcasters that are part of the daisy chain. This application SHOULD also be restricted to digital broadcasting.

The reason for the carrier section of the categories is primarily in case of failure of the 911 system. This way, only subscribers of the carrier with the problem will be selected to receive the message, unless there is no selectivity for that receiver.

For the First Responders and Intelligent Highway Signs categories, analog transmission of EAS+ messages is not permitted. The former is to enable privacy from the public, and to enable use of this category as part of messages sent for emergency management exercises. The latter is to avoid unnecessary EAS messages that the public receives.

eventCode; Not optional. This corresponds to the EAS+ Event Code when EAS or EAS+ is the valueName. While the NPRM for Mobile Commercial Radio Service "cellphones" proposed a very restricted set of Event Codes. In EAS+, all SHOULD be mapped to CAP, but as not all CAP alerts are intended for the public, the reverse MAY NOT apply.
1) Any system-specific code for event typing, in the form:

```
<eventCode>
  <valueName>valueName</valueName>
  <value>value</value>
</eventCode>
```

where the content of “valueName” is a user-assigned string designating the domain of the code, and the content of “value” is a string (which MAY represent a number) denoting the value itself (e.g., valueName ="SAME" and value="CEM").
(2) Values of “valueName” that are acronyms SHOULD be represented in all capital letters without periods (e.g., SAME, FIPS, ZIP).
3) Multiple instances MAY occur within an <info> block.

EAS Event Codes.

Weather-Related Events	EAS Code	Use Notes	Priority, Decoder, Authorization
Air Quality	AQA	Digital only	0, , L
Avalanche Watch	AVA		6, , L
Avalanche Warning	AVW	X	1, , L
Blizzard Warning	BZW	X	3, All, L
Coastal Flood Watch	CFA		6, , L

Coastal Flood Warning	CFW	X	3, , L
Dust Storm Warning	DSW		3, , L
Flash Flood/Lahar Watch	FFA		6, All, L
Flash Flood/Lahar Warning	FFW	X	1, All, L
Flash Flood/Lahar Statement	FFS		7, All, L
Flash Freeze Warning	FSW		4, , L
Flood, Levee/Dyke Warning	FVW		2, , L
Flood Watch	FLA		6, All, L
Flood Warning	FLW	X	3, All, L
Flood Statement	FLS		7, All, L
Fog Advisory	FOS		8, , L
Fog Warning	FOW		5, , L
Freeze Warning	FZW		6, , L
Freezing Drizzle	FZA	Digital Only	0, , L
Freezing Rain, Sleet	FZR	Digital Only	0, , L
Freezing Spray, Marine	FZS	Digital Only	5, , R
Hail Advisory	HAS		6, , L
Hail Warning	HAW		2, , L
Hazy (visibility limited)	HZW		4, , L
High Wind Watch	HWA		6, All, L
High Wind Warning	HWW	X	3, All, L
Hurricane/Cyclone Watch	HUA		6, All, R
Hurricane/Cyclone Warning	HUW	X	3, All, R
Hurricane/Cyclone Statement	HUS		7, All, R
Hurricane Local Statement	HLS		6, , L
Ice Advisory	ICS		6, , L
Iceberg Warning	IBW		5, ; L
Ice, Rapid Leads Closing	ILA	Digital Only	4, , L
Ice Pressure	IPA	Digital Only	5, , L
Ice, Special	ISA	Digital Only	6, , L
Icy Conditions Warning	ICW		3, , L
Landslide Watch	LSA		6, All, L
Landslide Warning	LSW		3, All, L
Rainstorm	RAA	Digital Only	0, , L
Severe Thunderstorm/Hail Watch	SVA		6, All, L
Severe Thunderstorm/Hail Warning	SVR	X	4, All, L
Sand/dust storm Watch	SSA		6, , L
Sand storm Warning	SSW		4, , L
Severe Weather Statement	SVS		6, All, L
Snow, Blowing	BSW	Digital Only	0, , L
Snowfall	SNA	Digital Only	0, , L
Snow Squall	WSW	X	3, , R
Special Marine Warning	SMW	X	3, , L
Special Weather Statement	SPS		4, , L
Squall	WSQ	Digital Only	4, , R

Stellar Flare, Magnetic Storm Warning	SFW		1, , N
Temperature	TEM	Digital Only	0, , L
Temperature, Arctic Outflow	TEA	Digital Only	0, , L
Temperature, Cold Wave	TEC	Digital Only	0, , L
Temperature, Frost	TEF	Digital Only	0, , L
Temperature, Heat Wave	TEH	Digital Only	0, , L
Temp, High Heat & Humidity	TEU	Digital Only	0, , L
Temperature, Wind Chill	TEW	Digital Only	0, , L
Tornado Watch	TOA		6, , L
Tornado Warning	TOW	X	1, , M
Tornado Waterspout Warning	TWW		1, , L
Tropical Storm Watch	TRA		6, , R
Tropical Storm Warning	TRW		3, , R
Tsunami Watch	TSA		4, , S
Tsunami Warning	TSW	X	1, , S
Winter Storm Watch	WSA		6, , R
Winter Storm Warning	WSW	X	3, , R
NON-WEATHER EVENTS	**EAS Code**	**Use Notes**	**Decoder**
Emergency Action Notification	EAN	NATIONAL REQUIRED	1, ALL, N
Emergency Action Termination	EAT	NATIONAL REQUIRED	1, ALL, N
National Information Center	NIC	National Required	1, ALL, N
State and Local Codes	**EAS code**	**Use Notes**	**Decoder**
Advertisement (if permitted)	ADV	Digital systems only, no tones	0, , A
Agricultural Emergency	AGE		5, , R
Agriculture, Plant Health	AGS	Digital Only	9, , L
Agriculture, Plant Infectious Disease	AGA	Digital Only	8, , L
Aircraft, large Balloon Advisory	ABS		7, , L
Aircraft, large Balloon Warning	ABW		1, , L
Airmen, Notice to	ABA	Digital Only	4, , R
Airspace Closure	ASA	Digital Only	5, , R
Airport Closure	APA	Digital Only	3, , R
Animal Feed	AFS	Digital Only	0, , L
Animal Health	AGS	Digital Only	9, , L
Avalanche Watch	AVA		6, , L
Avalanche Warning	AVW	X	1, , L
Aviation	AIA	Digital Only	0, , R
Boil Water Warning	BWW		6, , L
Bio Hazard Warning	BHW		3, , L
CAP Broadcast	CAP		2

Chemical Warning	CHW		3, , L
Child Abduction Emergency	CAE	XX	2, , L
City/Borough Activation	CBA	X	3, , L
Civil	CIS	Digital Only	5, , L
Civil Danger Warning	CDW	XX	2, , L
Civil Emergency Message	CEM	XX	3, ALL, L
Civil Volunteer Request	CVS		0, , L
Contaminated Water Warning	CWW		4, , L
Crime, Home	CHA	Digital Only	0, , L
Crime, Industrial	CNA	Digital Only	0, , L
Crime, Retail	CRA	Digital Only	0, , L
Crime, Vehicle	CVA	Digital Only	0, , L
Dam/Reservoir Break Watch	DBA		5, ; L
Dam/Reservoir Break Warning	DBW		1, , L
Dangerous Animal(s) Advisory	DAS		8, , L
Dangerous Animal(s) Warning	DAW		5, , L
Disease, Contagious Warning	DEW		2, , L
DXF file	DXF		7
Earthquake Damage Statement	EQS		7, , L
Earthquake Warning	EQW		1, , R
EDXL-DE file	EDX		7
Evacuation Immediate	EVI	X	1, ALL, L
Evacuation Rapidly	EVW		3, ALL, L
Explosion Warning	EXW		2, , L
Falling Objects (Canada)	HFW	Digital Only	1, , L
False Alarm Information	FAW		1, , L
Fire, Brush Warning	WBW		3, , L
Fire, Building Warning	FBW		2, , L
Fire Condition Low Advisory	FRS		8, , L
Fire Danger Extreme Advisory	FXA		4, , L
Fire Danger High Advisory	FHA		6, , L
Fire Danger Medium	FMA		7, , L
Fire Danger Very High Advisory	FRA		5, , L
Fire, Grass Warning	WGW		4, , L
Fire Warning	FRW	XX	3, , L
Fire, Forest Warning	WOW		2, , L
First Responders Advisory	FRV		7, , L
First Responders Warning	FIW		2, , L
Food Contamination Warning	FCW		5, , L
Hazardous Materials Warning	HMW	X	3, , L
Hazmat Toxic Leak	HMA		4, , L
Health	HES	Digital Only	7, , L
Health, Ambulance	HEA	Digital Only	3, , L
Health, Blood Supply	HEB	Digital Only	5, , L
Health, Food & Drug Supply	HEF	Digital Only	7, , L
Hospital	HEH	Digital Only	4, , L
IEEE 1512	IE1		3, , L

IEEE 1512 in EDXL-DE	I1E		3, , L
Industrial Fire Warning	IFW		3, , L
Industrial Plant Warning	IPW		3, , L
Intelligent Highway Sign	IHS		4, , L
JPG file	JPG		7
Law Enforcement Warning	LEW	XX	3, , L
Law Enforcement Watch	LEA		0, , L
Local Area Emergency	LAE	XX	4, , L
Local Area Statement	LAS		Not On EAS
Region/County Activation	LAA	XX	3, , L
Marine	MAR	Digital Only	6, , L
Marine Security	MAS	Digital Only	4, , L
Missing Person(s) Statement	MPS		0, , L
MPEG-2 file (+mono audio)	MPG		7
MPEG-4 file (+mono audio)	MP4		7
911 Phone Outage Emergency	TOE	XX	4, , L
Network Message Notification	NMN		8, , L
Nuclear Power Plant Warning	NUW	X	2, , L
Oil Tanker Leak Statement	OLS		8, , L
Oil Tanker Leak Warning	OLW		5, , L
Other	OTH	Digital Only	8, , L
PDF file	PDF		7
Power Distribution Warning	PDW		2, , L
Power Distribution Advisory	PDE		8, , L
Power Lines Warning	PWW		4, , L
Power Outage Statement	POS		7, , L
Preparedness Reminders	PRS	Digital Only	0, , L
Product Safety	PSS	Digital Only	0, , L
Public, Emergency Support Facilities	PES	Digital Only	0, , L
Public, Emergency Support Services	PSV	Digital Only	4, , L
Public Service	PSA	Digital Only	0, , L
Public Service or Facility	PSF	Digital Only	0, , L
Public Transit	PTR	Digital Only	0, , L
Radio Transmitter Warning	RFW		5, , L
Radioactive Material Release	RHA		4, , L
Radiological Hazard Warning	RHW	X	3, , L
Railway	RWY	Digital Only	0, , L
Railway, Train Accident	RWA	Digital Only	4, , L
Rescue Required Emergency	RRE		3, , L
Rescue Required Statement	RRS		8, , L
Return OK	ROS		8, , L
Roadway	RDS	Digital Only	0, , L
Road, Bridge Closure	RBA	Digital Only	0, , L
Road Closure	RCA	Digital Only	0, , L
Roadway Delay	RDA	Digital Only	0, , L

Road, Hazardous Conditions	RZA	Digital Only	0, , L
Road, Traffic Report	TRA	Digital Only	0, , L
Road Usage Conditions	RUS	Digital Only	0, , L
Road Vehicle Accident	TRE	Digital, Vehicles	5, , L
School Bus	PSB	Digital Only	0, , L
School Lockdown	SLA	Digital Only	0, , L
School weather closing	SWE		0, , M
Shelter in Place Warning	SPW	X	3, , L
Shooting/bombing Watch	SBA		6, , L
Shooting/bombing Warning	SBW		1, , L
Shore Statement	SLS		7, , L
Shore Warning (e.g. sharks)	SLW		4, , L
Shutdown Warning	SDW		2, , R
Smoke or plume	SUW		4, , L
State Priority Activation	STA	XX	1, , S
Tactical Situation Object	TSO		1, , L
TSO in EDXL-DE	TEO		1, , L
Traffic Advisory	TRA	Digital Only	0, , L
Traffic Emergency	TRE	Digital, Vehicles	5, , L
Transmitter Backup On	TXB		8, , E
Transmitter Carrier Off	TXF		8, , E
Transmitter Carrier On	TXO		8, , E
Transmitter Primary On	TXP		8, , E
TXT file	TXT		7
Utility	UTA	Digital Only	0, , L
Utility, Cable Service	UTC	Digital Only	0, , L
Utility, Diesel Supply	UTD	Digital Only	0, , L
Utility, Gasoline/Petrol	UTP	Digital Only	0, , L
Utility, Heating Oil	UTH	Digital Only	0, , L
Utility, Internet Service	UTI	Digital Only	0, , L
Utility, Natural/Coal Gas	UTG	Digital Only	0, , L
Utility, Satellite Service	UTS	Digital Only	0, , L
Utility, Telephone	UTT	Digital Only	0, , L
Utility, Waste Management	UTR	Digital Only	0, , L
Volcanic Ash Warning	VAW		4, , L
Volcanic Lava Warning	VLW		4, , L
Volcano Warning, Pyroclastic Flow	VOW		2, , L
Volcano, Pyroclastic Surge	VOS		2, , L
WAV file	WAV		8
Water Supply Advisory (not BWW or CWW)	WTA		8, , L
Wildfire Watch	WFA		6, , L
Wildfire Warning	WFW		2, , L
XML data, not CAP file	XML		7

Administrative Events	**EAS**	**Use Notes**	**Decoder**

	Code		
Administrative Message	ADR		8, All, N
National Audible Test	NAT		8, All, N
National Periodic Test	NPT		8, All, N
National Silent Test	NST		8, All, N
Network Message Notification	NMN		8, , R
Practice/Demo Warning	DMO		9, All, L
Required Monthly Test	RMT	REQUIRED	8, ALL, S
Required Weekly Test	RWT	REQUIRED	0, ALL, M
OPTIONAL Test	RWW		1, ALL, E
Required Yearly Test	RYT	REQUIRED	1, ALL, N
Unrecognized Watch	??A		6, , L
Unrecognized Emergency	??E		4, , L
Unrecognized Statement	??S		8, , L
Unrecognized Warning	??W		2, , L

Notes:

1) NWR denotes NOAA Weather Radio
2) NWS denotes National Weather Service
3) SAME denotes EAS compatible weather alert equipment.
4) Older EAS Decoders and SAME Weather Alert Receivers MAY NOT recognize EAS/SAME codes listed as "Effective June 30, 2004" unless they were manufactured or updated after mid-2002
5) The codes ABS, ABW, ADV, AGE (e.g. locust swarm or quarantining) CAP, CBA, DAS, DAW, DXF, EVW, FAS, FAW, FOS, FRS, HAS, HAW, HZW, ICS, ICW, IHS, JPG, LSA, LEA, LEW, LSW, MP4, MPG, MPS, OLS, OLW, PDA, PDF, PDW, PWW, RFW, ROS, RRE, RRS, RWW, RYT, SBA, SBW, SDW, SFW, SMW, SSA, SSW, SWE, TEO, TSO, TWW, TXT, WAV, and WSW are not official U.S. codes. Codes may also be added for compatibility with other standards. MPS MAY be for prison escapees or Alzheimers patients for example, which are not covered by Amber Alert. If jurisdictions legislate codes that are not official U.S. codes, these codes SHOULD be listed here for compatibility with other jurisdictions. EVI and EVW only differ in their priorities and urgency.
6) The descriptions Lahar and Cyclone are added.
7) This Table is fundamentally maintained by the FCC, and the W, A, E, S last letter format is used with the only exceptions already included above, or by addition for compatibility with other standards.
8) Any codes not listed SHALL be passed, and a default priority of 9 assigned.
9) Codes of lower priorities MAY also be allowed to override EAS-DND settings.
10) Priorities 1 and 2 SHALL override EAS-DND (Do Not Disturb) settings in consumer devices. Priorities of 2 lower (i.e. number higher) SHALL override all higher messages, which SHALL be stored in a buffer and retransmitted when the priority queue permits. An incomplete message will therefore be accepted on re-reception. Also messages with known errors will be accepted on re-reception. The first instance MAY be via the WARSEPS path and the second instance MAY be via the digital daisy mesh path.

11) Priority 0 consider as priority 10, messages SHALL NOT be transmitted to SDARS or DBS. Neither SHALL PDW nor PDE be transmitted. The volume of traffic is likely to become excessive.
12) For best implementation, EAS+ encoder/decoders SHOULD be automation communicable devices via standard protocols such as VDCP. Priority 1 SHALL be immediately transmitted, priority 2 and 3 within 8 minutes, priority 4 and 5 within 16 minutes, priority 6 and 7 within 24 minutes and all others within 30 minutes. If the traffic does not permit this, then SDARS and DBS nationwide systems SHALL be permitted to operate as priority queue best effort. As the data transmission rate is faster in this mode, practical results SHALL be obtained before changes are made. This is inadequate for the cable/telco implementation. The most promising solution to this is to use is to use the Event Information Table (EIT) in the Program and System Information Protocol (PSIP). This is defined by ATSC. The message format is not currently defined, but MAY be single entry, or multiple flexible. Essentially, the originator would include in the PSIP stream opportunities for EAS signal insertion every 8 minutes maximum. If no PSIP is present or a timeout occurs, the encoder/decoder will insert the EAS message unless it is priority 1, immediate. If there is more than one message of priority 2, both will be inserted at the next opportunity. If one is priority 2 and more are lower priority, then the lower priority ones SHALL await the next opportunity unless their timeout is also reached and an override SHALL be made. This data will connect through to the SCTE J-STD-042-2002 data, which is more complex in the MPEG splicer or direct multichannel IRD implementations. Whether priority 1 SHALL override program or be by receiver override depends on the situation e.g. whether the program is broadcast only or has a headend for some of the audience.
13) EAS tests can be used to cover engineering changes that would impact air in the chain before the EAS insertion equipment. This is a problem for the cable and receiver selected message configuration, but amendments to accommodate this possibility can be considered.
14) The RWW code is the same message as the RWT, but is OPTIONAL and it MAY be used to send something to the audience when the air chain is being rewired or equipment swapped, etc. This could be transmitted to headends or DBS by another event code in PSIP.
15) The FAS and FAW First Responders codes are for a redundant notification method if the primary method is unavailable. The IHS MAY be similarly used, or as messages directed to highway motorists.
16) Encoder/decoders that do not have an active automation interface SHALL operate in the immediate override mode. The times above do not apply. This is likely to be upgraded EAS Encoder/decoders, which are analog, and are analog radio or TV at the periphery of the daisy chain.
17) EAS+ compatible receivers or EAS+ compliant receivers via a configuration selection (default being on) SHOULD play the audio of the priority one code names before the audio. By default, this SHALL be in English, and other languages MAY follow by manufacturer choice. As Tornado, Tsunami and Lahar are multilingual words, the other English words MAY become accepted likewise.
18) ROS, Return OK Statement is applicable after AVW, EVI, ERW, FFW, NUW, RHW, SBW, TOR, and TSW. The duration in CAP is not used to trigger this message.

19) Rescue Required Emergency and Rescue Required Statement are to be sent to First Responders category only on HD radio and digital TV. Not for transmission on SDARS and DBS. Also note that a polygon MAY be specified with one point only. This can be a position from an EPIRB or E911 Phase 2 position indication. As rescues MAY be in remote locations, the First Responders radio system MAY NOT function there, but digital broadcast signals MAY be receivable. Skiers and climbers MAY have an EPIRB (Emergency Position Indicating Radio Beacon) activated.
20) LEW, Law Enforcement Warning, MAY be a message directed to homeowners only for example, and this is not a category that in the near future is expected to be practicable for people to configure in their consumer electronics. In such circumstances, where the priority is not so high or it is used to aid apprehension of criminals, the distribution via other technologies such as ETN (formerly Reverse-911) where a database MAY be available that can be used in selecting appropriate phone numbers is RECOMMENDED. Alternatively, Law Enforcement Watch, LEA, MAY be used on private mode to the public or other selected category.
21) Codes PDF, DXF and any others that require applications to process them SHOULD use older versions of applications to generate the file so recipients do not fail to receive the information because of the lack of the most current version being installed.
22) SDW, Shutdown & possibly evacuate SHALL always to be transmitted in private mode. Although it is priority 2, it would not normally be delayed as it is transmitted in private mode.
23) DMO is for making demonstration alerts or for system testing. They are not to be broadcast. The text SHALL clearly state that this is a demonstration, not an alert.
24) Authorization levels, from lowest to highest are A All, M Master Control Operator, E Engineering (8 character station/system designation), L Local Government, R Regional or Tribal Government, S State Government, N National or Federal Government. The assignment is as for the LLLLLLLL table under ENCODER/DECODER configuration. Authorized entity codes are to be assigned for each authorization level. If a message is requested by an entity with an inadequate authorization level, an error SHALL be returned “Authorization Level Inadequate”. If a message is requested by an entity that has an incorrect jurisdiction but adequate authorization, an error SHALL be returned “Jurisdiction Inappropriate”. This is not a process that is a substitute for other security measures.
25) ADV messages SHALL NOT use magenta, red, yellow or orange as the background.
26) SWE messages SHOULD be during program time only, not breaks, with program on the alternate PID.
27) Analog only radio stations MAY omit priority 0 and 9 messages. Such stations could be satellite or otherwise fed from a remote national uplink. Also such stations SHALL state “EAS plus emergency alerting is not on this station.” Every two hours.
28) Analog only TV stations MAY omit priority 0 and 9 messages. Such stations could be translators for digital stations. The digital station SHALL transmit alerts which include the translator area, however the analog translator SHALL only transmit alerts that pertain to the translator coverage area. Analog retransmitting from analog is expected to be phased out, and this is another reason to move that process forward.
29) SLW and SLS MAY be beach patrols underwritten by businesses, who wish to gain advertising. As they are providing a community service at some expense, the coverage area and other forms of selectivity SHOULD NOT be particularly

restrictive. This is a matter for some wisdom in application by the local jurisdictions, e.g. only to broadcasters with coverage of the area(s) of interest.

30) The event codes that MAY use unknown duration and exceed 2 minutes SHALL only be EAN, STA and SWE. Such activations SHALL be with the awareness that legacy ENCODER/DECODERs will truncate the message audio after two minutes. The SWE (school weather emergency) message is typically longer than two minutes. In EAS and EAS+ they would be scheduled to replace programming rather than advertising, however analog only radio stations would not have the capability of permitting the listener to be continuing listening to programming.
31) LAS, Local Area Statement is an event code that SHALL NOT be carried on EAS. It is included here as sometimes local authorities issue statements via emergency alerting technologies such as ETN which do not meet the stricter criteria required to issue an EAS alert.
32) Tsunami Watch is intended for tsunamis with a distant origin that are not expected to arrive within an hour at the earliest location of message delivery. In IEEE1512, this is assigned to the tidal wave emergency. With the urgency set at Immediate, the airing of the alert is as soon as possible without it being an immediate override.
33) The codes Aircraft, large Balloon Advisory (ABS); Aircraft, large Balloon Warning (e.g. crashing) (ABW); Dangerous Animal(s) Advisory (DAS); Dangerous Animal(s) Warning (DAW); Fire Condition Advisory (e.g. dry vegetation) (FRS); Fog Advisory (FOS); Hail Advisory (HAS); Hail Warning (HAW); Hazy (visibility limited for driving) (HZW); Ice Advisory (ICS); Icy Conditions Warning (ICW); Oil Tanker Leak Statement (OLS); Oil Tanker Leak Warning (OLW); Power Lines Warning (PWW); RF high field strength Warning (at high power transmitters) (RFW) (Broadcast Engineers handle this and Emergency Alerting Systems so SHALL be given access with supplies e.g. fuel); Smoke or plume Warning (SUW); Tactical Situation Object (www oasis-fp6.org) (TSO); Tactical Situation Object in an EDXL-DE message (TEO); Tornado Waterspout Warning (over sea or great lakes) (TWW). These codes are added for improved compatibility with TSOs.
34) IEEE 1512 provision added. AMBER Alert is already included there. The <vehicle> item is adapted to the terms used there. The section below is from the Disasters list in IT IS-00-00-00. The 30?? Ids are used in the IEEE 1512 standard. The Event Codes ending in / are added because an equivalent was not found. This is after the TSO additions. While developing an application to translate between the two systems, or adding CAP ability to an IEEE 1512 based Computer Aided Dispatch (CAD) is adding complexity, the first step is to rationalize the terminology. While standards developers are likely not intending to develop “silos of complexity” that do no interoperate, there may need to be some acceptance of extensions of scope to enable reasonable interoperability by project sponsors.

```
<xs:enumeration value="flash flood" id="_3073"/>                    FFW
<xs:enumeration value="major flood" id="_3074"/>                    FLW
<xs:enumeration value="reservoir failure" id="_3075"/>              DBW
   “Dam Break” warning
<xs:enumeration value="levee failure" id="_3076"/>                  FVW/
<xs:enumeration value="tsunami" id="_3077"/>                        TSW
<xs:enumeration value="tidal wave" id="_3078"/>                     TSA
   “tsunami” advisory, over 1 hour”
<xs:enumeration value="volcanic eruption" id="_3079"/>              VOW
<xs:enumeration value="ash fall" id="_3080"/>                       VAW/
<xs:enumeration value="lava flow" id="_3081"/>                      VLW/
```

```
<xs:enumeration value="serious fire" id="_3082"/>                  FRW
<xs:enumeration value="forest fire" id="_3083"/>                   WOW/
<xs:enumeration value="wildfire" id="_3084"/>                      WFW
<xs:enumeration value="building fire" id="_3085"/>                 FBW/
<xs:enumeration value="brush fire" id="_3086"/>                    WBW/
<xs:enumeration value="grass fire" id="_3087"/>                    WGW/
<xs:enumeration value="fire danger extreme" id="_3088"/>           FXA/
<xs:enumeration value="fire danger very high" id="_3089"/>         FRA
<xs:enumeration value="fire danger high" id="_3090"/>              FHA/
<xs:enumeration value="fire danger medium" id="_3091"/>            FMA/
<xs:enumeration value="fire danger low" id="_3092"/>               FRS
<xs:enumeration value="earthquake damage" id="_3093"/>             EQS/
<xs:enumeration value="air crash" id="_3094"/>                     ABW
<xs:enumeration value="rail crash" id="_3095"/>                    RCA
<xs:enumeration value="toxic release" id="_3096"/>                 CHW
<xs:enumeration value="toxic leak" id="_3097"/>                    HMA/
<xs:enumeration value="radioactive release" id="_3098"/>           RHA/
<xs:enumeration value="radiation hazard" id="_3099"/>              RHW
<xs:enumeration value="reactor leakage" id="_3100"/>               NUW
<xs:enumeration value="explosion" id="_3101"/>                     EXW/
<xs:enumeration value="major hazardous materials fire" id="_3102"/>
      SMW
<xs:enumeration value="major hazardous materials release" id="_3103"/>
      HMW
<xs:enumeration value="disaster cleared" id="_3199"/>              ROS
```

35) The CAP profile for Canada has a set of emergency terms. These may be incorporated by equivalence or addition and noted in this item as is following. As this is a different jurisdiction the use of such additions is dependent on the CAP message and not currently for use in U.S. originated messages. This avoids the necessity for a different profile for each country, which is a problem when cross-border messages for cross-border disasters occur.

CAP Canada Event Codes

X. Event List	CAP Canadian Profile						EAS+ EEE
TIER I EVENTS / ÉVÉNEMENT DE NIVEAU I (includes associated Tier II events / inclus les événements Niveau II associés)	TIER I EVENTS / ÉVÉNEMENT DE NIVEAU I (includes associated Tier II events / inclus les événements Niveau II associés)	TIER II EVENTS / ÉVÉNEMENTS DE NIVEAU II (Included in Tier I event associated with it / inclus l' événement de Niveau I associé)	TIER II EVENTS / ÉVÉNEMENTS DE NIVEAU II (Included in Tier I event associated with it / inclus l' événement de Niveau I associé)	EVENT CODE / CODE DES L' ÉVÉNEMENT	APPLICABLE CAP CATEGORY VALUE / VALEUR DE LA CATÉGORIE PAC APPLICABLE	CONTRIBUTOR / REVIEWER	
ENGLISH	FRENCH	ENGLISH	FRENCH				
Administration	Administration			admin	Other		ADR
Air Quality	Qualité de l'air			airQuality	Env, Health, Geo, Met, or Transport	1	AQA/, HZW, SMW
Animal Health	Santé animale			animalHealth	Health		AGS/
Animal Health	Santé animale	Animal Disease	Maladie animale	animalDiseas	Health		AGE
Animal Health	Santé animale	Animal Feed	Nourriture animale	animalFeed	Health		AFS/
Aviation	Aviation			aviation	Transport		AIA/
Aviation	Aviation	Notice to Airmen	Avis aux navigateurs	notam	Transport		ABA/
Aviation	Aviation	Airspace Closure	Fermeture de l' espace aérien	airspaceClos	Transport		ASA/
Aviation	Aviation	Airport Closure	Fermeture d'aéroport	airportClose	Transport		APA/
Aviation	Aviation	Aircraft Crash	Ecrasement d'avion	aircraftCras	Transport		ABW
Civil	Civil			civil	Security		CIS/
Civil	Civil	Civil Emergency	Crise civile	civilEmerg	Security		CDW
Civil	Civil	Public Event	Événement public	civilEvent	Security		CEM
Civil	Civil	Volunteer Request	Besoin de bénévoles	volunteer	Other		CVS/
Criminal Activity	Activité criminelle			crime	Security	4	LEW

Criminal Activity	Activité criminelle	Dangerous Person	Personne dangereuse	dangerPerson	Security	4	SBW
Criminal Activity	Activité criminelle	Home Crime	Crime contre la propriété	homeCrime	Security	4	CHA/
Criminal Activity	Activité criminelle	Industrial Crime	Crime industriel	industCrime	Security	4	CNA/
Criminal Activity	Activité criminelle	Retail Crime	Crime dans les commerces	retailCrime	Security	4	CRA/
Criminal Activity	Activité criminelle	Terrorism	Terrorisme	terrorism	Security	4	SBW
Criminal Activity	Activité criminelle	Vehicle Crime	Crime de véhicule	vehicleCrime	Security	4	CVA/
Dangerous Animal	Animal dangereux			animalDang	Security		DAW
Fire	Incendie			fire	Fire		FRW
Fire	Incendie	Wildfire	Feux de brousse	wildFire	Fire		WFW
Fire	Incendie	Industrial	Industrielle	industryFire	Fire		IFW
Fire	Incendie	Urban	Urbaine	urbanFire	Fire		FBW
Fire	Incendie	Forest Fire	Feux de forêts	forestFire	Fire		WOW
Flood	Inondation			flood	Met	1	FLW
Flood	Inondation	Storm Surge	Onde de Tempête	stormSurge	Met	1	CFW
Flood	Inondation	High Water Level	Niveau élevé des eaux	highWater	Met	1	CFA
Flood	Inondation	Overland Flow Flood	Inondation par ruissellement de surface	overflood	Met		FVW
Flood	Inondation	Flash Flood	Inondation soudaine	flashFlood	Geo or Safety		FFA, FFW
Flood	Inondation	Dam Overflow	Débordement de barrage	damOverflow	Infra or Safety		DBW
Geophysical	Géophysique			geophyiscal	Geo		GEO/
Geophysical	Géophysique	Avalanche	Avalanche	avalanche	Geo		AVW
Geophysical	Géophysique	Earthquake	Tremblement de terre	earthquake	Geo	2	EQW
Geophysical	Géophysique	Landslide	Glissement de terrain	landslide	Geo		LSW
Geophysical	Géophysique	Magnetic Storm	Orage magnétique	magnetStorm	Geo		SFW
Geophysical	Géophysique	Tsunami	Tsunami	tsunami	Geo	1	TSW
Geophysical	Géophysique	Meteorite	Météorite	meteor	Geo		EVI, SPW
Geophysical	Géophysique	Lahar	lahars	lahar	Geo		FFA, FFW
Geophysical	Géophysique	Pyroclastic Flow	Coulées pyroclastiques	pyroclasticF	Geo		VOW
Geophysical	Géophysique	Pyroclastic Surge	Nuées ardentes	pyroclasticS	Geo		VOS/
Geophysical	Géophysique	Volcanic Ash Cloud	Nuage de cendre	volcanicAsh	Geo		VAW
Hazardous Materials	Matières dangereuses			hazmat	CBRNE		HMW

Hazardous Materials	Matières dangereuses	Chemical Hazard	Risque chimique	chemical	CBRNE		CHW
Hazardous Materials	Matières dangereuses	Biological Hazard	Risque biologique	biological	CBRNE		BHW
Hazardous Materials	Matières dangereuses	Radiological Hazard	Risque radiologique	radiological	CBRNE		RHW
Hazardous Materials	Matières dangereuses	Explosive Hazard	Risque d'explosion	explosive	CBRNE		EXW
Hazardous Materials	Matières dangereuses	Falling Object	Chute d'objets	fallObject	Safety		HFW/
Health	Santé			health	Health		HES/
Health	Santé	Ambulance	Ambulance	ambulance	Health		HEA/
Health	Santé	Blood supply	Réserve de sang	bloodSupply	Health		HEB/
Health	Santé	Drinking Water	Eau potable	drinkingWate(r?)	Health		WTA, BWW, CWW
Health	Santé	Food & Drug Supply	Approvisionnement en aliments et médicaments	foodSupply	Health		HEF/
Health	Santé	Hospital	Hôpital	hospital	Health		HEH/
Health	Santé	Infectious Disease	Maladie infectieuse	infectious	Health		DEW
Ice	Glaces			ice	Met	1	ICS
Ice	Glaces	Ice Pressure	Pression des glaces	icePressure	Met	1	IPA/
Ice	Glaces	Rapid Closing of Coastal Leads	Fermeture rapide de chenaux côtiers	rpdCloseLead	Met	1	ILA/
Ice	Glaces	Special Ice	Spécial des glaces	spclIce	Met	1	ISA/
Marine	Maritime			marine	Met, Transport	1	MAR/
Marine	Maritime	Freezing Spray	Embruns verglacants	freezngSpray	Met	1	FZS/
Marine	Maritime	Gale Wind	Coups de vent	galeWind	Met	1	HWW
Marine	Maritime	Hurricane Force Wind	Vent de force ouragan	hurricFrcWnd	Met	1	HUW
Marine	Maritime	Iceberg	Iceberg	iceberg	Met, Transport		IBW
Marine	Maritime	Marine Security	Sécurité maritime	marineSecure	Transport	1	MAS/
Marine	Maritime	Nautical Incident	Incident nautique	nautical	Transport	5	SMW
Marine	Maritime	Special Marine	Maritime speciale	spclMarine	Met	1	SMW
Marine	Maritime	Squall	Grains	squall	Met	1	WSQ/

Marine	Maritime	Storm Force Wind	Vent de tempête	stormFrcWnd	Met	1	HWW
Marine	Maritime	Strong Wind	Vent fort	strongWind	Met	1	HWA
Marine	Maritime	Waterspout	Trombe marine	waterspout	Met	1	TWW
Missing Person	Personne manquante			missingPer	Missing	4	MPS
Missing Person	Personne manquante	AMBER Alert	Alerte AMBER	amber	Missing	4	CAE
Missing Person	Personne manquante	Missing Vulnerable Person	Personne vulnérable disparue	missingVulPer	Missing	4	MPS
Missing Person	Personne manquante	Silver Alert	Alerte Silver	silver	Missing	5	MPS
Other	Autre			other	Other		OTH/
Plant Health	Santé végétale			plant		5	AGS/
Plant Health	Santé végétale	Plant Infectious Disease	Maladie infectieuse végétale	plantInfect		5	AGA/
Preparedness Reminders	Rappel de préparation	Emergency Preparedness Reminder	Rappel de préparatifd'urgence	reminder	Safety		PRS/
Product Safety	Sécurité des produits			product	Safety		PSS/
Public Services	Services publics			publicServic(e ?)	Infra		PSA/
Public Services	Services publics	Emergency Support Facilities	Installations de soutien en situation d'urgence	emergFacility	Infra, Safety	3	PES/
Public Services	Services publics	Emergency Support Services	Services de soutien d'urgence	emergSupport	Infra, Safety	3	PSV/
Public Services	Services publics	School Bus	Autobus scolaire	schoolBus	Infra		PSB/
Public Services	Services publics	School Closure	Fermeture d'école	schoolClose	Infra		SWE
Public Services	Services publics	School Lockdown	Isolement d'école	schoolLock	Infra		SLA/
Public Services	Services publics	Service or Facility	Service ou installation	facility	Infra		PSF/
Public Services	Services publics	Transit	Transport public	transit	Infra		PTR/
Railway	Ferroviaire			railway	Transport		RWY/
Railway	Ferroviaire	Train Accident	Accident ferroviaire	train	Transport		RWA/
Rescue	Sauvetage			rescue	Rescue		RRE
Roadway	Routier			road	Transport		RDS/
Roadway	Routier	Bridge Closure	Pont fermé	bridgeClose	Transport	5	RBA/
Roadway	Routier	Roadway Closure	Fermeture de route	roadClose	Transport	4	RCA/
Roadway	Routier	Roadway Delay	Retard de circulation (Délai	roadDelay	Transport	4	RDA/

			routier)				
Roadway	Routier	Hazardous Road Conditions	Conditions routières dangereuses	rdCondition	Transport		RZA/
Roadway	Routier	Traffic Report	Rapport de circulation	traffic	Transport		TRA
Roadway	Routier	Roadway Usage Condition	État des routes	roadUsage	Transport		RUS/
Roadway	Routier	Motor Vehicle Accident	Accident de voiture	accident	Transport		TRE
Storm	Tempête			storm	Met	1	SPS
Storm	Tempête	Blizzard	Blizzard	blizzard	Met	1	BZW
Storm	Tempête	Blowing Snow	Poudrerie	blowingSnow	Met	1	BSW/
Storm	Tempête	Dust Storm	Tempête de poussière	dustStorm	Met	1	DSW
Storm	Tempête	Freezing Drizzle	Bruine verglacante	freezeDrzl	Met	1	FZA/
Storm	Tempête	Freezing Rain	Pluie verglacante	freezeRain	Met	1	FZR/
Storm	Tempête	Hurricane	Ouragan	hurricane	Met	1	HUW
Storm	Tempête	Rainfall	Pluie	rainfall	Met	1	RAA/
Storm	Tempête	Thunderstorm	Orages	thunderstorm	Met	1	SVA, SVR
Storm	Tempête	Snowfall	Neige	snowfall	Met	1	SNA/
Storm	Tempête	Snow Squall	Bourrasque de neige	snowSquall	Met	1	WSW
Storm	Tempête	Tornado	Tornade	tornado	Met	1	TOW
Storm	Tempête	Tropical Storm	Tempête tropicale	tropStorm	Met	1	TRA, TRW
Storm	Tempête	Winter Storm	Tempête hivernale	winterStorm	Met	1	WSA, WSW
Storm	Tempête	Weather	Météo	weather	Met	1	SPS
Temperature	Température			temperature	Met	1	TEM/
Temperature	Température	Arctic Outflow	Poussée d’air arctique	arcticOut	Met	1	TEA/
Temperature	Température	Cold Wave	Vague de froid	coldWave	Met	1	TEC/
Temperature	Température	Flash Freeze	Refroidissement soudain	flashFreeze	Met	1	FSW
Temperature	Température	Frost	Gel	frost	Met	1	TEF/
Temperature	Température	Heat Wave	Vague de chaleur	heatWave	Met	1	TEH/
Temperature	Température	High Heat and Humidity	Chaleur et humidité accablantes	heatHumidity	Met	1	TEU/
Temperature	Température	Wind Chill	Refroidisse-ment éolien	windchill	Met	1	TEW/
Test Message	Message test			testMessage	Other		RWT, RMT, RYT, DMO
Utility	Utilité publique			utility	Infra		UTA/

Utility	Utilité publique	Cable Service	Service de câble	cable	Infra		UTC/
Utility	Utilité publique	Diesel Supply	Approvisionnement en diesel	diesel	Infra		UTD/
Utility	Utilité publique	Electricity Supply	Distribution d'électricité	electric	Infra		PDE, PDW, PWW
Utility	Utilité publique	Gasoline Supply	Approvisionnement en essence	gasoline	Infra		UTP/
Utility	Utilité publique	Heating Oil Supply	Approvisionnement en mazout	heatingOil	Infra		UTH/
Utility	Utilité publique	Internet Service	Service Internet	internet	Infra		UTI/
Utility	Utilité publique	Natural Gas Supply	Approvisionnement en gaz naturel	naturalGas	Infra		UTG/
Utility	Utilité publique	Satellite Service	Service par satellite	satellite	Infra		UTS/
Utility	Utilité publique	Sewer System	Réseau d'égouts	sewer	Infra		UTW/
Utility	Utilité publique	Telephone Service	Service téléphonique	telephone	Infra		UTT/
Utility	Utilité publique	911 Service Inoperative	Service 911 inopérant	911Service	Infra		TOE/
Utility	Utilité publique	Waste management	Gestion des déchets	waste	Infra		UTR/
Utility	Utilité publique	Water Supply	Alimentation en eau	water	Infra		WTA, BWW, CWW
Wind	Vent			wind	Met	1	HWA
XII. Table of Recognized Contributors / Reviewers:							
Reference	Term Contributor: Agency or Group		NOTES;				
1	Environment Canada		1) Codes ending in / are added for EAS+ codes.				
2	Natural Resources Canada		2) However such codes may be more appropriately				
3	New Brunswick Multi-Agency Situational Awareness System Project Team		distributed by other means than EAS+ or EAS, e.g. news.				
4	RCMP New Brunswick		3) There is not always a statement type to match the alert				
5	Alberta Emergency Management Agency		type. Return OK Statement ROS may be used.				

effective; If this is used, it SHALL set the transmission time of the EAS+ message. Otherwise it will be immediate. Such selections SHALL be logged and emailed to QC.

onset; If this is used, it SHALL be included in the EAS+ message as <onset=*onset*>. Such selections SHALL be logged and emailed to QC.

expires; This SHALL set the +TTTT- purge time which is an addition to the issue time of the EAS+ message, and is in 15 minute segments up to one hour then in 30 minute segments up to six hours. For longer duration events, new messages MAY be required in order to fulfill the expires date and time.

senderName; This SHALL be included in the EAS+ text following <senderName>.

headline; This SHALL be included in the EAS+ text following <headline>. As 160 characters MAY be the maximum length, this SHOULD work with SMS devices that MAY limit the displayed message length. Vehicle radio displays usually have less display size, and in the interests of road safety, considerably shorter text lengths are desirable.

description; This SHALL be incorporated in the EAS+ text following <description>, but will likely be truncated by vehicle radios.

instruction; This SHALL be incorporated in the EAS+ text following <instruction>, but will most likely be truncated by vehicle radios. See the polygon section where vehicle navigation to exit the polygon is an item.

audioDuration; In order for the duration of the EAS+ message to be transmitted for automation systems to schedule, the Second J SHALL have the values of the first bits as below. This data MAY be derived from the CAP audioDuration (not currently standard);
Binary 0000 15 sec.
Binary 0001 30 sec.
Binary 0010 Unknown duration (default value)
Binary 0011 45 sec.
Binary 0100 60 sec.
Binary 0101 75 sec.
Binary 0110 90 sec.
Binary 0111 120 sec.
Binary 1000 105 sec. (not RECOMMENDED, MAY become reserved)
Binary 1001 to
Binary 1111 Reserved

repetition; This is not in CAP 1.2. The repetition of the message with the same header by broadcasters MAY be permitted. This is a provision that some jurisdiction could select. The third J indicates this as below. Regardless of priority, these SHALL be overridden by subsequent messages. SDARS and DBS MAY also repeat the messages, but the code here SHOULD be implemented in the SDARS receiver or DBS set top box. Also subsequent messages SHALL override the repetition, regardless of priority. These times are not precise as they can be varied by up to 5 minutes either way by automation systems.
Binary 0000 15 min.
Binary 0001 30 min.
Binary 0010 No Repetition (the default).
Binary 0011 1 hour
Binary 0100 2 hour (not RECOMMENDED, MAY become reserved)
Binary 0101 to
Binary 1111 Reserved.

Vehicle, vehicleGroup, vehicleID and Identity-plate-origin; This is not implemented in CAP V1.2. This SHALL be incorporated in the <instruction> section where appropriate, e.g. for AMBER Alerts, e.g.

<vehicle>
<vehicleGroup> AMBER
<Identity-plate-origin> *vvv*
<vehicleID> *vvvvvvvv*
</vehicle>

Then this text items without the <> and content SHALL appear in the message display, but also EAS+ compatible HD radios SHALL also display this text again after the message is displayed. It SHALL continue to display until either the duration times out or the vehicle passenger changes what is displayed. The text MAY be truncated in which case it is the AMBER that SHALL be truncated first. An earlier filing referred to "vehicleState", however in IEEE 1512, ATIS-00-00-00 the term used is "Identity-plate-origin", and accordingly changed here. In IMDraft-00-00-00 there is reference to "vehicleID" which is used here. In JXDA-00-00-00 there is reference to "VehicleID" which is not used here, and also "VehicleRegistration" which is also not used here but the data of "VehicleRegistration" shall have precedence over "VehicleID" which shall be used here if "vehicleID" is blank. Then the data of from the previous sentence shall be used here, and if this also is blank then the data of "VehicleVINAText" shall be used here. IMDraft-00-00-00 also refers to "vehicleUnitID" however the use of this is not well defined and shall not be used here.

As a number of analog radio stations have RDS or RDBS, ENCODER/DECODERs or CAP to ENCODER/DECODER PCs SHALL provide an output to the RDS or RDBS system. The CAP protocol translation to RDS or RDBS SHALL also be provided on this output. As this system has no <vehicleID> or <Identity-plate-origin> definition, the text transmitted to the RDS or RDBS system SHALL conclude with this content if it is provided and in a mode that it SHALL continue to display unless a cancellation is transmitted or the vehicle passenger makes some operation that interrupts the text e.g. changing station.

web; This is an URI for an HTML page for additional information. However note that internet infrastructure MAY be damaged, and the server capacity is very likely to be exceeded. A RECOMMENDED alternative is to use CAP broadcast to push .PDF or .RTF or other files to computers and comparable devices (PDAs with larger memory and such file viewing capability). So URIs SHOULD NOT not be transmitted on EAS+ messages as links, but text that can be copied is acceptable. All URIs SHOULD to be checked with whitelist software so no unacceptable sites are accidentally transmitted.

contact; This SHALL be logged and emailed to the QC and included as <contact=*contact*>.

parameter; This MAY be included in the EAS+ text as
<parameter=<valueName>*valueName*</valueName> <value>*value*</value>>
note that the < and > are nested, but applicability needs defining.
(1) Where the content of "valueName" is a user-assigned string designating the domain of the code, and the content of "value" is a string (which MAY represent a number) denoting the value itself (e.g., valueName ="SAME" and value="CIV").

(2) Values of "valueName" that are acronyms SHOULD be represented in all capital letters without periods (e.g., SAME, FIPS, ZIP).
(3) Multiple instances MAY occur within an <info> block.

EAS-CAP Profile defines three <valueName> fields:

1. **EAS-ORG (***from* [5])
2. **EASText** (*ECIG recommendation)*
3. **EAS-Must-Carry** (*from* [5] *below*)

1. Special EAS parameter
<parameter>
<valueName> **EAS-ORG**
</valueName>
<value> EAS, CIV, WXR, or PEP
</value>

Maps to 3 letter **EAS ORG** code. Range is; EAS, CIV, WXR, or PEP. Example

```
<parameter>
  <valueName>EAS-ORG
  </valueName>
  <value>CIV
  </value>
</parameter>
```

Required for IPAWS profile conformance: Messages missing <parameter> <valueName>EAS-ORG SHALL be rejected. Messages with an incorrect value for EAS-ORG as defined above, SHALL be rejected.

2. Special EAS parameter.
<parameter><valueName>**EASText**
</valueName>
<value> Originator authored alert text
</value>

If this parameter is present the value is used verbatim to construct alert text or other visual display. [5] *does not define this extension, but does include something similar for CMAS (Mobile phone alerts).*

3. Special EAS parameter
<parameter>
<valueName> **EAS-Must-Carry**
</valueName>
<value> TRUE
</value>

If this parameter is present and the value is TRUE, then the CAP message has come from a state governor's office and the EAS system SHALL place the message on air according to the rules of the state plan.

3.2.3 "resource" Element and Sub-elements

resource; Additional files can be transmitted as CAP broadcast, but snapshot pictures for AMBER Alert SHALL be displayed above the crawl on TV. An audio file SHALL be EAS audio. Multiple audio files SHALL be identified as to the language.

resourceDesc; This SHALL be included in the EAS+ text after <resourceDesc> so the presence of additional items is noted.

mimeType; MIME content type and sub-type as described in **[RFC 2046].** (As of this document, the current IANA registered MIME types are listed at http:// www iana.org/assignments/media-types/) This SHALL be included as <mimeType=*mimeType*>. Unicode is listed as applying RFC1641, RFC1521 and RFC1522 for use as a mimeType. Unicode is always in character pairs with the higher order byte first. For this use as EAS+ text, the Unicode version SHALL be 5.0 and such text SHALL begin with =?UC and terminate with ?=. The header SHALL NOT use Unicode.

size; The integer indicating the size of the resource in bytes. This SHOULD be included and SHALL be in the form <size=*size*>.

uri; A full absolute URI, typically a Uniform Resource Locator that can be used to retrieve the resource over the Internet if referenced. Required if <info><resource> is present.
OR
a relative URI to name the content of a <derefUri> element if one is present in this resource block.
An internet URL SHALL be in the form <URL> *URL*. Other URIs SHALL be in the form <URI=*URI*>.

derefUri; The base-64 encoded data content of the resource file (CONDITIONAL).
(1) MAY be used either with or instead of the <uri> element in messages transmitted over one-way (e.g., broadcast) data links where retrieval of a resource via a URI is not feasible.
(2) Clients intended for use with one-way data links SHALL support this element.
(3) This element SHALL NOT be used unless the sender is certain that all direct clients are capable of processing it.
(4) If messages including this element are forwarded onto a two-way network, the forwarder SHALL strip the <derefUri> element and SHOULD extract the file contents and provide a <uri> link to a retrievable version of the file.
(5) Providers of one-way data links MAY enforce additional restrictions on the use of this element, including message-size limits and restrictions regarding file types.
If used, this SHALL be in the form <derefUri=*derefUri*>
ECIG does not recommend using this feature to send multimedia resource data within CAP, due to the enormous expansion of the CAP file length. This method has use in a system where only the CAP message can be sent and received. Graphics should be defined with use of EIA 708 in mind, and there is no mechanism for providing lipsync with the mono audio and any motion video.

digest; The code representing the digital digest (“hash”) computed from the resource file (OPTIONAL) Calculated using the Secure Hash Algorithm (SHA-1) per **[FIPS 180-2]**. If used in the source message, **digest** SHALL be included in the form <digest=*digest*>.

3.2.4 "area" Element and Sub-elements

area; As the definition of the area MAY consist of one or multiple instances of <polygon>, <circle> or <geocode> if the geocode does not correspond to a whole State, County, Region or Sector jurisdiction, then the appropriate jurisdictions SHALL each have their own EAS+ message with <polygon> as described. Adjacent counties (or regions if defined in the coding and by polygon) MAY be included with a maximum of 31. This is because EAS+ is designed to be processed by 8 bit processors in low power consumer devices. While the polygon points can be up to 32, it is too difficult for such processors to do navigational calculations for circles and are unlikely to have the database for the geocodes. Also the navigational calculations SHALL be for rhumb lines for simple arithmetic calculations. Also the calculation processing SHALL be completed within 0.8 sec in preparation to switch the audio incoming if appropriate.

areaDesc; This MAY be included in the EAS+ displayed and spoken text message preceded by <areaDesc> (which does not display). Initially it SHALL be used, but as selectivity becomes effectively implemented it SHOULD be replaced by <areaDesc=*areaDesc*> to reduce the text that the public is expected to process and remember. Analog radio SHOULD include the areaDesc text if the selected area is smaller than the transmitter coverage area. See **AN ALGORITHM FOR IMPROVED POLYGON TRANSMISSION** for the **polygon**; case.

polygon; In CAP these are defined as having a maximum of 15 points with also a last point being the same as the first point. There SHALL be a maximum of one polygon in EAS+, which is a summary shape of all the polygons and circles in CAP that are adjacent or overlap. The polygon output direction of rotation SHALL follow the left or right hand rule decided upon for the output regardless of which direction of rotation the user enters the data in. The left hand rule apparently is selected, this means that as you go around the polygon, your left hand is on the inside. Looping inside the loop would be an exception.

circle; This SHALL be converted to a polygon. See **AN ALGORITHM FOR IMPROVED POLYGON TRANSMISSION.** The paired values of a point and radius delineating the affected area of the alert message (OPTIONAL)
(1) Code Values: The circular area is represented by a central point given as a **[WGS 84]** coordinate pair followed by a space character and a radius value in kilometers or kiloyards. (See WGS 84 Note at end of this section)
(2) Multiple instances MAY occur within an <area> block. For data passage, the message SHALL include <circle=*circle*> if used in the source message.

plume; The provision for plume modeling is not provided for in the current CAP 1.2, but is work in progress. The means to handle such data in EAS+ is not defined, it may be a series of alerts of fixed polygons as that is about as much as can be expected of consumer receiver microcontrollers.

geocode; The geographic code delineating the affected area of the alert message (OPTIONAL)
(1) Any geographically-based code to describe a message target area, in the form:

```
<geocode>
  <valueName>valueName</valueName>
  <value>value</value>
```

</geocode>
where the content of “valueName” is a user-assigned string designating the domain of the code, and the content of “value” is a string (which MAY represent a number) denoting the value itself (e.g., valueName ="SAME" and value="006113").
(2) Values of “valueName” that are acronyms SHOULD be represented in all capital letters without periods (e.g., SAME, FIPS, ZIP). Note, P&FIPS=SAME. Zip or Postcodes MAY be used outside the U.S. if a maximum of 32 point polygon is officially defined for each one in a database. For this purpose, ZIP is the name of a postcode without spaces and without the +4 option of zip codes.
(3) Multiple instances MAY occur within an <area> block, in CAP or EDXL-DE. However they SHOULD intersect and a polygon of maximum 32 points be derived to approximate the overall area. If there is no intersection for some later instance or instances, then only the first intersecting instances SHALL be used and the rest ignored for EAS+. This is to simplify the processing for consumer receiver microcontrollers.
(4) This element is primarily for compatibility with other systems. Use of this element presumes knowledge of the coding system on the part of recipients; therefore, for interoperability, it SHOULD be used in concert with an equivalent description in the more universally understood <polygon> and <circle> forms whenever possible.
As in the U.S. EAS+ uses FIPS/SAME, this SHALL be the data values for SSCCC/PSSCCC even if a different source is used. When a different source is used, polygons SHALL be used. If only the FIPS is used, the P shall have the value to select the whole area. When FIPS or SAME is used, polygons SHOULD be added if not provided to provide compatibility with vehicle radios. The code is still used for message routing even if the selectivity is defined using a different polygon.

If there are no <polygon> or <circle> definitions, these SHALL be translated into <polygon> because vehicles do not know which geocode they are in, and expecting consumers to program their clock radios with much data is not advisable. However they could use earth.google.com to find their house and enter the latitude and longitude into a house clock radio, or make this part of the product registration by internet process.. Emergency radios SHOULD have GPS or a Bluetooth connection to a cellphone with GPS.

Ibiquity has a system that enables receivers to be selected by FIPS code or similar number. The translation to this code SHALL be included as it is suitable for HD home radios. This is a matter of liaison with Ibiquity.

PSSCCC. EAS uses a two digit regional code SS, which is adequate for North America and counties/provinces CCC are another three. The P was originally intended to be the first character of a country code and smaller countries would split to share the next character similar as is done for airplanes. In the implementation, P was defined as 0x00 (hexadecimal 00) (binary 00000000). More recently however the P has been assigned to be used for county sector coding. ASCII is the definition format with 0 (0x30) being the whole county, 1 being the northwest sector, 2 the north, 3 the northeast, 4 the west, 5 the central, 6 the east, 7 the southwest, 8 the south and 9 (0x39) the southeast. I suggest that 0x3A be reserved for the East 3 sectors unless the latitude and longitude area defines a smaller area. Similarly that 0x3B be the North 3 sectors, 0x3C be the West 3 sectors, 0x3D be the South 3 sectors, and 0x3E be reserved in county use. Also that 0x3F be reserved to mean that only the latitude and longitude area definition will apply, however that SHOULD only be used when county officials are satisfied that enough EAS decoders have the correct latitude and longitude of their position entered. This range 0x0-0xF is the last 4 bits of that byte. The FCC also wished to reserve 10 to 16 but these are not ASCII characters and so this is not currently implemented.

The P is further used for EAS+ routing. For this if the polygon is multiple counties, then the P SHALL be used to indicate which sectors of the state are affected in the same manner. In order to implement this, the county code then SHALL be AAA,

and the hexadecimal F value for the last four bits of P SHALL be reserved. However the value of hexadecimal E SHALL mean the whole state and the value of hexadecimal F SHALL mean a polygon within the state larger than a sector. The ENCODER/DECODER SHALL pass messages based on the coverage area, not whether the transmitter is located in the selected sectors for public mode. The use of private mode SHALL be to relay messages to additional sectors and counties defined. The code AAA for county is not a FIPS code, and SHALL be checked for compatibility with SAME code usage. This would then leave 30 other FIPS codes as available,

The SCTE reserved 0x30 to 0x3F for P. To assign subdivision codes to large countries seems desirable so in order to avoid conflict with software installed in the U.S. ;

0x00 - 0x0F Reserved (possible Antarctic, oceanic or space use)
0x10 – 0x1F China
0x20 – 0x2F Australia
0x30 – 0x3F USA as at present The FIPS/SAME codes are used.
0x40 – 0x4F Canada
0x50 – 0x5F Russia
0x60 – 0x6F Brazil
0x70 – 0x7F Argentina
This would be followed by the present SSCCC 5 digit code.

The State Emergency Communications Committee SHOULD be the organization to assign the counties to the sectors. Also as this, along with other configuration requirements, is making ENCODER/DECODER configuration a complex subject, along with the question of legal liability. So as broadcast engineering staff have not made these types of equipment configurations, and are not expected to do so with any frequency as to gain familiarity, this SHOULD be performed by staff with broadcast engineering experience, but employed by the SECC or SEMO. Such staff SHOULD also be responsible for preparing the system quality reports. Such staff SHOULD also have experience and qualifications in broadcast engineering, e.g. to the Chief Engineer level.

In order to provide for a country code, I propose that country codes start with bit 7 set to 1. This gives provision for country codes to be assigned as proposed below;
0x80 – 0x8F non-American and Caribbean countries.
0x90 – 0x9F non-American and Caribbean countries.
0xA0 – 0xAF non-American and Caribbean countries.
0xB0 – 0xBF Reserved so as to avoid compatibility problems with EASv0 software.
0xC0 Haiti & the Dominican Republic
0xC1 – 0xCF country codes including Caribbean and American not included above
0xD0 – 0xDF METAREAS
0xE0 – 0xEF This means that the locCodeUN SHALL be applied. County sectors are also selectable as noted above.
0xF0 – 0xFF country codes with next character being another country character, for small countries.
Some governments MAY derive their regional coding system from the zip or postcode system. This has the advantage that regular users usually know their zip/postcode, and when configuring their equipment can enter this. As some postcode systems are alphanumeric, this SHOULD be provided for in the user interface and format definitions. The final digits zero meaning a region broadcast MAY require some tweaking of the coding system e.g. using last digits ZZ if 00 is a zip/postcode number assigned. If ZZ is assigned, then perhaps 99 is not. That aspect of implementation needs further research, and the original design MAY be adequate worldwide. The countries are responsible for devising their identification scheme and if their assignment is unworkable, e.g. not enough characters in a country split character assignment, this is a matter to resolve as the standard is being finalized. The last byte SHALL have the last 4 bits assigned as above. The purpose of this is to make a definition such that one version of software SHALL apply to all EAS decoders in the world of that make and model, except if the country code is in the software rather than locally configured.

The seas and oceans, for administrative purposes, are currently divided into 19 areas. These are called METAREAS and, except for the ones called ARCTIC OCEAN and ANTARCTICA, the area is listed by Roman numeral, plus perhaps an N or S. This does not include freshwater areas such as the Great Lakes that are in the U.S. FIPS/SAME code. Also countries can include their economic zone of the sea in their country divisions. The U.S. has FIPS/SAME codes for these areas.

altitude; The specific or minimum altitude of the affected area of the alert message (OPTIONAL)

(1) If used with the <ceiling> element this value is the lower limit of a range. Otherwise, this value specifies a specific altitude.
(2) The altitude measure is in feet above mean sea level per the **[WGS 84]** datum.
Altitude SHALL be logged and included in the QC email. If there is a polygon, it SHALL be included as in the EAS+ polygon format.. Note that this is a world standard and where numbers only are given, it is in feet and the county is USA or Myanmar. For all countries the value can be *xxxxx*m or *xxxxx.x*m for 10 cm resolution. However CAP V1.2 does not support other than feet, and compatibility with air traffic control standards used is applicable. The leading zero MAY be a - for below sea level, or to ensure that shoreline or near shore ocean are included. Otherwise leading zeros are kept for simpler FEC.

ceiling; The maximum altitude of the affected area of the alert message (CONDITIONAL)
(1) SHALL NOT be used except in combination with the <altitude> element.
(2) The ceiling measure is in feet above mean sea level per the **[WGS 84]** datum.
Ceiling SHALL be logged and included in the QC email. If there is a polygon, it SHALL be included as in the EAS+ polygon format. Note that this is a world standard and where numbers only are given, it is in feet and the county is USA or Myanmar. For all countries the value can be *xxxxx*m or *xxxxx.x*m for 10 cm resolution. Leading zeros are kept for simpler FEC. Mt. Everest is less than 9999m high.

However as tsunamis and cold weather depends on altitude, this could be a basis for polygon definition in the future by translation in the ENCODER/DECODER where topographical data is available.

3.3 Implementation Notes

The notes SHALL be applied as specified to extract the data for EAS+.

The end of the EAS+ text SHALL include "<hash=##>". The hash value SHALL be for text only and begin with the polygon, if present. It SHALL end just before the <hash string. It SHALL be calculated as for CAP. If the hash value and calculated hash do not match, the text SHALL end with "??".

A resource efficient way to display photos or graphics on a TV would be to adapt the "picture in picture" feature.

3.4 XML Schema

As the example illustrates.

A currently unresolved question is the method of selecting whether EAS+ is sending an alert or relaying a CAP message using CAP Broadcast mode. The selection of the mode is by using ZCZC for EAS(+) alerting mode and replacing that with CZCZ for the CAP broadcast mode which is a message that SHALL be rejected by legacy EAS equipment. The selection may be made by interpreting the CAP message, or having a CAP term to select the mode, or possibly some combination. This is a standards definition issue that is to be raised.

3.5 User Interface Considerations

ENCODER/DECODERs SHOULD have two types of user interface in addition to any Telnet or browser interface. The keyboard, video display and mouse (KVM) interface with full functionality is a normal PC interface to the operating system (OS) which is normally a graphical user interface (GUI). In addition there SHOULD be an interface with a small display and some keys, buttons or touchscreen, this is known as the front panel interface (FPI). The FPI SHALL provide a number of functions including, but not limited to;

1) Display of message details, which MAY need to be scrolled. As language and other information is within the header code as binary, this SHALL be displayed in the ISO language code abbreviation. Local language SHALL be displayed as Local1 or Local2. The other binary information to be displayed needs to be defined.
2) A limited function menu, which SHOULD include;
    a. Viewing history.
    b. Selecting an alert to manually send from the allowable Event Codes.
    c. Selecting which user category to authorize this alert transmission, e.g. Engineering, Management, Master Control Operator, Emergency Manager, Police, Military, Fire Department. The default user category which SHALL be accepted SHALL be Master Control Operator only. Others SHALL be included if the State EAS plan with originator verification codes are applied. All others SHALL result in a cancellation of the message.
    d. Displaying which coverage area map is selected.
    e. Selecting whether pre-built text and audio or text entered in the KVM and audio via the microphone input is to be used.
    f. Sending the alert after a confirmation question is asked.
    g. Displaying an error condition, the details of which MAY require the KVM interface.
3) A display of satisfactory status of the ENCODER/DECODER.
4) A display of the time and date, with the date being local and UTC referenced, in the format MM/DD HH:MM:SS (UTC YYYY-MM-DD HH:MM:SS +/- HH:MM). The last HH:MM is the UTC offset.
5) The OPTIONAL ability to have a remote FPI when the ENCODER/DECODER is located at a transmitter site SHOULD be provided. The interconnection SHALL be via the STL and TSL for security. The failure of this interconnection SHALL NOT inhibit the ENCODER/DECODER from inserting alerts except for FPI manual ones. The automation system interface SHOULD be by this interconnection when so installed. If this interconnection fails for more than 30 minutes, the ENCODER/DECODER SHALL change to the immediate override mode. Restoration of this interconnection and communication between the automation system and the ENCODER/DECODER SHOULD restore the mode to normal.

When a broadcaster originates an EAS message, this SHALL be logged and communicated with the State Emergency Management Office via the IPAWS network, or via email if applicable. Then the SEMO has the option of further distribution, accepting the activation, or generating a

FAW, (False Alarm Warning). The area applicable SHALL be assumed to be the current broadcast coverage area as modified by the event code, e.g. tsunami for near shore. Any Daisy Chain/Mesh stations monitoring this broadcaster SHALL distribute the message with the area selected polygon being an approximation of the initiating broadcaster. As EAS+ to CAP translation is available, this SHOULD be similarly applied, then for example cellphones can receive a tsunami warning from a broadcaster.
The configuration of the ENCODER/DECODER SHALL be in accord with the circumstances of the installation, and jurisdictional requirements, e.g. which Event Codes are available in the FPI. While there is some disagreement as to whether broadcasters SHOULD be able to generate EAS messages, this has saved many lives in the recent American Samoa tsunami. Elsewhere there is described the importance of having a complex polygon describing the broadcast coverage area. This coverage area MAY vary with the hour of the day, and the month of the year, the hours of daylight affecting the Heaviside layer are one factor. Antenna pattern switching is another factor. This polygon is matched with the EAS area selection for determination as to whether an alert is broadcast. A suitable user interface to enter this data SHALL be provided.
The user interface configuration data entered MAY be directly used as operational memory or registers, in which case a backup copy on a memory stick SHALL be automatically maintained. If the user interface configuration data entered is not directly used as operational memory or registers, but as a result of some additional process, then this is two copies already. In either case, on every day ending with a 2, either of the month or of the year, then a checking process SHALL be applied verifying that both versions of the data are in agreement. If there is some discrepancy, then an error SHALL be indicated on the FPI, with details on the GUI. Then the operator or engineer SHALL determine which information is correct. Having an additional backup is desirable for this situation. This is not a normal requirement on a computer system, but the significance of one bit of information in terms of lives can be very consequential. It is observed with computer systems that there is a non-zero probability that any piece of information MAY be changed. Unlike broadcast, the error MAY NOT be a momentary click or picture error, but MAY otherwise remain undetected for a long time before creating a problem. One possible cause of such a problem is the effect of radiation. For this reason, it is desirable that the radiation hardness of ENCODER/DECODERs be known.
In simpler microcontroller or microprocessor systems, it is practicable for a processor to have code to periodically reset a watchdog timer. Normal operating systems currently do not readily support this. Also when the watchdog timer times out, it applies a reset to the microcontroller, which is like an automatic reboot. However complex operating systems tend to garble the data when that occurs. Nonetheless it is possible to have a PC run a real-time operating system (RTOS) with an application such as steering a satellite dish for over five years without a crash. This MAY be applicable with a variant of Linux running an EAS application, and achieve similar reliability. Testing to determine memory leaks and hard or flash drive usage to not run out of capacity SHALL be applied.

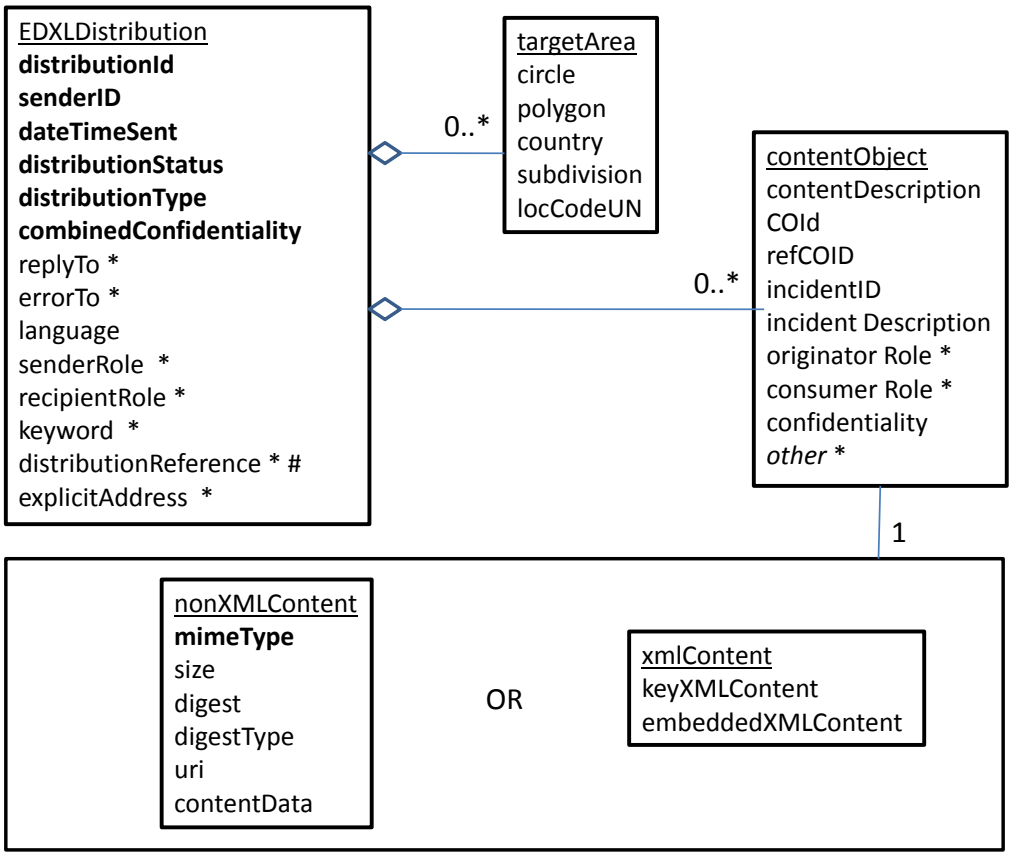
Appendix A.
Some message examples follow. Also in the EDXL-DE, more examples follow.

EDXL Distribution Element Structure

3. EDXLDistribution Element Structure (normative)

3.1 Document Object Model

Bold indicates required element.
Italics indicates one or more optional unspecified elements
# indicates conditional requirement
***** indicates multiple instances allowed



3.2 Data Dictionary

Note: Unless explicitly constrained within this Data Dictionary, EDXL-DE elements MAY have null values. Implementers SHALL check for this condition wherever it might affect application performance.

3.2.1 EDXL Distribution Element and Sub-elements

distributionID; This SHALL be logged and included in the QC email, the EAS+ header(s) associated SHALL be identified. Also this SHALL be in the EAS+ text as <distributionID=*distributionID*>.

senderID; This needs to be translated from the actor @domainname format to the -LLLLLLLL- format used in EAS+ for the message sent. Also senderID SHALL be included in the EAS+ text as <senderID=*senderID*>.

dateTimeSent; This SHALL be translated to the UTC -JJJHHMM format. For the EAS+ messages the local time offset is not included, so this shall be added to the text as <timeOffset=*timeOffset*>.

distributionStatus; "Actual" SHALL result in an EAS+ message.

"Exercise" SHALL generate an appropriate EAS+ message but the recipient category SHALL be First Responders via digital TV or radio. The message SHALL be transmitted in private mode. Either the first responders SHOULD be notified or the message contains "Exercise".

"System" These SHALL be logged, emailed to QC, and brought to the attention of ENCODER/DECODER operators. NMN activation code MAY apply.

"Test" EAS+ has DMO, RWT, RMT, RYT and NPT. RYT SHALL go to the public, NPT can be digital and not result in a message from a receiver.

distributionType; "Report" and "Update" SHALL generate appropriate EAS+ messages.

"Cancel" and "Error" SHALL either generate an appropriate EAS+ statement or a FAW, false alarm warning.

"Ack", "Request", "Response", "Dispatch" SHALL be logged and emailed to QC only. As these are message types that are not for the public, they SHALL not be publically broadcast, However they MAY be sent in private mode if the audienceType is “First Responders”. Otherwise CAP Broadcast mode SHOULD be used.

"SensorConfiguration", "SensorControl", "SensorDetection" SHALL be reserved for a future standard for remote monitoring and control of ENCODER/DECODERS. Otherwise CAP Broadcast mode SHOULD be used.

A currently unresolved question is the method of selecting whether EAS+ is sending an alert or relaying an EDXL-DE message using CAP Broadcast mode. The selection of the mode is by using ZCZC for EAS(+) alerting mode and replacing that with CZCZ for the CAP broadcast mode which is a message that SHALL be rejected by legacy EAS equipment. The selection may be made by interpreting the EDXL-DE message, or having an EDXL-DE term to select the mode, or possibly some combination. This is a standards definition issue that is to be raised.

combinedConfidentiality; The value SHALL be "UNCLASSIFIED AND NOT SENSITIVE" for public, domestic and vehicle category EAS+ messages. Other values are to be defined. If they are used, CAP Broadcast mode SHALL be used.

replyTo; This SHALL be included in the text as <<replyTo>

```
    <scheme> scheme </scheme>
    <address> address </address>
    <operation> operation </operation>
    <replyAuthentication> authenticationType </replyauthentication>
  </replyTo >>
```

and not included in the character count as are all <> content.

errorTo; This SHALL be included in the text as<<errorTo>

```
    <scheme> scheme </scheme>
```

<address> address </address>
<operation> operation </operation>
<replyAuthentication> authenticationType </replyAuthentication>
</errorTo >>

language; This is the primary language. Other languages MAY be used in the payloads but <language >*language* SHALL only be used once. In EDXL-DE, additional languages SHOULD be provided for either by additional messages, or in the future a TSO type terminology translation scheme may be implemented. A language selection scheme is defined within the constraints of the EAS protocol, and translation between RFC 3066 is either achievable or it is a single nation language and can be handled by the Unicode standard. The details are in the EAS+ documentation. If this is not specified, then "en-US" SHALL be assumed
-JJJHHMM-. This header code block identifies the Julian calendar date and the time the message was originally disseminated in hours and minutes using the 24-hour Universal Time Coordinated (UTC) clock.

An implication of the New Orleans experience of EAS performance is the desirability to be able to carry different languages. Also an implication of specific message coding is to be able to select appropriate language messages by different users. This means that language identification SHOULD be in the EAS header. While the header has everything assigned, a redefinition is proposed for the first J of JJJ, the Julian calendar day of the year. This J at present can only have the ASCII values of 0, 1, 2 or 3. So the proposal is to keep this the same for English. The date only requires the last two bits. So use the first six bits as follows

Binary 000000 Octal 00 Use for National or local language, ASCII 7 bit.
Binary 000001 Octal 01 Use for National or local language, Unicode extended data after Lat-Long.

Binary 000010 Octal 02
To To be assigned to multi-country or major languages, 10 codes
Binary 001011 Octal 13

Binary 001100 Octal 14 English
Binary 001101 Octal 15 Spanish
Binary 001110 Octal 16 French

Binary 001111 Octal 17
To To be assigned to multi-country or major languages, 17 codes
Binary 011111 Octal 37

Hexadecimal 0x80
To Reserved to keep 7 bit ASCII format
Hexadecimal 0xFF

These characters will read as ASCII "0", "1", "2", "3" for English, "4", "5", "6", "7" for Spanish (i.e. subtract 4 for the date value). "8", "9", ":", ";" for French as the date hundreds change. The rest are more difficult and not a current concern for the U.S. EAS system. However a few examples of multi-country languages are:
German is the language of Germany, Austria and Switzerland, so it needs a code.
Korean is the language of the Republic of Korea and the Democratic Peoples' Republic of Korea, so it needs a code as it is multi-country.
Chinese has many languages/dialects with one writing system. It is used widely in Singapore for example. So to provide the local language option for another spoken language, Chinese needs a code.
Russian and Arabic are multi-country languages. Japanese is an important language, and they have an extensive alert system also.
Latin is the international language of botany and zoology, so it needs a code.
Esperanto is neither a national or local language, but it is an official language of the U.N. so it needs a code.

In order for the duration of the EAS+ message to be transmitted for automation systems to schedule, the Second J SHALL have the values of the first bits as below. This data MAY be derived from the CAP audioDuration (not currently standard);
Binary 0000 15 sec.
Binary 0001 30 sec.
Binary 0010 Unknown duration (default value)
Binary 0011 45 sec.
Binary 0100 60 sec.
Binary 0101 75 sec.
Binary 0110 90 sec.
Binary 0111 120 sec.
Binary 1000 105 sec. (not RECOMMENDED, MAY become reserved)
Binary 1001 to
Binary 1111 Reserved

The repetition of the message with the same header by broadcasters MAY be permitted. This is a provision that some jurisdiction could select. The third J indicates this as below. Regardless of priority, these SHALL be overridden by subsequent messages. SDARS and DBS MAY also repeat the messages, but the code here SHOULD be implemented in the SDARS receiver or DBS set top box. Also subsequent messages SHALL override the repetition, regardless of priority. These times are not precise as they can be varied by up to 5 minutes either way by automation systems.
Binary 0000 15 min.
Binary 0001 30 min.
Binary 0010 No Repetition (the default).
Binary 0011 1 hour
Binary 0100 2 hour (not RECOMMENDED, MAY become reserved)
Binary 0101 to
Binary 1111 Reserved.

As Unicode has been proposed, perhaps the languages can be grouped into those that would use extended ASCII and those that would use Unicode for the extended data. However U.S. ASCII SHALL be the basis for the header code e.g. event codes, originators, etc. unless otherwise specified.
The first H SHALL have the first bits 001100 defined and reserved with the last two bits used for tens hour value. The second H SHALL have the first bits 0011 defined and reserved with the last four bits used for units hour value. The first M SHALL have the first bits 00110 defined and reserved with the last three bits used for the tens of minutes value. The second M SHALL have the first bits 0011 defined and reserved with the last four bits used for the units minutes value. If Unicode is mixed with ASCII in the text, the start delimiter SHALL be (space)$XZ. The exit of the Unicode mode appears to be defined by ISO 2022 and 6049. This SHALL be done before the pause and end of the message.

senderRole; The example illustrates this as being the sender device. This SHALL be included in the text as <<senderRole>
<valueListUrn>valueListUrn</valueListUrn>
<value>value</value>
</senderRole>>.

recipientRole; The example illustrates this as being the receiver device. This SHALL be included in the text as <<recipientRole>
<valueListUrn>valueListUrn</valueListUrn>
<value>value</value>
</recipientRole>>. CAP Broadcast distribution SHOULD be selected by appropriate list entries.

keyword; (not in v1.0) This SHALL be included in the text as <<keyword>
<valueListUrn>valueListUrn</valueListUrn>
<value>value</value>
</keyword>>.

distributionReference; (not in v1.0) This SHALL be included in the text as the <distributionReference=<distributionID> and <senderID> and <dateTimeSent>> of the referenced previous message, concatenated with a comma delimiter. E.g. < distributionReference=msgID0074,actor@domain-name,2004-08-01T16:49:00-07:00>.

explicitAddress; This SHALL be included in the text as <<explicitAddress>
< explicitAddressScheme> explicitAddressScheme </ explicitAddressScheme>
<explicitAddressValue> explicitAddressValue </ explicitAddressValue>
</ explicitAddress >>.

explicitAddressScheme This SHALL be included in the text as above.

explicitAddressValue. This SHALL be included in the text as above.

targetArea; The <targetArea> MAY consist of <circle>, <polygon>, <country>, <county>, <subdivision> or <locCodeUN>. As the definition of the area MAY consist of one or multiple instances of <polygon>, <circle> or <geocode> if the geocode does not correspond to a whole State, County, Region or Sector jurisdiction, then the appropriate jurisdictions SHALL each have their own EAS+ message with <polygon> as described. This is because EAS+ is designed to be processed by 8 bit processors in low power consumer devices. While the polygon points can be up to 32, it is too difficult for such processors to do navigational calculations for circles and are unlikely to have the database for the geocodes. Also the navigational calculations SHALL be for rhumb lines for simple arithmetic calculations. Also the calculation processing SHALL be completed within 0.8 sec in preparation to switch the audio incoming if appropriate.
circle; This SHALL be converted to a polygon as below. For data passage, the message SHALL include <circle=*circle*> if used in the source message.
polygon; see below.

There are two types of reasons for incorporating polygons;

1) Dale Gehman has made a filing providing detailed evidence as to the desirability of selecting area by using a polygon.
2) Vehicle radios are often part of a vehicle navigation system and so the position of the vehicle is known. Vehicle radio listeners are over 70% of the radio audience. However area selection by jurisdiction, or county sector, is not data available to car radios, and is unlikely to ever be provided as officially approved polygons in a practical manner. Therefore translation to polygons SHOULD be provided by the ENCODER/DECODER.

AN ALGORITHM FOR IMPROVED POLYGON TRANSMISSION
Only one polygon is acceptable for the output, however this may be derived by combining adjacent jurisdiction polygons, circles and CAP polygons. Non-adjacent shapes SHALL require a separate message.
This algorithm is compatible with NWS SAME, NMEA 0183 and CAP formats.
The U.S. NWS latitude and longitude format is illustrated by;

LAT…LON 3165 8940 3179 8939 3180 8904
3176 8904 3175 8902 3173 8904 3173
8907 3170 8912 3163 8938

$$

The numbers are two decimal places of degrees at the end with the degrees before them. This example has no hundreds of degrees. Minutes are not used, as the example has more than 59. They are in pairs, with the latitude preceding the longitude. This example is a 9 point polygon. It is always North latitude and West longitude. Latitude precedes longitude because in navigation, latitude was a known factor before the longitude was. The blank line before the $$ is optional. The tab on the second and third lines is optional. The $$ denotes the end of the message and the latitude and longitude is always the last item.

The proposed EAS+ format is illustrated by;

<pHash1=##>LAT.LON N52. (AB) E172.2 (ABC) N52.0 (ABC) W177.45 (ABCD) N51.02536 (ABCDEF) W177.451 (ABCD) N50.0096 (ABCDE) E172.176 (ABCD) A00593.2m (ABCD) C04000m (ABCD)<pHash2=##>

$$

The decimal points can be followed up to 5 places resolution, except for altitude and ceiling. The N, W, E, or S will be in the first character position because they are equivalent to a sign in arithmetic. They are in pairs, but the order within the pair SHOULD NOT be of concern to any software developed. Rather, all the pairs SHOULD have the same order for human convenience. The following blank line is [CR][LF] and is not necessary if $$ is there. For processing efficiency, the LAT.LON string SHOULD be the first thing in the body after the header so the microprocessor can be processing that while receiving the rest of the message. Then determination as to whether the receiver is in the area specified can proceed. The (AB…) sections are the forward error detection and correction characters used as part of the algorithm described elsewhere. The example crosses 180 degrees. This algorithm is rather contorted. That is deliberate so as to greatly increase the difficulty of reverse-engineering it. So this algorithm also aids the security by making it difficult to generate unauthorized messages. End of line is [CR][LF].

The algorithm is not made public, but would be on the next pages if included. The brackets and their contents SHALL NOT be displayed to the public. As this algorithm needs to be executed in devices like car radios, it cannot be too complex, also there is no possibility of the algorithm being upgraded as it has to be in firmware. The polygons are defined as enclosing areas for alert messages. Rumb lines are the connections between the vertices, these are simpler for small microprocessors to process. So the security is provided by inaccessibility from the public, which is one level. System security needs provision by other means, some of which are outlined elsewhere. Currently some exercising of the algorithm needs to be done to debug it but that SHOULD be completed soon. It provides for near or crossing of the equator or the 0^o or 180^o longitudes. If the bit error(s) in a character cannot be determined and corrected, but are too numerous, the character SHALL be followed by a "?". Then the polygon drawing algorithm can construct the largest polygon with the value that is unknown, this errs on the side of safety. Also the display of the “?” alerts the public to a signal quality issue. The limit SHALL be 32 points. The A and C are the altitude and ceiling in meters from the CAP-EDXL message. The NMEA units are in meters, which SHALL be used here. The A MAY be followed by a - for below sea level altitudes. The algorithm also accepts the NWS SAME format.

Also it provides for a secure mode which is accessed by using position N99. E199. To set and S99. W199. to clear this mode. In this mode, positions which can be from 90. to 99.99999 latitude and 180. to 199.99999 longitude can be used for county and sector positions and the FEC security mechanism will still work. However such positions SHALL NOT be displayed to the public, and the value of the sector SHALL be 0 to 9 only. This is an unusual FEC method in that it is human-readable. This is to be compatible with existing EAS equipment and for viewing by operators. It is advantageous that the security switches are passed through forward error correction. However they SHOULD be repeated also for reliability. This FEC algorithm is good against random noise, however it can be susceptible to burst noise. The pHash provides for detection of errors of consumer receivers. For improved reliability, the LAT.LON string can be repeated on a new line and the characters followed by a "?" SHOULD be replaced with acceptable data from the second copy if available in time. If there are discrepancies between accepted characters, the output of them SHALL be followed by a "?", but that SHOULD be infrequent.

If a second instance of the message is received and no "?" characters are in the message latitude and longitude section where there are any in the first message, the non-"?" character SHALL be substituted and the message transmitted. Consumer devices SHALL NOT reject a second instance of the message but SHALL amend their response so as to be applicable to the resulting corrected message. As small microcontroller consumer devices could be unable to process a 32 point polygon in a timely manner, such models may apply for an exemption to normal EAS+ compatibility requirements if they process the polygon using every odd number point.

The method of polygon closing SHALL be either by;

1) Finish polygon selection. The extra close polygon location point SHALL be generated as the origin point.
2) The origin SHALL be a snap point and selection within the snap box SHALL either finish the polygon or an Esc SHALL be required. CAD users are familiar with snap usage.

The <pHash1=##> and <pHash2=##> are the hash value for the polygon string excluding the <, > and contents calculated by the same algorithm as for CAP messages hash value and placed in the ## characters. If the received message hash value is the same as either ##, the number of bits in error including the <pHash12=> characters SHALL be added to the bit error count in EAS+ compliant decoders. The Forward Error Correction SHALL be applied and if the recalculated hash agrees with either hash value the message SHALL be forwarded with the incorrect hash value corrected. If there is no agreement between the three values, a "?" SHALL be added before the <pHash2=##> in the forwarded message. Then also for selection of the broadcast mode of private or public, the selection mode SHALL be based on inside polygon selection. In EAS+ compatible receivers, intended for consumer use, if the calculated hash value agrees with either pHash1 or pHash2, the polygon SHALL be used for selectivity selection. If not, then the selectivity SHALL be considered as inside polygon.

Fine Area Resolution Application. In a cellphone system, some handsets have GPS capability for a finer resolution of location than the cell sector. However most that are advertised as having GPS are likely to be using the E911 Phase 2 resolution of location which uses triangulation to more than one tower. While this uses extra processing at the tower, this is not a problem for 911 or revenue generating purposes. However EAS messages requiring the use of this can create a

demand surge that MAY NOT be adequately served in a timely manner. Therefore such application requires appropriate engineering.

Emergency Telephone Notification (ETN or Reverse-911) can also apply finer resolution in two resolutions. First there is the local switch (exchange) area of cabling which is normally within major geographic or political boundaries. This defines the last four digits area when Local Number Portability (LNP) is not applied. Second the telephone database also has the address of each customer within the previous area and this database could be used to determine precise location. In this case the processing demand surge for EAS MAY NOT be adequately served in a timely manner. Therefore such application requires appropriate engineering.

The NMEA-0183 format MAY be used for data from a GPS or other navigation device. Its' format is illustrated by;

$$GPGGA,hhmmss.sss,ddmm.mmmm,N,dddmm.mmmm,E,F,SU,HD.P,AL.T,M,G,M,DGPSA,DGPS,CHK[CR]LF]

Where GP means that a GPS is the talker identifier. GGA means that it is a global positioning system fix data sentence.
hhmmss.ss is the fix time (UTC).
ddd or dd are the degrees. mm.mmmm are the minutes
N MAY be S, E MAY be W,
F is position fix (0 = Invalid, 1 = Valid SPS, 2 = Valid DGPS, 3 = Valid PPS)
SU Satellites Used (2 digits, presently 12 max.)
HD.P Horizontal Dilution of Position (same units as altitude)
AL.T Altitude (based on WGS-84 ellipsoid)
M meters, units of HD.P and AL.T
G Geoid separation
M meters, units of geoid separation
DGPSA Age of DGPS data in seconds
DGPS DGPS Station ID, 4 characters
CHK Checksum, 3 characters. This is inadequate for Forward Error Correction
[CR][LF] carriage return, line feed
The NMEA (www nmea.org) first published this in January 1983. The use of minutes is because navigators used paper charts that had degrees and minutes on. A format to transmit polygons from a receiver to a videoplotter is being researched. There are some proprietary formats existing. The U.S. Census Department and U.S. Geological Survey use and prefer an ArcView Shapefile format. NMEA could be engaged to formulate a polygon standard sentence. However this format does not provide for error correction and the associated bit error and quality assurance, so a translation application would have to be developed between this format and EAS.

Compatibility with EAS+ Format above and SAME Format;
The SAME format has a limit of 10 points for a polygon. While this one has a limit of 16, the resolution is up to 1000 times finer. So when the resolution is reduced, this is like blurring and an algorithm converting to SAME format would require fewer points for a polygon. The five decimal place resolution is to less than a meter, though such fine resolution MAY only be needed when digging for avalanche victims for example. The example in the standard on **polygon** is 4 decimal places, but in the Appendix B. 1 lines 40 to 42 are to 14 decimal places. EAS+ SHALL round such resolution to 5 decimal places.

Application of Polygons Across Jurisdictions;
When the polygon is in one county, the P usage defines that polygon selection is to be applied. When the polygon is larger than one county or region, then the whole state (or region if applicable) code SHALL be selected and the P usage is applied to this larger area. If the polygon is across state borders, then the whole state code SHALL be selected and the P usage is applied inside the state. A similarly applied second message SHALL be generated for other states affected. The polygon MAY be the same in each case or MAY be segmented along state borders, but all equipment SHALL be able to process the message either way. If the polygon covers seas or oceans, then the message SHALL be communicated to the appropriate GMDSS authorities e.g. U.S. Coast Guard. If the polygon crosses national boundaries, the message SHALL be communicated to the appropriate national emergency management office for them to generate their national alerts. If these are automated transmissions, then the use of EAS+ will limit the content, but also assist the security of the CAP and DEAS core messages.

The CAP standard supports circles for area definitions. This is flexible for Emergency Management. Purposes, however to process this using latitude and longitude, requires trigonometric calculations with considerable accuracy. This is beyond the capabilities of small consumer microcontrollers because they are usually 8 bit devices and at least 32 bit processing is required. However proportional calculations on Rumb lines are possible. So circles to 8 or more sided polygons can be translated in the ENCODER/DECODER. The logging of this is noted in section 8 on Quality.

CAP uses + instead of N, and E and – instead of S and W. However this is not as humanly understood, so the letters are RECOMMENDED, but the sign SHALL also be acceptable and then the latitude precedes the longitude in pairs, with a comma after the latitude. The equator is then N0. (followed by zeros indicating resolution if needed) or 0. The 180 longitude is W180. not E180. The + sign SHALL always be used in EAS+ in order for the FEC algorithm to be simpler. A configuration of the ENCODER/DECODER SHALL be to convert CAP to NSEW usage or always use sign. The default SHALL be NSEW. In CAP, the last point coordinates SHALL always be the first point. In EAS+, if there is a difference, the last point to the first point SHALL always close the polygon. Any CAP polygons with more than 32 sides SHALL be simplified to the best fit in the ENCODER/DECODER. A limit needs specifying so that the consumer electronics processor limits are not exceeded, which would likely result in a crash of the processor and the message not being effectively received.

Inside Polygon?
When a line is drawn from the location to the limit, if it crosses an odd number of polygon lines, it is inside the polygon. 0 is an even number. This can be checked by going in all 4 directions north, south, east and west. While all four SHOULD agree, an error in calculation MAY occur, so a majority will count. A disagreement SHOULD produce a “Polygon Inside Error Check” message. Equal vote SHOULD produce a “Polygon Inside Undetermined Error”. The exceptions are when a polygon crosses the 180 longitude. A polygon SHALL NOT circle a pole, location selection SHALL be applied for both poles. The longitude for the poles SHALL be E0.0 so that no unexpected processor behavior results. If the receiver has known accurate altitude data, e.g. from a GPS, then the altitude and ceiling SHALL also be considered, otherwise it is not a selection criteria.
.

This check also works when a polygon is inside a polygon, or lines cross inwards. While the inner area MAY be considered “inside”, topologically it is more “outside”. Consider an isolated hill. When the water level rises it is still dry land, even though it is isolated. The correct mathematics is the correct answer. This can be compared to “I ain’t not going” to which a correct response could be “OK, when?” and the answer cannot be “Never.” To determine which part of the globe is inside, a polygon latitude and longitude SHALL NOT exceed 30 degrees, unless more than 60 degrees latitude, when 50 degrees longitude is permitted. The inside polygon test SHALL NOT apply to single or two point polygons. These are also permitted for RRE and RRS activation codes.

A vehicle radio that is connected to a navigation system SHALL be EAS+ compatible when the navigation system is capable of providing suitable directions to exit the polygon. The location of the problem inside the polygon is not an appropriate reference point as this draws the attention of and movement toward this point by some people.

Emergency Alerting is but one function of an EAS+ compatible consumer electronics device. So as a design goal, the resources and cost of the addition of this feature SHOULD NOT be in excess of the value of the added feature. This is a reason for tightly defining and limiting the requirements in consumer electronics devices. For example, assuming that alerts consist of about 0.2% of program time, the added cost of EAS+ SHOULD be about 0.2% of the product price. In reality, if the value can be demonstrated to be higher with market research, then that can justify a fraction of that value added. If it is more than a fraction, it is unprofitable to society, and MAY be politically unacceptable.

If a polygon has only one or two points, then this is for First Responders category receivers only for their information, e.g. for rescue purposes. It is not for selectivity in these cases.

If a rescue is the event code, additional "LAND", "SEA", "LAKE", "RIVER" or "SHORE" details SHOULD be included if the position is accurately known or if this information is communicated.
The direction of rotation of the output SHALL be following the left hand rule, i.e. your left hand is to the inside of the polygon, regardless of the direction of rotation of the user entry.

circle; Circles SHALL be translated to polygons with 16 points. Consumer receiver microcontrollers are normally 8 bit devices that are incapable of performing such plotting calculations in a timely manner. The radius of the circle is specified in km. For use in the U.S. and Myanmar, the use of kiloyards (kyd) is also proposed. The two are equivalent for normal emergency management use for this practical purpose.

country; see below.

subdivision; see below. In the US, this corresponds to the state.

county, region or tribal land; These are not provided for explicitly. In the US, these are identified in the FIPS code which also identifies the state.

locCodeUN; see below.
PSSCCC. EAS uses a two digit regional code SS, which is adequate for North America and counties/provinces CCC are another three. The P was originally intended to be the first character of a country code and smaller countries would split to

share the next character. In the implementation, P was defined as 0x00 (hexadecimal 00) (binary 00000000). More recently however the P has been assigned to be used for county sector coding. ASCII is the definition format with 0 (0x30) being the whole county, 1 being the northwest sector, 2 the north, 3 the northeast, 4 the west, 5 the central, 6 the east, 7 the southwest, 8 the south and 9 (0x39) the southeast. I suggest that 0x3A be reserved for the East 3 sectors unless the latitude and longitude area defines a smaller area. Similarly that 0x3B be the North 3 sectors, 0x3C be the West 3 sectors, 0x3D be the South 3 sectors, and 0x3E be the whole county. Also that 0x3F be reserved to mean that only the latitude and longitude area definition will apply, however that SHOULD only be used when county officials are satisfied that enough EAS decoders have the correct latitude and longitude of their position entered. This range 0x0-0xF is the last 4 bits of that byte. The FCC also wished to reserve 10 to 16 but these are not ASCII characters and so this is not currently implemented. The SCTE reserved 0x30 to 0x3F. To assign subdivision codes to large countries seems desirable so in order to avoid conflict with software installed in the U.S. I propose;

0x00 - 0x0F Reserved (possible Antarctic, oceanic or space use)
0x10 – 0x1F China
0x20 – 0x2F Australia
0x30 – 0x3F USA as at present
0x40 – 0x4F Canada
0x50 – 0x5F Russia
0x60 – 0x6F Brazil
0x70 – 0x7F Argentina
This would be followed by the present SSCCC 5 digit code.

In order to provide for a country code, I propose that country codes start with bit 7 set to 1. This gives provision for country codes to be assigned as proposed below;
0x80 – 0x8F non-American and Caribbean countries.
0x90 – 0x9F non-American and Caribbean countries.
0xA0 – 0xAF non-American and Caribbean countries.
0xB0 – 0xBF Reserved so as to avoid compatibility problems with EASv0 software.
0xC0 Haiti & the Dominican Republic
0xC1 – 0xCF country codes including Caribbean and American not included above
0xD0 – 0xDF METAREAS
0xE0 – 0xEF This means that the locCodeUN SHALL be applied. County sectors are also selectable as noted above.
0xF0 – 0xFF country codes with next character being another country character, for small countries.
Some governments MAY derive their regional coding system from the zip or postcode system. This has the advantage that regular users usually know their zip/postcode, and when configuring their equipment can enter this. As some postcode systems are alphanumeric, this SHOULD be provided for in the user interface and format definitions. The final digits zero meaning a region broadcast MAY require some tweaking of the coding system e.g. using last digits ZZ if 00 is a zip/postcode number assigned. If ZZ is assigned, then perhaps 99 is not. That aspect of implementation needs further research, and the original design MAY be adequate worldwide. The countries are responsible for devising their identification scheme and if their assignment is unworkable, e.g. not enough characters in a country split character assignment, this is a matter to resolve as the standard is being finalized. The last byte SHALL have the last 4 bits assigned as above. The purpose of this is to make a definition such that one version of software SHALL apply to all EAS decoders in the world of that make and model, except if the country code is in the software rather than locally configured.

The seas and oceans, for administrative purposes, are currently divided into 19 areas. These are called METAREAS and, except for the ones called ARCTIC OCEAN and ANTARCTICA, the area is listed by Roman numeral, plus perhaps an N or S. This does not include freshwater areas such as the Great Lakes that are in the U.S. FIPS/SAME code. Also countries can include their economic zone of the sea in their country divisions. The U.S. has FIPS/SAME codes for these areas. As polygons SHALL NOT circle either pole, a METAREA with finer resolution SHALL be used for pole selection

contentObject; Bold items on this list have further subdivisions. <contentDescription>, <**contentKeyword**>, <incidentID>, <incidentDescription>, <**originatorRole**>, <**consumerRole**>, <confidentiality>, <*other*>, <**nonXMLContent**>, <xmlContent>.

contentDescription; This is inserted in the EAS+ text following <contentDescription>

contentKeyword; Consists of <valueListUrn> and <value>. This SHALL be inserted in the text in the form <contentKeyword <valueListUrn=*value*> <valueListUrn=*value*>>.

incidentID; This SHALL be logged and in the email to QC with the headers of the EAS+ message(s) generated. Also it SHALL be inserted in the text as <incidentID=*incidentID*>

incidentDescription; This SHALL be in the EAS+ text following <incidentDescription>.

originatorRole; Consists of <valueListUrn> and <value>. This SHALL be logged and in the email to QC. Also it SHALL be inserted in the EAS+ text as <originatorRole <valueListUrn=*value*> <valueListUrn=*value*>>.

consumerRole; Consists of <valueListUrn> and <value>. This SHALL be logged and in the email to QC. Also it SHALL be inserted in the EAS+ text as <consumerRole <valueListUrn=*value*> <valueListUrn=*value*>>.

confidentiality; The value SHALL be "UNCLASSIFIED AND NOT SENSITIVE" for public, domestic and vehicle category EAS+ messages. The output text SHALL be <confidentiality= UNCLASSIFIED AND NOT SENSITIVE> in this case. Other values are to be defined. If other values are used, CAP Broadcast mode SHOULD be used.

other; This is for XML signing process. This SHALL be logged and in the email to QC. It SHALL be included in the form <<other> *other*>.

nonXMLContent; This SHOULD contain <mimeType>, <size>, <digest>, <url>, <contentData> in the form <nonXMLContent <mimeType=*mimeType*><size=*size*><digest=*digest*><uri=*uri*><contentData=*contentData*>>. The exception is when the mimeType is text and the contentData shall instead be included as below.

mimeType; As per RFC 2046. This SHALL be included as <mimeType=*mimeType*> in the EAS+ message if present.

size; This SHOULD be used in CAP Broadcast. Otherwise this SHALL be logged and in the email to QC and included as <size=*size*> in the EAS+ message if present.

Digest; This SHALL be used in CAP Broadcast. Otherwise this SHALL be logged and in the email to QC, and included as <digest=*digest*> in the EAS+ message.

uri; This SHALL be logged and in the email to QC. This typically is an URL for an HTML page for additional information. However note that internet infrastructure MAY be damaged, and the server capacity is very likely to be exceeded. A RECOMMENDED alternative is to use CAP broadcast to push .PDF or .RTF or other files to computers and comparable devices (PDAs with larger memory and such file viewing capability). So URIs will not be transmitted on EAS+ messages as links, but text that can be copied is acceptable and if present SHALL have <uri> beforehand. All URLs need to be checked with whitelist software so no unacceptable sites are accidentally transmitted.

contentData; This SHALL be logged and in the email to QC. If the mimeType is text, this SHALL be in the EAS+ message after <contentData>.

3.2.5 xmlContent Element and Sub-elements

xmlContent; (v1.0) This SHALL be used if there is CAP broadcast. Otherwise this MAY be used in the form <<contentXML>
<keyXMLContent><keyXMLContent><embeddedXMLContent><embeddedXMLContent>>
and SHALL be logged and in the email to QC. In v2.0 this is replaced with;

contentXML; This SHALL be used if there is CAP broadcast. Otherwise this SHALL be logged and in the email to QC

keyXMLContent; This SHALL be used if there is CAP broadcast. Otherwise this SHALL be logged and in the email to QC.

embeddedXMLContent; This SHALL be used if there is CAP broadcast. Otherwise this SHALL be logged and in the email to QC.

3.2.6 List and Associated Value(s)

valueListUrn; This is used in <EDXLDistribution/senderRole>,
<EXDLDistribution/recipientRole>, <EXDLDistribution/keyword>,
<contentObject/contentKeyword>, <contentObject/originatorRole>,
<contentObject/consumerRole>.
This SHALL be used as specified for those items and SHALL be logged and in the email to QC.

value; This is used in <EDXLDistribution/senderRole>, <EXDLDistribution/recipientRole>,
<EXDLDistribution/keyword>, <contentObject/contentKeyword>,
<contentObject/originatorRole>, and <contentObject/consumerRole>.
This SHALL be used as specified for those items and SHALL be logged and in the email to QC.

3.2.7 Reply to Type

scheme; This SHALL be included as <scheme=*scheme*>.

forwarder; This SHALL be included as <forwarder=*forwarder*>. If a multiple, SHALL be in the form <<forwarder=*forwarder*><forwarder=*forwarder*><forwarder=*forwarder*>>.

addresses; This SHALL be included as <addresses=*addresses*>. If a multiple, SHALL be in the form <<addresses=*addresses*><addresses=*addresses*><addresses=*addresses*>>.

replyAuthentication; This SHALL be included as <replyAuthentication=*replyAuthentication*>.
If a multiple, SHALL be in the form
<<replyAuthentication=*replyAuthentication*><replyAuthentication=*replyAuthentication*>>.

3.2.8 Authentication Type

authScheme; This SHALL be included in the form <authScheme=*authScheme*>.

authPrinciple; This SHALL be included in the form <authPrinciple=*authPrinciple*>.

authCredential; In the draft, this is spelled authCreditential, possibly not intended and this needs clarification. Assuming so, this SHALL be in the form <authCredential=*authCredential*>.

3.2.9 Explicit Addressing

explicitAddressScheme; This SHALL be included in the form <explicitAddressScheme=*explicitAddressScheme*>.

explicitAddressValue; This SHALL be in the form <explicitAddressValue=*explicitAddressValue*> OR if a multiple, in the form <<explicitAddressValue=*explicitAddressValue*><explicitAddressValue=*explicitAddressValue*>> .

hash This is not in EDXL-DE.
The end of the EAS+ text SHALL include "<hash=*hash*>". The hash value SHALL be for text only and begin with the polygon, if present. It SHALL end just before the <hash string. It SHALL be calculated as for CAP. If the hash value and calculated hash do not match, the text SHALL end with "??".

EAS+ AS A COMPLEMENT OF CAP AND EDXL

Abstract: CAP, the Common Alert Protocol standard, was developed in an EAS environment. It is rather complementary to EAS, but both its capabilities and other developments have led to the desirability of improvements in EAS (Emergency Alert System) itself. These are first considered, then the other improvements to EAS that together could be called EAS+ are considered.

COMPARING CAP AND EAS OR EAS+

CAP	EAS and EAS+ (+) means both
Emergency management application	Public alerting application
Private or secure network	Public distribution (cable & broadcast presently)
Complex and versatile	Simple and difficult to modify
Needs a PC level device	Needs a microcontroller device.
Moderate or high expense device	Low cost device (radio, TV, perhaps + cellphone)
Significant power consumption	Low power consumption
Device SHALL always be on	Device can be in standby if suitably designed
Device is not readily mobile except PDA-cellphone with internet	Personal and Vehicular mobility.
CAP can generate EAS messages	EAS(+) messages, in their limited content, can generate CAP messages with assistance. + is better.
Private networks can be infiltrated	EAS daisy chain/mesh can be infiltrated.
VLANs can be infiltrated (difficult)	EAS+ is more difficult to infiltrate
Successful infiltration can be very serious	Successful infiltration can be apparent to public
Separate from ISP, corporate LAN alerts	EAS+ for ISP or corporate alerts, not remotely hackable for large population
Unsuitable for automatic messages to adjacent countries, (national security).	Suitable for automatic messages to adjacent countries and counties across border where selected
Device location awareness an add-on	Device location awareness can be in-built or E911-2
More training of staff	Can operate automatically e.g. night radio station
TCP/IP error correction	EAS triple redundant header and testing only. EAS+ adds BER, monitoring, FEC for Lat-Long.
Needs power and network at all points	Broadcast stations with generators have large coverage, daisy chain/mesh a backup for "CAP" network failure.
Largely fiber or microwave transmission	Broadcast transmission
Satellite transmission SHALL be bidirectional except DEAS	Satellite transmission is one direction
Unsuitable for SDARS & DBS	Suitable for SDARS and DBS
Unsuitable for cable/telco STBs	Suitable for cable/telco STBs
Fiber can fail with ground shear	Broadcast towers can fail in earthquake or building failure e.g. 9-11
Possibly better to cellphone towers	EAS+ suitable for cellphone towers (cost only?)
Difficult to use for Fire-Alarm/PA systems	EAS+ suitable for Fire-Alarm/PA systems (no WAN)
Audio not inherent, text to speech MAY be needed	Audio inherent, text-to-speech is an add-on
CAP cannot be securely internet broadcast	EAS+ can broadcast CAP securely

CONCLUSION;
Both CAP and EAS+ systems are complementary and having both provides a measure of redundancy in an Integrated Public Access Warning System. Other technologies such as CATS, an email system for emergency messages also known by other acronyms, and reverse-911 for limited personnel e.g. first responders, are also applicable and probably have an appropriate place if only for redundancy.

A COMPARISON OF EAS AND EAS+;

The Society of Cable Television Engineers (SCTE) has published a standard (J-STD-042-2002) for the transmission of EAS on digital cable systems, to be decoded by cablecards. Unlike the original EAS, the EAS data and audio are separated from the program audio and video. This is done by using different PIDs (Program Ids) in a multiplexed digital stream. The decoding device determines if the EAS message is intended for the recipient and if so, then it overrides the audio and superimposes a crawl that is similar to how TV broadcasters currently transmit EAS video. This was included in my 2005 submission to the FCC, minus the acronym. This is the most suitable standard for how to implement EAS in DBS and SDARS (Satellite Digital Audio Radio Service) systems. Some adaption to do this MAY be required. XM radio already has a dedicated channel for emergency information, but there is no widespread usage of the approach of superimposing EAS video and substituting EAS audio for the program.

This recipient override selection capability is an important component of solving the over-alerting problem. While first responders and legislators MAY NOT consider this an important problem, the general public certainly does. Otherwise alerts are liable to have as much attention given as advertisements. Also there SHOULD be legislation inhibiting advertisers from mimicking EAS alerts just as private cars are prohibited from operating sirens. The numbers in brackets refer to the appendix where this is explained in more detail.

EAS	EAS+
Message overrides audio program	Only in EAS compatible mode or when recipient selected by location and category (1)
Message superimposes or replaces video	Superimposes only in EAS compatible mode or when recipient selected by location and category (1)
HD radio, ATSC, DVB-T same as analog	EAS+ data and audio in a different PID, the analog transmission would be in the EAS compatible mode (1,4)
Location selection by coverage or headend	Location selection by jurisdiction to county sector or latitude and longitude.(1,2)
Lat-Long specification by NWS format	Lat-Long by NWS or EAS+ format, worldwide (2)
Relationship of Lat-Long to jurisdiction not specified	Relationship of Lat-Long to jurisdiction clearly specified (2)
Lat-Long resolution to 0.01 degree	Lat-Long resolved to 0.00001 deg EAS+ format (2)
Resolution suitable for weather	Resolution suitable for gas pipeline break (2)
School Weather Closing or Water Supply Warning not permitted	School Weather Closing & Water Supply possible in EAS+ mode
Response time in minutes	Response time in seconds for special messages
Unites States of America only	Canada and any other country (1)
English only, no language code	All languages possible (1,8)

County and sector area selection	Latitude and Longitude polygons added (2)
Area selection not feasible by car radio	Selection feasible by car radio for HD and SDARS (2,4)
Location by street address	Location can be by sector automatically with product registration also, or NMEA-0183 (2)
AMBER Alert no pictures	Pictures possible for graphics devices (JPEG?)
No DND (Do-Not-Disturb)	EAS-DND possible with priority messages passing
RMT interrupts program or spot	RMT scheduled by traffic, counted as PSA
RWT not to the consumer	RWT to the consumer in all-EAS message mode
No RYT (Required Yearly Test) a National Test	RYT interrupts program or spot at announced time of the year, a PSA time.
Error correction in triple header only	Adds FEC (Forward Error Correction) for lat-long (2) and hash for consumer receiver
Human monitoring only plus logs	Automated monitor including BER also (7)
Active code testing requested	No active code testing needed (6)
Selected codes transmitted	All codes transmitted (not 0 priority to DBS or SDARS) (6)
Not to fire alarms/PA systems	To fire alarms/PA systems
Incompatible with E911-2 resolution	Compatible with E911-2 cellphone sector resolution
Protocol defined in ASCII	Same protocol for US English, defined in binary, with latitude-longitude extension permitted (1,2)
Emergency location in remote area difficult for 911 calls if E911-2 unavailable	Location by latitude-longitude simpler when 911calls include this from the car radio or cellphone GPS (4)
No secure message transmission	Checks against tampering/infiltration and secure message transmission for limited use (1,2)
Data is FSK audio, not easily compressed	Data is data in separate PID, audio remains for unique FSK or SEWS alerting sound
Basically audio with modem for data	Basically digital audio and data
Audio levels a problem	Audio levels need to be correct for the microphone, not a problem thereafter once analog outputs set, details in (7).
"West, Texas" City or region?	Only the specified area gets the alert to the people (1)
FCC evaluation or equivalent certified	Adds self evaluation and staff test (3)
Broadcast & cable only	Adds ISPs, LANs, cell and IP phones (5)
EAS+ English compatible in US.	EAS compatible with less functions supported.
Override mode only	Priority 1 override, others work with automation, MAY use PSIP. (6)
Daisy chain of broadcasters (some more)	WARSEPS primary distribution with digital secondary channel daisy chain backup
Suitable as analog periphery	RECOMMENDED for daisy-chain core
Only National override	Priority scheme especially for DBS & SDARS
Specification and various plans	Engineering Standard and RECOMMENDED Practice for improved quality both ways
No critical, severity or urgency codes	These codes possible with restrictions
Legal mandated architecture	adds architecture for value to society
No categories	receiver categories for more selectivity.
911 outage warning usually impractical	911 outage warning practical

Everything is public	Private mode available
Mandate based paradigm	Adds Value Based Paradigm.
Value determined by mandate fulfillment	Value demonstrated by usage documentation with market research data added
Event codes limited to large events or CAE	Event codes for local problems can be added (6)
Penetration limited, e.g. radio or TV off	Significantly better penetration e.g. with EAS+ alarm clock radios when people are asleep
Cannot normally be used to generate CAP	CAP messages normally SHOULD be generatable without significant loss of data.
No “Abandon Facility” provision	“Abandon Facility” situation provided for
Digital radio and TV introduce delay	Minimal digital broadcast delay

(The references below are to the book on EAS and EAS+)

1) EAS Protocol in sec 3.10 and OP 10.D
2) Latitude and Longitude in Appendix A
3) Self Evaluation & Staff test OP Appendix J and sec 8
4) HD Radio considerations in Appendix D
5) ISPs, larger LANs and buildings/venues/campus/fire/PA I OP 15. 7-11
6) EAS codes and routing prioritization in OP 10 C
7) Reliability & Audio in Appendix E.
8) Multiple languages (up to 4) can be transmitted in parallel or simultaneously on TV, but bandwidth limitations on HD radio require that they be transmitted in serial (sequential).

SUMMARY;
A full description of a project plan to implement this is in the 2005 FCC submission, but in brief there is the scope definition, standards development and implementation. The implementation here is primarily developing improved firmware and installing it. Implementation can begin before standards development is complete, which is usual. Because EAS+ will handle EAS messages, and EAS SHOULD handle EAS+ messages, there is no switchover required. The "SHOULD" in reality requires testing in case there are some unexpected behavior(s) which would limit what can be done until the upgrade is complete. With these improvements, and perhaps others not listed here could be included, the EAS+ SHOULD provide satisfactory service for a long time into the future. While digital technologies are developing, there is no prospect of digital being replaced by something else, unlike analog being replaced.

IN CONCLUSION;
There have been many proposals for improvements made, some overlap what is here. Some MAY be worthy additions to this. However at the end of the day, it is what is implemented effectively that really counts in terms of lives and property saved. Some critics are really not supportive of new proposals, because of the quite patchwork implementation that currently exists. That is an honestly valid point of view. If the proposals are implemented in conflicting ways or otherwise divert human and fiscal resources such that a well intentioned but shoddily implemented system results instead of a simple but very effective system, then the critics will have been proved to be absolutely correct, and I would have to agree with them. This is an aspect of finishing the job, and there is a legend of a man named Abraham who had to go to the top of a mountain and among other things had to cut up a couple of birds. However the job did not get completed, and the consequences were very severe. In TV there is the split between engineering and operations/production. This is comparable, but in my experience the two aspects can

effectively work together and this is through good communications, which is a very important part of project management.

RECEIVER CATEGORY FOR ADDITIONAL SELECTIVITY <audienceType>

In addition to location, the category of the receiver can provide additional selectivity for EAS+ messages. The categories are assigned as follows;

0x000000 to
0x001011 reserved
0x001100 Public (Except First Responders, IHS)
0x001101 Vehicle receivers (including first responders and trains)
0x001110 Domestic or household receivers (business if purchased as a domestic model)
0x001111 First Responders special receivers.
0x010000 Telephone company #1 subscriber
0x010001 Telephone company #2 subscriber
0x010010 Telephone company #3 subscriber
0x010011 Telephone company #4 subscriber
0x010100 to
0x010110 reserved for other telephone or cable TV company.
0x010111 Cable TV company subscriber
0x011000 Cellphone company #1 subscriber
0x011001 Cellphone company #2 subscriber
0x011010 Cellphone company #3 subscriber
0x011011 Cellphone company #4 subscriber
0x011100 to
0x011110 reserved for other radio transmission company.
0x011111 Messaging Company (e.g. RIM) subscriber
0x100000 to
0x101011 ISPs and System Administrators
0x101100 Everyone
0x101101 Intelligent Highway Signs special receivers (perhaps backup system)
0x101110 to
0x111111 Reserved for compatibility with 7 bit ASCII

These six bits would be applied to the bits before the last two in the tens of hours of HH in the header. The Public category would display the tens as 0, 1 or 2 in ASCII. The Vehicle category would display the tens as 4, 5 or 6 in ASCII. The Domestic category would display as the tens as 8, 9 or : in ASCII. The First Responders would display the tens as <, = or > in ASCII. The first 3 bits are defined as 001 in 8 bit ASCII. This SHALL be a category programmed into the receiver at the time of manufacturing. Only First Responders receivers MAY need configuring in this respect as they MAY be some model(s) of other receiver.

The allocation of company name to the assignments above would be on a statewide basis, with unused assignments in border counties where there are companies not present in both states.

By making this additional selectivity, then except for basic receivers which are not EAS+ compatible or compliant, the messages for other than everyone can be deselected. Vehicle

receivers could be selected for AMBER ALERT messages. School weather closings could be selected for domestic receivers. Messages for First Responders could be selected by their specially coded or configured receivers. User menus could add configuration with a minimum of one choice. If more categories are needed, there are four more available.

Currently available "emergency style" receivers are basically cheap or low quality receivers with a manual generator added. They are not digital, usually not even stereo. There is a market gap for something bigger than the current mini FM receivers that can deliver louder headphone levels like a mini-boombox can and is also stereo or HD radio compatible, yet is portable and be EAS+ compatible. Disasters happen where people are, which MAY be distant from the "emergency style" receiver that is collecting dust in a closet. As power consumption reduces, digital EAS+ TVs that have emergency power source or option MAY become available before long. An LCD display EAS+ compatible alarm clock radio that keeps accurate time from the broadcaster and has a long-life rechargeable battery and external DC adaptor for 12V and a generator that might be used for other things e.g. recharge LED flashlights or cellphones would be a product that would be valuable in normal use as well as in emergency.

These selection mechanisms might also be applicable for more targeted advertising, but the design of EAS+ is not optimized for that application. An event code of ADV with a priority of 0 would be reserved for this application. There are other mechanism(s) implemented in relevant standards that are optimized for this application. Any such advertising SHALL be restricted to the single broadcast coverage area and any cable/telco carriage. This would also apply to any broadcasters that are part of the daisy chain. This application SHOULD also be restricted to digital broadcasting.

The reason for the carrier section of the categories is primarily in case of failure of the 911 system. This way only subscribers of the carrier with the problem will be selected to receive the message, unless there is no selectivity for that receiver.

ENCODER/DECODER SELECTIVITY AND TRANSMISSION MODE RELATED

The - after TTTT is the 5th hyphen, and SHALL be used as below.
Binary 00101101 normal hyphen
Binary 10101101 Soft hyphen, Private or Daisy chain/mesh relay mode also for First Responders, IHS or Rescue.
The - after JJJHHMM is the 6th hyphen, and SHALL be used as below.
Binary 00101101 normal hyphen
Binary 10101101 Soft hyphen, Private or Daisy chain/mesh relay mode also for First Responders, IHS or Rescue.

In Normal mode ENCODER/DECODER selectivity, the transmission of a message SHALL be when the transmitter coverage area intersects with either a polygon or a jurisdiction selected area. Subject to further mode selection of digital only for first responder or IHS category, or Rescue Required event codes, the origination of a message SHALL set the bits as above. Also the message SHALL be transmitted with the audio in the alternate PID while normal programming continues in the regular PID. Also such messages will not be displayed in normal receivers. An algorithm for selection follows. All Private Mode message transmissions SHALL be made immediately or in priority order without further delay. When there are multiple program streams, even though there MAY be different languages, there is no need for multiple alternate PIDs. The lowest number alternate PID SHALL be accepted as the default. For radio, as the multiple languages are transmitted serially, this conserves bandwidth. For TV, the languages audio SHOULD be transmitted in parallel. The text crawl SHALL display the languages serially. This MAY be modified at such time that all TVs are displaying the crawl from the internal character generator. Then at such time, if there are different languages on different channels, the crawl MAY display the language selected for that channel first, followed by other languages. The audio SHOULD also be for the language selected, if available. As the duration of the alert is the audio duration, the longer duration of a crawl for multiple languages SHALL be for the benefit of multilingual audiences, e.g. in a public or patronized environment.

Q0; Are the first bit of the 5th hyphen and the 6th hyphen both set to 1?
A01; If no, go to Q1.
A02; If yes, go to Q3
Q1; Are both set to 0?
A11 If yes go to Q2.
A12 They both differ, generate a “Privacy mode bit error” alarm. At the multiplexor, put the audio stream with mute in channel 2 to the primary PID and the other stream to the alternate PID. If there is no mute on channel 2, place the audio stream with the least bandwidth, which can be assumed to be the EAS audio in two (or more) languages to the primary PID. However do not change the bits received so the EAS decoder downstream or the monitoring receiver decoder will note this error and log and report it. This at least provides reasonable failsafe protection. Exit.
Q2; Is the jurisdiction or polygon selection in the transmitter coverage area, or is the polygon error check not making corrections successfully?
A21; If no, go to Q4.
A22; If yes, go to Q5

Q3; Is the jurisdiction or polygon selection in the transmitter coverage area, or is the polygon forward error correction check not making corrections successfully?
A31; If no, go to Q6.
A32; If yes, go to Q5
Q4; Is the audienceType First Responders or IHS?
A41; If no, got to Q7.
A42; If yes, set the first bit of the 5th hyphen and the 6th hyphen to 1, broadcast in Private or chain/mesh mode, where the EAS audio is in the alternate PID, and EAS+ compatible consumer receivers do not display the text data. Exit.
Q5; Is the event code RRE or RRS?
A51; If no, go to Q6
A52; If yes, set the first bit of the 5th hyphen and the 6th hyphen to 1, broadcast in Private or chain/mesh mode, where the EAS audio is in the alternate PID, and EAS+ compatible consumer receivers do not display the text data. Exit.
Q6; Is the source from a selected Emergency Management Office?
A61; If no, set the first bit of the 5th hyphen and the 6th hyphen to 0, broadcast in normal mode subject to whatever other requirements. Exit.
A62; Set the first bit of the 5th hyphen and the 6th hyphen to 1, broadcast in Private or chain/mesh mode, where the EAS audio is in the alternate PID, and EAS+ compatible consumer receivers do not display the text data. Exit.
Q7; Is the event code RRE or RRS?
A71; If no, go to Q8
A72; If yes, set the first bit of the 5th hyphen and the 6th hyphen to 1, broadcast in Private or chain/mesh mode, where the EAS audio is in the alternate PID, and EAS+ compatible consumer receivers do not display the text data. Exit.
Q8; Is the source from selected Emergency Management Office(s) and to jurisdictions listed in installation?
A81; If no, log the reception and email to QC only. Exit.
A82; Set the first bit of the 5th hyphen and 6th hyphen to 1, broadcast in Private or chain/mesh mode, where the EAS audio is in the alternate PID, and EAS+ compatible consumer receivers do not display the text data. Exit.
Q9; Are the first bits of the 3rd and 4th hyphens set to 01 respectively indicating <*status*> of EXERCISE?
A91; If not go to Q10.
A92; If yes, set the first bit of the 5th hyphen and 6th hyphen to 1, broadcast in Private or chain/mesh mode, where the EAS audio is in the alternate PID, and EAS+ compatible consumer receivers do not display the text data. Exit.
Q10; Are the first bits of the 3rd and 4th hyphens set to 10 respectively indicating <*status*> of TEST?
A101? If no, exit
A102? If yes, AND the event code is either RMT, RWT, NPT or DMO, set the first bit of the 5th hyphen and 6th hyphen to 1, broadcast in Private or chain/mesh mode, where the EAS audio is in the alternate PID, and EAS+ compatible consumer receivers do not display the text data. Exit.

If advertising is permitted (ADV), the audio SHALL only be on the alternate ("emergency" in Dolby Digital) and the station does not insert a crawl. The selectivity of EAS+ receivers is applied. Do-Not-Disturb is not overridden, but the advertisement SHALL be displayed and heard if no emergency message overrides it. So the method above is modified for this case. It is expected that advertising is only inserted for the station selected and not passed along the chain,

unless the State legislation authorizes that. The background SHALL be green or blue only, and EIA708 captioning provide the text and any pictures SHALL be handled the same as AMBER Alert pictures.

A subsequent processor, e.g. an MPEG splicer, receiving this data as serial or LAN from the encoder/decoder SHALL compare the value of the 5th hyphen and the 6th hyphen in the received data and check this for validity by their being the same. If they are different, generate a "Privacy mode bit error" alarm.

ENCODER/DECODER configuration is different in that rather than selecting activation codes, the ENCODER/DECODER is configured for the location, jurisdictions and transmitter coverage. Also using a standard, to be defined, it SHOULD be possible to check the configuration of ENCODER/DECODERS remotely for operations and compliance checking.

Where other technologies are unavailable for ENCODER/DECODER connection to a local EMO, one that appears to be overlooked is the use of a single audio line. By notching out the middle of the voice spectrum, a modem can be inserted with a low bit rate. The intelligibility of the voice is little affected.

QUALITY MONITORING;

There are numerous emails generated by each CAP and EAS+ message. At each state monitoring part of the SEMO, the quality monitoring application SHALL examine these emails with human access to the basic email for further detailed analysis. Basically this SHALL process each email into a database of initial data based on;

EAS+CAP Message Result States

The validation steps result in three states, Rejected, Ignored, or Accepted. The resulting actions that SHALL be taken are described below. Returning a result provides a valuable mechanism for message validation to the sender, CAP servers MAY support this option, and if not, a separate email server SHALL be implemented. Also such servers SHALL be capable of receiving emails from monitoring receivers or other appropriate devices. If the EAS+CAP Profile Decoder does send the OPTIONAL return message, it SHALL conform to the syntax rules described below, and SHOULD also carry the additional information in the following numbered list if available. This methodology will be further reviewed by the EAS+CAP Industry Group before further recommendation.

Rejected:

An EAS+CAP Profile Decoder SHALL NOT further process or render a rejected message. It SHALL generate a return message and the syntax SHALL be a <msgType> of "Error", a <note> element describing the issue, and a <references> element containing the extended message identifier (in the form *sender,identifier,sent*) of the Rejected message.

Ignored: An EAS+CAP Profile Decoder SHALL NOT further process or render an ignored message. It SHALL generate a return message and the syntax SHALL be a <msgType> of "Ack", a <note> of "Ignored" ("Ignored" MAY be followed by a colon (":") and a text description of the issue), and a <references> element containing the extended message identifier (in the form *sender,identifier,sent*) of the Ignored message.

Accepted: An EAS+CAP Profile Decoder SHALL generate a return message and the syntax

SHALL be a <msgType> of "Ack", a <note> of "Accepted", and a <references> element containing the extended message identifier (in the form *sender,identifier,sent*) of the Accepted message.
If the EAS+CAP Profile Decoder places the alert on the air, it SHALL generate an additional return message with a <msgType> of "Ack", a note of "Aired on" followed by the FCC Call Sign(s) of the stations(s) that the alert was sent on, and a <references> element containing the extended message identifier (in the form *sender, identifier, sent*) of the aired message. This MAY result in multiple "Ack" messages in the case where an EAS+CAP Profile Decoder controls more than one broadcast outlet. Furthermore the following information SHOULD be provided when available.

1) The message identification in CAP, and where ENCODER/DECODERS are involved converting CAP or EDXL-DE messages to EAS+, the resulting identification.
2) The time the message was received, preferably based on GPS time at that location.
3) The Bit Error Rate (BER) for EAS+ messages received.
4) The Privacy mode on EAS+.
5) A copy of the CAP, EDXL-DE and EAS+ message.
6) The latitude and longitude of the location of the message originator from file.
7) The email address of the message originator.
8) The response of the QC receiver or ENCODER/DECODER to performance email check when appropriate.
9) The time the EAS+ message was transmitted, preferably based on GPS time at that location. . This provides a measure of the transit time from the sensor message transmission to reception by the public.

If an email confirming message transmission from an ENCODER/DECODER or by a monitoring receiver in the coverage area, a status and log request email SHALL be sent to the appropriate device. If a reply is not received in 20 minutes, another request SHALL be sent. So within an hour, the data to locate problems SHOULD be available. The reply confirming transmission according to the log MAY be displayed in paper space, but is not a substitute for an original confirmation.

This database SHALL be used to derive a graphical display of the state map, including details to street or house resolution. This SHALL be in a CAD format to allow appropriate zooming to areas of interest. If AutoCAD is used, there are capabilities using LISP applications and DBMS interfaces. The message responses SHALL be displayed in the following colors;

Color	Layer Name
A) Light Green	CAP or EDXL-DE message.
B) Dark Green	CAP Broadcast
C) Light Blue	EAS+ message, normal mode
D) Dark Blue	EAS message (where applicable)
E) Violet	EAS+ message, private mode
F) Red	EAS+ message required but not reported. This MAY be in paper space.
G) Orange	EAS+ message corrupted or excessive BER
H) Yellow	Boundary of the message jurisdiction or polygon

The coverage of each broadcasters, excluding fringe areas, SHALL be included on other layers. This MAY be one layer per broadcaster. The definition of what constitutes coverage area selection is to be made by appropriate authorities.

Operators of this application SHALL be checked for color blindness. Other alerting technologies can be included similarly on layers to be defined in similar colors. This will give a simple graphical display of each message distribution so staff can readily confirm the results. This will be a file to be saved for each message sent. Also subsequent analysis can be performed. This is a basis for design for quality.

Further analysis SHOULD include combining the coverage with Arbitron and/or Nielson rating data for those broadcasters at that time to determine the positive and negative value of the message transmission as considered in the Value related appendix or filing. In order to include radios or TVs that are tuned to the channel but on standby awaiting selective message reception for activation, this would require further market research, and the consideration that at present this option is generally not available. There are reportedly some analog EAS radios and TVs in use that can activate from standby in this manner, but there does not appear to be any currently manufactured other than some of the Weather Radio capable models. These are not usually found in consumer electronics retailers. While policy decisions are likely to reflect the consumer and market reality, some market research can provide more data to support the basic policy approach and clarify some details, in a cost-effective manner.

Reporting the positive and negative value and their sum, and the determined penetration and response time for this technology for each message will provide guidance for future management of this system. This is not a substitute for mandated requirements such as National Activation, but would ease the demand for the management and fiscal responsibility to be based primarily on such mandates. Similar analysis of other alerting technologies SHOULD be made so a realistic comparison can be made. As a technology becomes obsolete, such indicators would provide a basis for decisions regarding improving or removing the system. For example pagers have been around for many years, but are rare now.

The central processing of CAP messages is a point of failure. This SHALL be duplicate redundant at a minimum except for countries with a population of less than 1 million, in which case the duplication or higher redundancy SHOULD be arranged with neighboring countries. Computers have varying reliability. The best have RAID6 storage, hot-swappable redundant processing, fans that can be replaced without having to shut off the system, electrolytic capacitors rated 105 C or better, and other best practices. Such reliability is available from NonStop (an HP division), Stratus, and others. The operating system can be very reliable, UNIX and its' real time variants have the ability to be updated without rebooting for example. Applications can be written in Ada which is a language that checks for buffer overflows, divide-by-zero, and other weaknesses that erroneous data and hackers can exploit to crash processes. SPARK is a higher reliability implementation of Ada.

In the event of a facility being abandoned because of an emergency, an ENCODER/DECODER SHOULD have an "Abandon Facility" protected switch that cannot be inadvertently operated, and gives a visible indication of its' status. Such a switch SHALL NOT use contact material that could tarnish or corrode like silver does. Use of a register in the electronics is not RECOMMENDED as incorrect operation or radiation could erroneously change the status. The Abandon Facility mode of an ENCODER/DECODER would allow an audio loop program to play to air from the ENCODER/DECODER or external GPI controlled device. This loop SHOULD be a significant length, at least an hour, and MAY include some advertising. That audio would be interrupted by emergency messages. A video loop MAY also be implemented and selected by the keyer input selection. A log fire or a waterfall are examples. The purpose of

this “Abandon Facility” mode is to enable broadcast staff to avoid serious injury or loss of life, and be in compliance with Emergency Management evacuation directions, yet still be able to provide the public with emergency information. A selectable ability to repeat messages of specific event codes every 15 minutes in this mode SHOULD be provided. Such situations have occurred, without appropriate options. . Monitoring of the incoming audio to check for program content MAY be done, in which case the loop playout SHOULD begin after program has halted for 20 seconds or some other time that MAY be selectable by the station.

In terms of addressing the social needs of society, rather than the economic ones arising from inadequate preparedness for natural events, EAS+ SHOULD continue to be very relevant. CONELRAD was a system addressing the possibility of thermonuclear war. This is not a significant current concern, but the existence of such a civil defense system is a deterring factor that potential aggressors would be wise to consider. Switzerland and Sweden have long been considered examples of this respect. A current concern is that of terrorists and well-armed crazies. Such people rarely are as coordinated as they were on 9-11, partly because of more effective government measures, so the impact is much more local when it is not prevented. So the effectiveness of local alerting is particularly relevant to addressing this type of problem. Therefore if Federal decision-making results in systems which are poorer at addressing local problems, this has an indirect benefit to the impact of terrorist attacks.

Audio Level Setting

Dependable audio levels are a problem. The audio can be measured using dialnorm if conventional metering is inadequate. Level indication can be indicated using a bargraph or colored lamp or display. If the latter two, intensity modulation is preferable. The color scheme for all three SHALL be, from left to right or bottom to top in the following order;

1) Black or off for no detectable audio, 40 dB below voice reference level.
2) Blue for detectable audio.
3) Green for voice reference level + or – 3 dB. This is +4 dBm analog (unless 0 VU is different) or -24dB of digital peak.
4) Yellow for higher levels.
5) Red for within -6dB of peak level.

The volume SHALL be adjusted so that speech gives a green and occasionally yellow indication. AVC is not a good system, but a DSP based gain control system that keeps background noise down can be acceptable. In such a design, the tallies indicated above SHALL still be used, and a shaft encoder MAY be used instead of a volume control.

In order to use the audio of the RWT, RMT and RYT, these SHALL be prerecorded with limiting so the VU or PPM peak average reading SHALL be the reference level +/- 1 dB.

While this would normalize the dialog level reasonably accurately, the argument could be made for making the emergency audio somewhat louder. A 2 dB increase is probably sufficient. In TV there is headroom for this, but the audio chain MAY NOT lend itself to implementing this so easily, especially when there is a compressor/limiter, or cable distribution, or Dialnorm level control is used. Radio is mostly rock and roll stations, and they normally have the audio set as high as the transmitter can accept legally. So this is not something that is normally practical.

Consumer Receiver Feature Impact

An estimate for the practicality of the implementation of the EAS+ feature is desirable. A higher price estimate than in reality is preferable. This document defining a standard is less than 44,000 words, or at 7 characters a word, 308 kB. The file includes formatting and pictures, but is 655 kB. Assuming that this 308 kB is multiplied by three when written in a programming language and compiled into an executable file, that is 924 kB. This size is too large for a small microcontroller that can only address 64 kB. However as only a fraction of this content would be implemented in a consumer receiver, it might be possible to implement this in such a microcontroller if there is enough available memory.

With a large enough memory, the processing required is defined as being within the capability of an 8 bit microcontroller, assuming enough clock cycles are available. This is MIPS, a measure of computer horsepower. Flash memory retails for $20 for 2 GB, or 1 c per MB. Therefore the added retail cost of this feature is estimated as being 1 cent. In reality there is engineering and overhead, and the only market in the short term is expected to be the U.S., but volume consumer electronics are worldwide, so a wider market is desirable.

HD Radio Interface Considerations

The HD Radio System developed by Ibiquity has capabilities that are of assistance in alert distribution. Software is available that takes some advantage of this. In particular, the domestic radio is capable of being set to a FIPS code so alerts for other FIPS codes can be ignored.

The HD system has the ability to take additional lower data rate audio such as is proposed for the primary and alternate audio stream approach. The compression rate is somewhat variable and is statmuxed. For the duration of an EAS+ message there MAY be some degradation of regular program audio. However it is not anticipated that this would be noticeable to the average listener. Another aspect of the HD radio system is that the compression system takes time, so in order to make the analog audio be synchronized, the analog audio is normally delayed to do so. The primary exception to this is what is called the “Baseball Mode”. In this mode the analog signal is not delayed, and the receivers listening to that selected program stream are force switched to the analog signal. In consequence of this, the EQW event code SHALL force all program streams to the Baseball Mode for the message duration in order to reduce the distribution time of the message. If the radio is in standby, the time to switch to fully on needs consideration, but is not expected to pose a problem. The data transmission capability would still be functional so the message text would still display. Such a capability of the Baseball Mode is possible on digital TV, and is described in the “Compression Systems Considerations”. The turn on from standby time for flat screen TVs can be made short, a limiting factor is the time taken for MPEG 2 or MPEG 4 video to start the picture display based on an I frame reception.

Energy Consumption Considerations

Most current TVs do not completely turn off when turned off by the remote or front panel. The infrared remote receiver and microcontroller are still powered on to provide the capability to respond to the remote control. Adding the ability to turn on to selected alerts would require that

the tuner and data demodulator also be powered on so that the microcontroller can analyze the data to determine if the receiver needs to be fully powered. This is an additional power consumption. It MAY appear attractive to force the power consumption to be reduced, however there is a basic limitation in that designs that use less power are also liable to intermodulation distortion at lower levels. This intermodulation distortion both raises the noise so it is more difficult to receive weak signals, and makes it harder to reject unwanted signals. Therefore such efforts are not without undesirable consequences, and so are not advisable.

So there MAY be a desirability to have two modes, one which is standby, and also receives alerts, and the other which is completely off, by using a disconnecting switch. People would have to be explained the difference. The bandwidth of radio is less, and the tuner and data demodulator use less power, so the standby mode is not expected to use as much power as in the case of digital TVs with EAS+. So it is a tradeoff of energy consumption versus the likelihood of saving lives.

MONITOR MESSAGES

The EAS monitor receivers SHALL send acknowledgement messages of all EAS and CAP Broadcast messages as emails in the following format;
ORG-EEE-PSSCCC-JJJHHMM-LLLLLLLL;WWW;BER=M.Ne-P;LEVEL=<+/-VV>dBr100mS;MMSS.S; and <identifier>*identifier* AND <sender>*sender* for CAP or <distributionID>*distributionID* and <senderID>*senderID* for EDXL-DE on separate lines if multiple messages are acknowledged.
Where WWW is the county or state ID of the monitor receiver, 000 being reserved for the county monitor email address. M.N are the units and tenths of the Bit Error Rate. P is the exponent, with a maximum of 9. If the BER is better than 0.1e-9 it SHALL be indicated as 0.0e-9 unless there are no errors in which case it SHALL be indicated as 0.0e-9. The LEVEL is the level of the peak audio that lasts for 100ms, as the simplest level measurement of voice audio. It is relative to the reference analog or digital level as appropriate, where VV is the dB. The reference level for digital is -24 dB of digital absolute peak, this is the dialnorm value adopted by ATSC. The time of receipt of the ZCZC or CZCZ start of the message is the MMSS.S. This is to measure distribution time. The subject line SHALL be PSSCCC-JJJHHMM-WWW.

The email address is RECOMMENDED to be in the form PSSCCC-WWW@<mailserver>. If a message to this address with a subject line RUOK, the reply SHALL be with a subject line of PSSCCC-JJJHHMM-WWW-OK. The content SHALL be;
LLLLLLLL-RX=M.Ne-P, (repeated for multiple receivers)
<TEMP>=+/-VVVC
<AC>=VVV or < DC>=VV.V>
<PSU1>=OK/Fail
<PSU2>=OK/Fail/NA
<UPTIME>=VVVVVHRS
<FAN>=1 or 0 or a value in between if one of many fans failed or NNNNNRPM

Where RX=M.Ne-P is the receive signal strength in dBm with an accuracy of +/- 20%, and the – could be a + if appropriate. The TEMP is Celsius, and the + could be a -. The AC or DC are the input supply voltages. The UPTIME is the time since last boot. Together these email messages can not only monitor the EAS messages but also the EAS monitoring system automatically with software, for cost-effectiveness.

CAP messages have some details that MAY NOT be able to be carried in the EAS+ protocol, but are not needed by consumers. So the CAP message and the corresponding EAS+ message(s) generated will be made into log entries in the ENCODER/DECODER, probably a selected directory. Also that this entry or entries SHALL be emailed to the QC email receiving in the same format. Also that the QC email sending an enquiry to the ENCODER/DECODER SHALL result in a response email formatted as above. See the specification on translating CAP and EDXL-DE messages to EAS+ as it incorporates some <XML> expressions in the EAS+ text.

SECTION III

CAP Broadcast (includes EDXL-DE)

As it is desirable to transmit CAP or EDXL-DE messages to public computers in a secure manner, this can be accomplished using EAS+. The method of requesting this from within a CAP or EDXL-DE message is not defined here, or may be accomplished by using this mode for alerts that are not valid or EDXL-DE files or other files if the area selection and routing is valid. The protocol differs in that the header has CZCZ replacing ZCZC. This SHALL cause all inappropriate devices to ignore the message. As this message is not broadcast in analog, it would not reach legacy ENCODER/DECODERs. The event code will be CAP and the priority will be 2. As this is not an audio PID usage, only data, the transmission is not delayed by an automation system. The latitude and longitude string can be included. The CAP message with forward error correction (FEC) will then follow, with the FEC mode defined later in the multilingual section. The algorithm SHALL be the Viterbi unless the currently unassigned values of the T^4 FEC indicate otherwise. The preamble NNNN will end as usual. The action expected at the computer SHOULD be to popup a window saying that a CAP emergency alert message is stored with a filename ORGPSSCCCJJJHHMMLLLLLLLL.xml, and if the file is to be saved, opened or put in the recycle bin. As these messages would arrive from broadcast to the LAN direct or via ISP, it SHOULD be impossible to falsely generate a widespread alert. CAP broadcast messages can be large, numerous and hence would not be suitable for DBS or SDARS distribution. Additional file types that can be transmitted with FEC are .pdf, .txt, .dxf, .wav, .jpg, .mpg, .xml and others to be decided. EDXL (emergency data exchange language) and EPAD (Emergency Provider Access Directory) are a couple of examples. Only data and no executables or macros are permitted. Files will be named as above and stored in a <drive>:\EAS folder, selectable by the user. Although the extensions are normally lower case, the upper case version SHALL be used in the header code. While it is possible to reinforce this by legislation, a point to remember is that the computer user has no control, and therefore the originator is therefore responsible for any damages. Not all users have adequate storage space and additional files can lead to crashing and other problems including loss of data. The file is already on the computer when the user decides to save it. The possibility of lawsuits for damages SHOULD be considered when originating file downloads.

		Language	T^4 FEC
Binary 01000	Octal 4+00	To	1/2
Binary 01001	Octal 4+01	Reserved	2/3
Binary 01010	Octal 4+10	Local language “Local1” for T^3 , “Local2” for T^4	3/4
Binary 01011	Octal 4+11	Italian	5/6
Binary 01100	Octal 5+00	English (default value)	none
Binary 01101	Octal 5+01	Spanish	7/8
Binary 01110	Octal 5+10	French	
Binary 01111	Octal 5+11	German	
Binary 10000			
To		Reserved to keep 7 bit ASCII format.	
Binary 11111			

SECTION IV

Selection of EAS and EAS+ Mode See Fig. 1 for the flowchart.

This section is to be updated to reflect the latest ECIG recommendations adopted at such time. The version 1.0 is reproduced below.

Version 1.0 52 pages. The page numbers referred to in this section (e.g. the index) are per the source document.
ECIG Recommendations for CAP EAS Implementation Guide - **Version 1.0**

ECIG Recommendations

For a

CAP EAS Implementation Guide

EAS CAP Industry Group - ECIG
EAS-CAP Implementation Guide Subcommittee
Version 1.0
17 May, 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
Rev 5 – April 29-May 14. Changes for final release of Version 1.0. New figures, Section 5 and 6 completed, and clarifications agreed on by ECIG Sub-Committee. Compiled by Tom Wood

Version 1.0
ECIG Recommendations for CAP EAS Implementation Guide - **Version 1.0**

Contents

1 Introduction 4
1.1 Purpose 4
1.2 Disclaimer of Intellectual Property Claims 4
1.3 Copyright.....4
1.4 Terminology 4
1.5 References 5
2 General Requirements and Specifications
.....6
2.1 Recommended Additions to the IPAWS CAP Profile Requirements 6
2.1.1 Specific mimeTypes 6
2.1.2 New EASText <parameter> Element 6
2.2 Recommended Modifications to the IPAWS CAP Profile Requirements.....7
3 Implementation Guide Requirements and Specifications.....8
3.1 Introduction 8
3.2 EAS Alert Activations 8
3.3 General Processing Rules 11
3.3.1 Multiple Parameters.....11
3.4 Constructing an EAS Header Code from CAP IPAWS v1.0 Profile.....11
3.4.1 EAS Header and CAP IPAWS v1.0 Profile 11
3.5 CAP EAS Audio from CAP IPAWS v1.0 Profile 13
3.5.1 Using or constructing EAS Audio during a CAP-to-EAS alert activation 13
3.5.2 Constructing EAS Recorded Audio from CAP V1.2 IPAWS v1.0 Profile 14
3.5.3 Constructing EAS Streaming Audio from CAP V1.2 IPAWS v1.0 Profile 16
3.5.4 Constructing Text-to-Speech from the CAP V1.2 IPAWS v1.0 Profile.....17
3.6 Constructing Alert Text from CAP V1.2 IPAWS v1.0 Profile for EAS activations 17
3.6.1 White space rule 17
3.6.2 EASText element.....17
3.6.3 CAP/EAS Alert Text with the FCC Required Text.....18
3.6.4 Alert Text construction details 18
3.7 Languages.....22
3.8 CAP/EAS msgType handling.....23
3.8.1 Alert.....23

Version 1.0
ECIG Recommendations for CAP EAS Implementation Guide - **Version 1.0**

3.8.2 Update.....23
3.8.3 Cancel 24
3.8.4 Ack and Error 24
3.9 Test messages 24
3.10 Standards for older CAP protocol versions. 25
3.11 Reception Of An Alert in Both the CAP And The EAS Domain.....25
4 Notes for Originators and Origination Software 27
5 CAP/EAS Examples of the CAP V1.2 IPAWS v1.0 Profile.....28
5.1 Anatomy of an EAS compatible CAP Alert - Hazardous Materials Warning.....28
5.2 Hypothetical Test Alert: Required Monthly Test 32
5.3 Hypothetical National Alert Notification: 34
5.4 Hypothetical National Alert Termination:.....36
5.5 Test CAP/EAS message for the CAP IPAWS v1.0 profile 37
6 CAP-to-EAS Validation Criteria
.....38
6.1 Introduction 38
6.2 Validation Philosophy 38
6.3 Error Signaling Philosophy 38
6.4 Validation Overview.....38
6.4.1 CAP Required Elements.....39
6.4.2 EAS-CAP Required Elements 39
6.4.3 Logging.....40
6.5 EAS-CAP Message Validation Procedure.....40
6.6 EAS-CAP Message Result States.....42
6.7 CAP to EAS Required Elements 43
7 Acronyms 51

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 guide has not been written to benefit any specific vendor or type of equipment. The goal is general interoperability at a data and messaging level.

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. The guide has been written to facilitate the success of any CAP-to-EAS system including existing and planned state, local, territorial and tribal systems; the proposed IPAWS system, and emerging National Weather Service systems. To that end, in addition to addressing general CAP-to-EAS implementation issues, this guide also directly addresses constraints and requirements of the IPAWS program.

1.2 Disclaimer of Intellectual Property Claims

The Common Alerting Protocol (CAP) Specification [4]and [5] 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

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.

Version 1.0
ECIG Recommendations for CAP EAS Implementation Guide - **Version 1.0**

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:
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 and http://eascap.org/Recommendation%20EAS-CAP-0.1.pdf,

[1] IPAWS_CAP-to-EAS Requirements . http:// www cmasforum.com/docs/IPAWS_CAP-to-EAS_Requirements.pdf This document is itself a compilation of work from FEMA and the original ECIG CAP EAS Profile recommendation
[2] RFC2119 S. Bradner, Key words for use in RFCs to Indicate Requirement Levels, IETF RFC 2119, March 1997. Web: http:// www ietf.org/rfc/rfc2119.txt
[3] FCC EAS Rules (CFR 47 Part 11). Web: http:// ecfr.gpoaccess.gov/cgi/t/text/textidx?c=ecfr&rgn=div5&view=text&node=47:1.0.1.1.11&idno=47
[4] CAP v1.2 Committee Draft OASIS Emergency Management Technical Committee, March 2010. Web: http:// docs.oasis-open.org/emergency/cap/v1.2/pr03/CAP-v1.2-PR03.pdf
[5] CAP v1.2 USA IPAWS Profile v1.0 Committee Specification OASIS Emergency Management Technical Committee, October 2009. Web: http:// docs.oasisopen.org/emergency/cap/v1.2/ipaws-profile/v1.0/cs01/cap-v1.2-ipaws-profile-cs01.pdf
[6] CAP v1.1 IPAWS Profile v1.0 Issues List - 1st Public Review, OASIS Emergency Management Technical Committee, Jun 2009. Web: http:// www oasisopen.org/committees/download.php/33000/CAPv1.1-IPAWS-Profile-v1.0-PR01-IssuesList_v2.4.xls
[7] FEMA IPAWS CAP Profile Requirements FEMA IPAWS Program Management Office *FEMA IPAWS CAP v1.2 Profile Requirements v2.4 - Public*, December 2008. Web: http://www oasis-open.org/committees/download.php/31084/FEMA_IPAWS_CAP%20v1.1_Profile_Requirements_v2.4_-_Public.doc
[8] EAS-CAP Profile -EAS-CAP Industry Group EAS-CAP Profile Recommendation EASCAP-01, September 2008. Web: 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 [5].

2.1.1 Specific mimeTypes

The CAP element <mimeType> identifies the audio or video file format of the indicated content. While [5] 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 mimeTypes included the actual file type name it would be very beneficial. Thus, ECIG recommends that “-wav” and “-mp3” be appended to the existing OASIS mimeTypes when FEMA implements its IPAWS Profile.
By incorporating this ECIG recommendation, the mimeTypes 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 mimeTypes. Most importantly, this convention will in general allow for a sensible method to introduce new media formats in the future. 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 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[1]. 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: Reference [5] 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.

[1] 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 [5][2]. 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 message based on [5], 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/textidx?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[3], 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 not

[2] The full name is indicated in [4]. Please see the Validation Criteria section below for an overview of [4]
[3] "… 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.

Version 1.0
ECIG Recommendations for CAP EAS Implementation Guide - **Version 1.0**

]
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 below shows the general processing steps and flow of data during CAP to EAS translation.

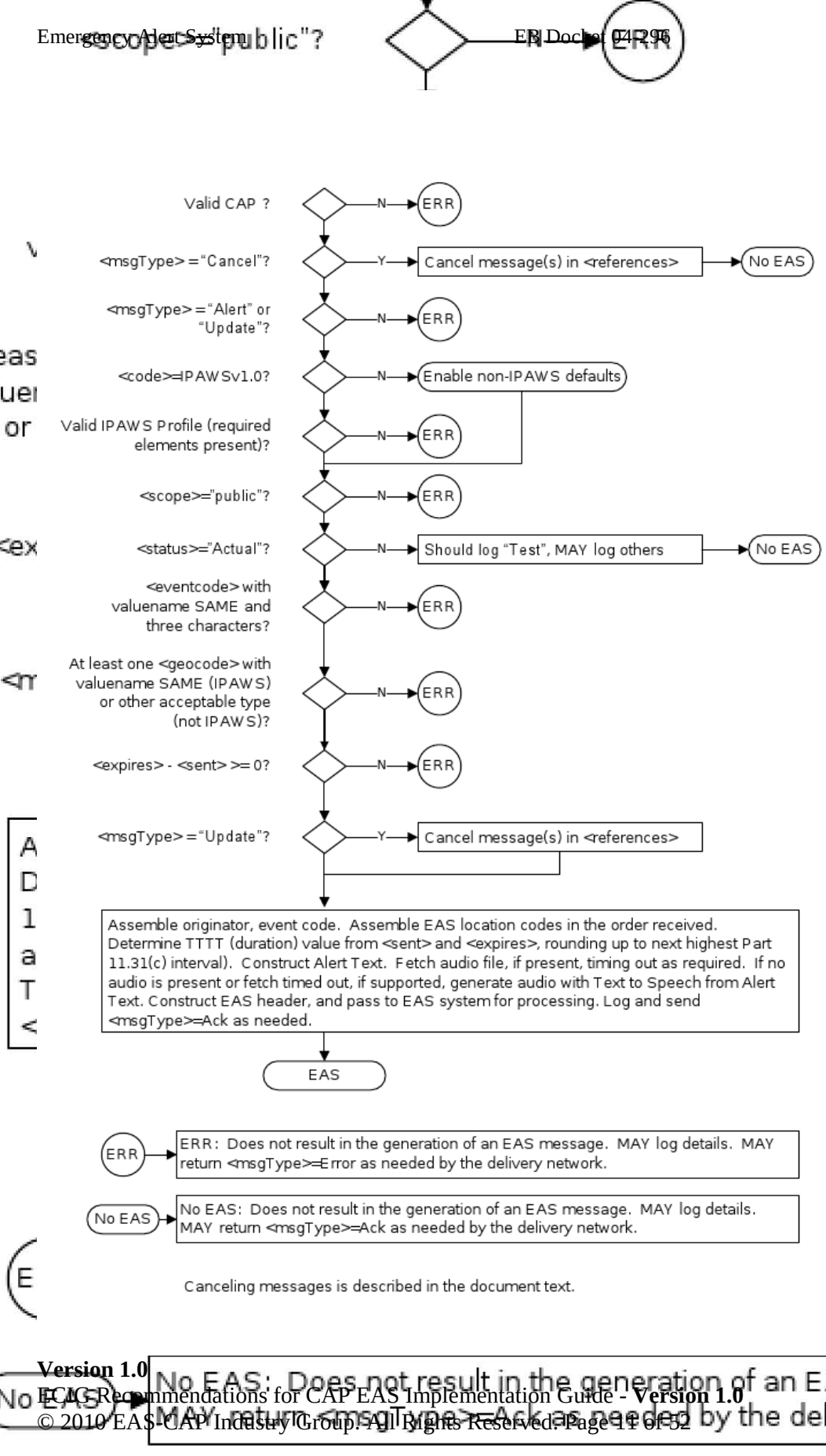


Figure 1. General CAP-to-EAS Processing

Canceling messages is described in the document text.

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 [3]. 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[4]:
Originator Codes are specified in Part 11.31(d) [3]., 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.

[4] The EAN ORG code (not the EAN event code) was removed as a valid originator code 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 an ORG code of EAN. As the CAP profile is a post-2002 environment, EAN
ORG is no longer defined for those systems, and should not be used.

3.4.1.3 PSSCCC (Location Code)

Each EAS 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, as defined in FCC Part 11.31.(c) [3].

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 new definition for location code "000000" can be found in [5].

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 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 or equal to 45 minutes and greater than 0 the valid range permitted for EAS Duration shall be 0015, 0030, or 0045. If the interval is less than or equal to 0 then the message SHALL be considered expired and SHALL be ignored.

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 JJJHHMM (Time)

The EAS Time Alert Issued (JJJHHMM) 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 during EAS activation, and is thus not specified by any element of the CAP message. When a CAP to EAS device transmits an EAS message the contents of the Station ID SHOULD be the call sign of the CAP to EAS device.

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 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."

The use of the word "Must" in this term is part of FCC rulemaking and as such is considered here to be an exception to the standards organization norm which is the use of the word "Shall".

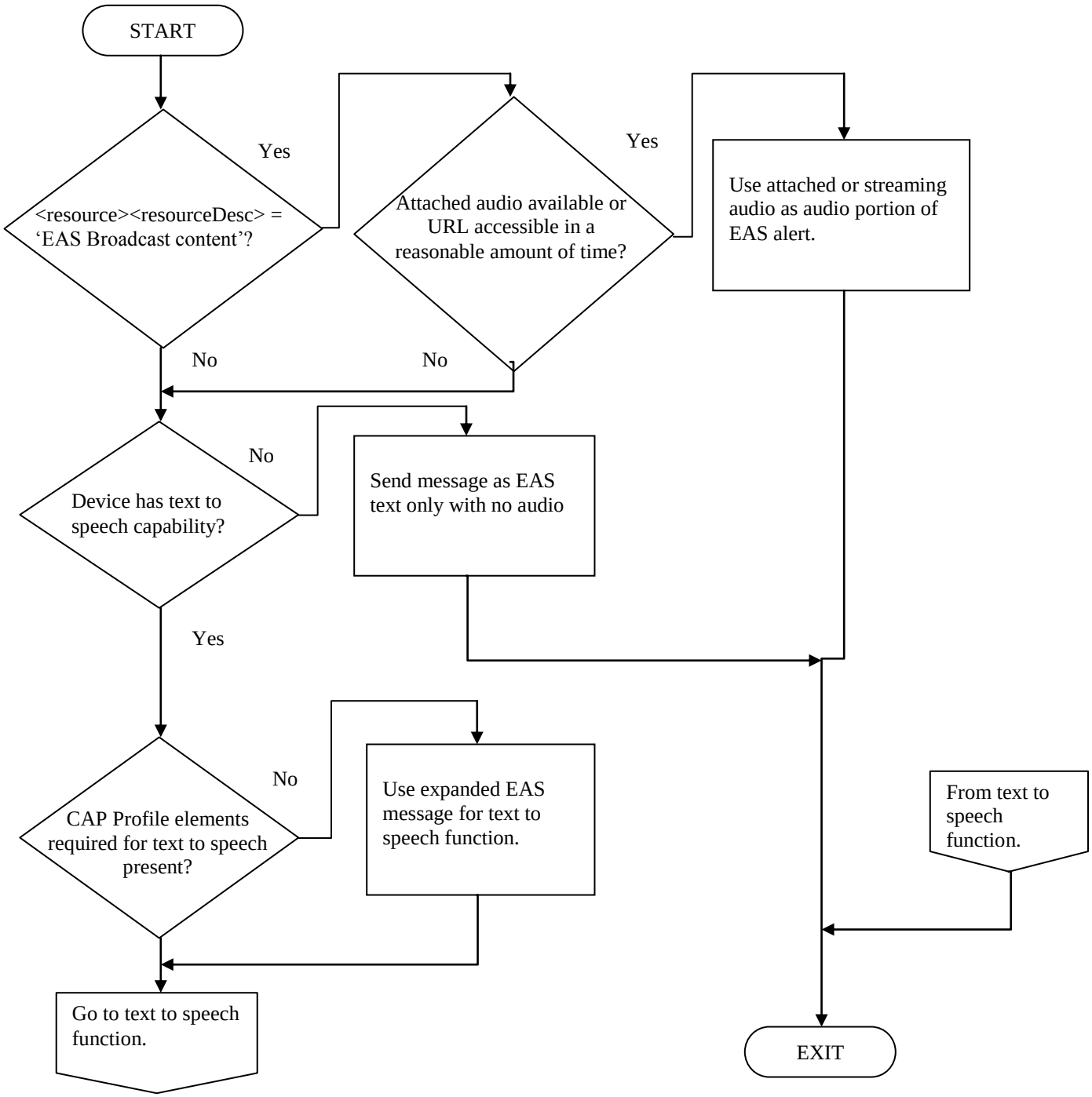
Version 1.0
ECIG Recommendations for CAP EAS Implementation Guide - **Version 1.0**
  device Originator and Event Code

3.5 CAP EAS Audio from CAP IPAWS v1.0 Profile

3.5.1 Using or constructing EAS Audio during a CAPtoEAS alert activation

During a CAP-to-EAS alert activation, an EAS Audio message will be used or constructed as follows:
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-tospeech.
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" 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. Multiple resource blocks with a <resourceDesc> of "EAS Broadcast Content" MAY be present in an <info> block, with each accompanied by a unique <mimeType>. 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 multiple <resource> blocks with <resourceDesc> of "EAS Broadcast Content " are present, and the associated <mimeType> value is not different, then the first encountered block SHALL be recognized. 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

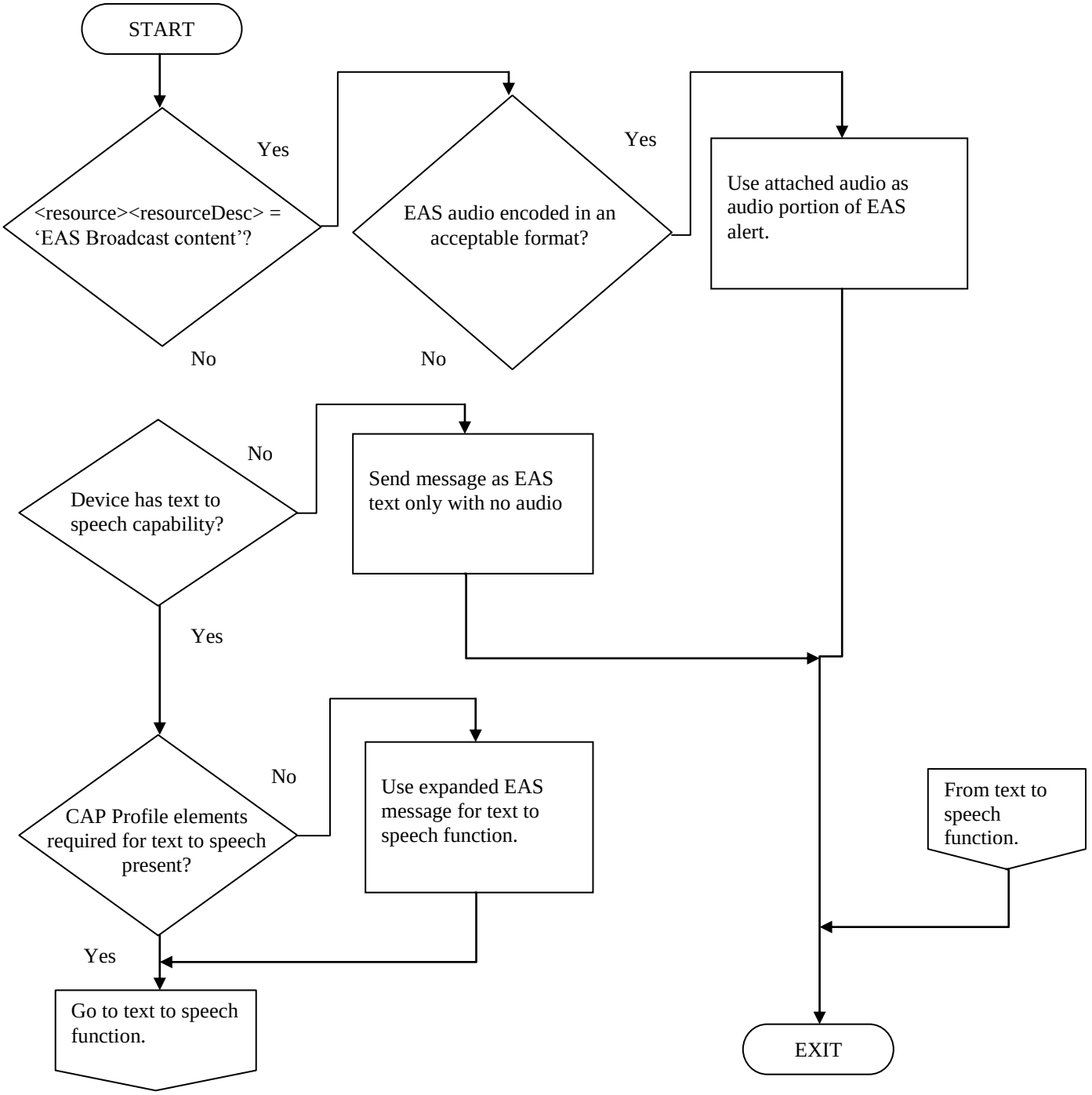


3.5.2 Constructing EAS Recorded Audio from CAP V1.2 IPAWS v1.0 Profile

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 [5]. The defined mimeTypes 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 mimeTypes be added to the profile to resolve audio format ambiguity, by appending –wav or –mp3 to the end of the defined mime types.

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 V1.2 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."

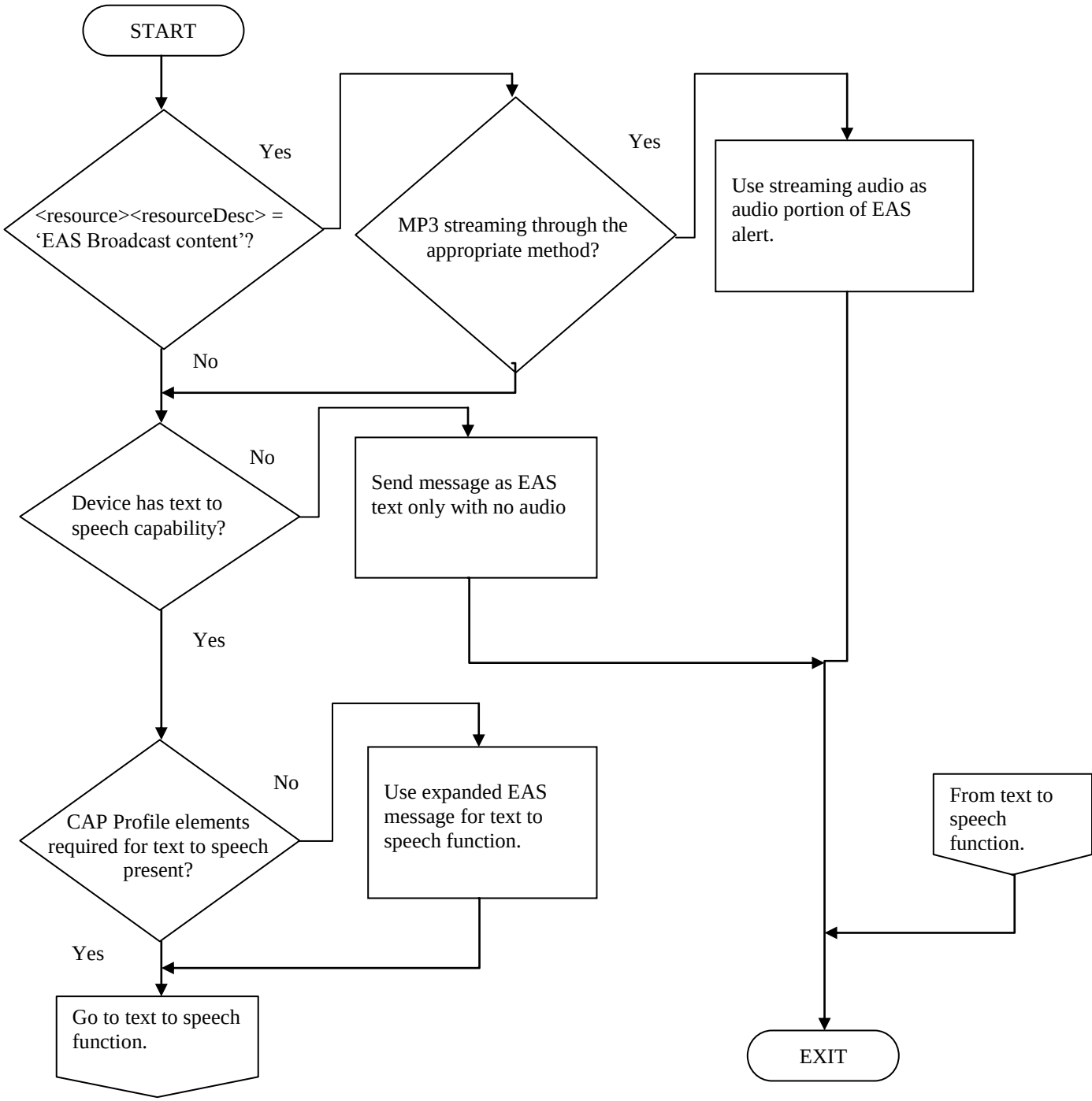
2) The audio SHALL use one of the following streaming methods:

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 TexttoSpeech from the CAP V1.2 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 V1.2 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 to1800 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 [3] 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 [3]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 alert text.

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 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

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

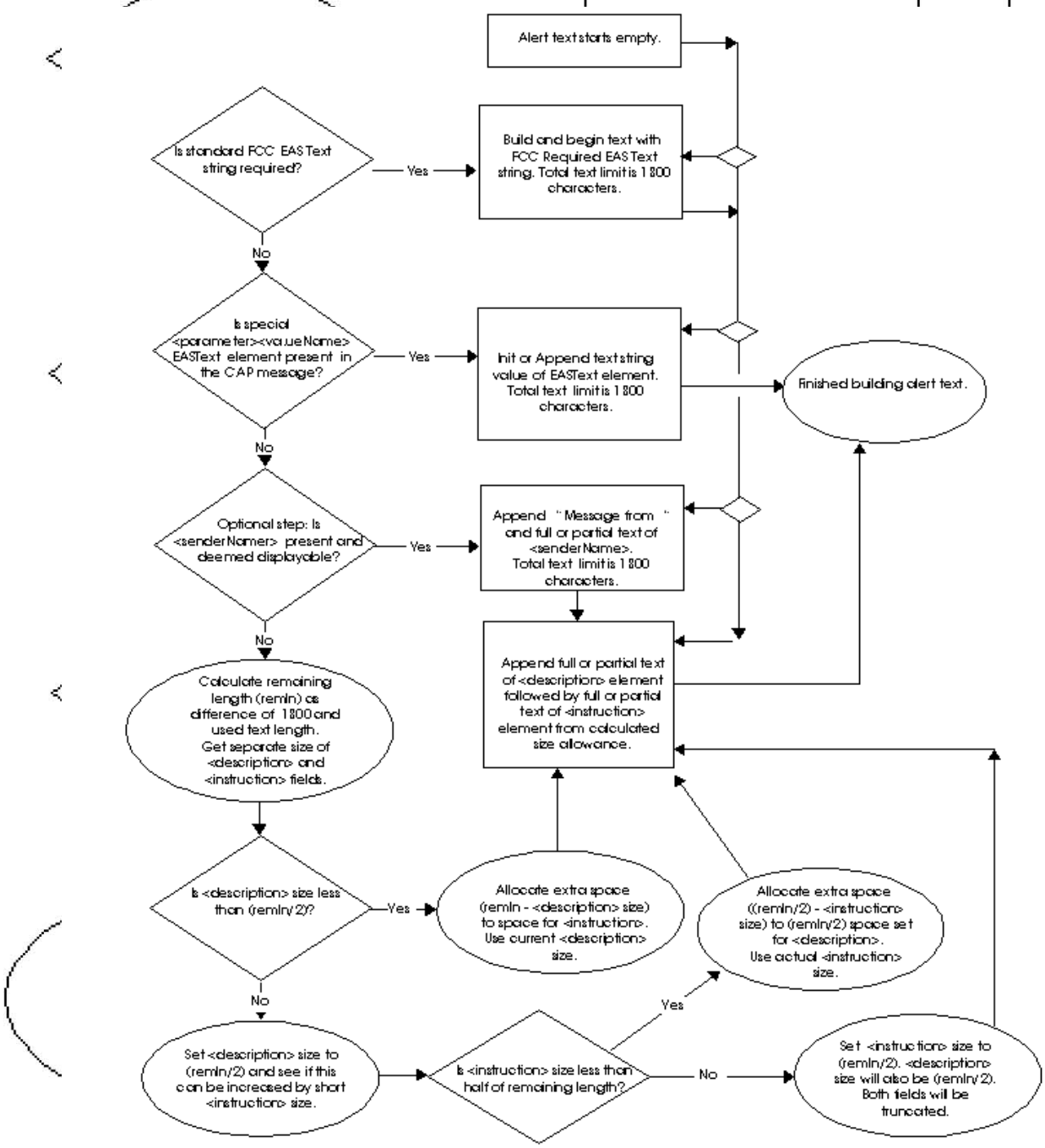


Figure 5: EAS Alert Text Processing

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:
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.

Version 1.0
ECIG Recommendations for CAP EAS Implementation Guide - **Version 1.0**

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 CAP/EAS device SHOULD log the Cancel message.
The CAP/EAS device MUST NOT attempt any new deliveries of the cancelled message:
1) If the message is not in the process of being delivered, do not deliver the message.
2) If the message is in the process of being delivered, complete the delivery normally. In no case may an in-progress EAS alert audio announcement be preempted and halted by a Cancel message. In particular, if an EAS header has been aired, the corresponding EAS EOM MUST be aired.
3) If the message is being delivered sequentially to several stations, complete any message in progress to particular station, but do not deliver the message to any other stations.
The CAP/EAS device MAY halt the video display for message that has been aired.
An <info> block is optional with a Cancel message. The CAP/EAS device will not process any <info> block and will not air an EAS alert from a Cancel message. The EAS system was not designed to support Cancellation messages.
As with the Update <msgType>, the originator can make no assumptions regarding what might happen at a particular broadcaster. No matter how soon a cancel is issued, the original alert may be broadcast to the public.

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. The CAP/EAS device MAY send such messages, as determined by the particular distribution system in use.

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 (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 [4]and [5] 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 [3] 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. [5]
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. *Note: The <identifier> field is not sufficiently specified to be unique across the universe of CAP originators. It is specified to be unique on any one CAP origination system. Thus the requirement that a CAP processing system SHOULD use the above three fields.*

[5] 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.

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.
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 [4] [5], 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 <msgType>s for air:
Alert, Update, and Cancel

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 V1.2 IPAWS v1.0 Profile

5.1 Anatomy of an EAS compatible CAP Alert Hazardous Materials Warning

Key: Violet: CAP 1.2 and ECIG EAS-CAP required, Red: CAP 1.2 required and ECIG EAS-CAP optional or not used,
Blue: CAP 1.2 optional but ECIG EAS-CAP required, Dk Yellow: CAP 1.2/ECIG EAS-CAP conditionally required, Green: optional for both

<?xml version="1.0" encoding="UTF-8"?> <alert xmlns="urn:oasis:names:tc:emergency:cap:1.2"> <identifier>EASCAP-14-20090311173400</identifier> <sender>testcap.com@100.0.0.101</sender> <sent>2009-03-11T17:34:00-6:00</sent> <status>Actual</status> <msgType>Alert</msgType> <source>EASAUTH</source> <scope>Public</scope> <code>IPAWSv1.0</code>	<- Standard xml header <- The required alert tag with attributes <- Unique CAP message identifier> <-CAP message sender s name <-sent time value. This encodes the start time of the alert, <-CAP message status. See CAP 1.2 reference. <-CAP message type. See CAP 1.2 reference. <-source sender. See CAP 1.2 reference. <-scope of alert. See CAP 1.2 reference. <-IPAWS compliant CAP message
<info> <event>HAZARDOUS MATERIALS WARNING</event> <category>Safety</category> <urgency>Immediate</urgency> <severity>Severe</severity> <certainty>Unknown</certainty> <audience>All</audience> <senderName>CAP alert central</senderName> <expires>2009-03-11T18:34:00-6:00</expires> <parameter> <valueName>EAS-ORG</valueName> <value>CIV</value> </parameter> <eventCode> <valueName>SAME</valueName> <value>HMW</value> </eventCode> <area>	<- start of single info block <- Event name. Textual label naming the alert <- Event category. See CAP 1.2 reference <- Event urgency. See CAP 1.2 reference <- Event severity. See CAP 1.2 reference <- Event certainty. See CAP 1.2 reference <- Event audience. See CAP 1.2 reference <- Name of sender. <- Expiration time of the alert. For non-IPAWS, if not provided then it is defaulted to be 1 hour after <sent> time. <- Special parameter, unique to EAS CAP messages, to specify the EAS ORG code. Required for IPAWS compliance. For non-IPAWS, if not provided, may default EAS ORG code to CIV. <- Alert event code to identify type of alert. <- the valueName field allows any encoding scheme. SAME is the only scheme compatible with EAS. <- Start of area block. Can have multiple geocode blocks.

<areaDesc>Downtown Washington, DC and District of Columbia</areaDesc>	<- Specific Textual description of alert area ignored
<geocode>	<- geocode blocks. Each geocode defines one location. CAP-EAS requires SAME type FIPS codes.
<valueName>SAME</valueName>	
<value>011001</value>	
</geocode>	
</area>	
<resource>	<- start of resource block for audio message
<resourceDesc>EAS Broadcast Content </resourceDesc>	<- resource description name
<mimeType>audio/x-ipaws-audio </mimeType>	<- mimeType to identify resource file format
<uri>http://100.0.0.101/EASCAP-14-20090311173400.mp3</uri>	<- location of audio file on network
</resource>	

Version 1.0

<headline>Hydrochloric Acid Leak Hazard Emergency</headline>	<- headline element . This is a short headline style announcement for the alert. This should be compelling and very brief. Details are provided in the <description> and <instruction> fields. Not used by the ECIG profile.
<description> A dangerous chemical spill has created a hazard potentially threatening downtown Washington, DC and areas immediately south of downtown from 10:45AM until at least 11:45AM. A train derailment at 10:40AM, 1 mile south of the Capitol, has resulted in a large hydrochloric acid leak. A northerly breeze will disperse some volatile hydrogen chloride gas towards downtown Washington, DC and all areas of the capitol within 10 minutes. Crews are working now to neutralize the acid and quickly mitigate the hazard. </description>	<- description of the alert This description provides the essential details about where the alert is, what it is and who is affected. This has 78 words and 513 letters.
<instruction>Liquid hydrochloric acid releases toxic hydrogen chloride gas fumes. This gas is extremely irritating to the lungs and has a sharp and very irritating odor. All people south of the capitol and south of downtown Washington, DC within 1/2 mile if the railroad track, should evacuate street areas by walking steadily to the north immediately. Seek fresh air and place a dripping wet cloth over your mouth to breathe. Affected areas should be safe within one hour as the acid is neutralized and the gas disperses. Copious amounts of water can be sprayed in the air to reduce the immediate hazard. Stay tuned for further information. </instruction>	<- instruction for the public concerning the alert This section is designed to provide instructions to the public for eliciting a rational response and reaction to the alert. This is example is somewhat lengthy for broadcast but is to the point and provides the most immediate advice to those citizens in the area. It would translate via a text-to-speech engine quite well. This has 107 words and 633 letters. The amount of text is well within the limits of EAS broadcast systems. The total text from the three informational fields is under 1200 characters and 200 words.
</info> </alert>	<- end of info block < end of CAP alert

Translation Notes:

Using Implementation Guide recommendations, this CAP alert is translated into the following EAS header
for the EAS audio activation:

Header = ZCZC-CIV-HMW-011001+0100-0702334-LLLLLLLL–

Note that the LLLLLLL station ID derivation is open. ECIG recommends using a string, up to eight characters long, assigned to the CAP to EAS translator. This is the only part of the header string that can be
variable among different implementations of translators.

The CAP message translates into the following alert text:

> A CIVIL AUTHORITY HAS ISSUED A HAZARDOUS MATERIALS WARNING FOR THE FOLLOWING COUNTIES/AREAS: District of Columbia, DC; AT 5:34 PM ON MAR 11, 2009 EFFECTIVE UNTIL 6:34 PM. Message from CAP alert central. A dangerous chemical spill has created a hazard potentially threatening downtown Washington, DC and areas immediately south of downtown from 10:45AM until at least 11:45AM. A train derailment at 10:40AM, 1 mile south of the Capitol, has resulted in a large hydrochloric acid

> leak. A northerly breeze will disperse some volatile hydrogen chloride gas towards downtown Washington, DC and all areas of the capitol within 10 minutes. Crews are working now to neutralize the acid and quickly mitigate the hazard. Liquid hydrochloric acid releases toxic hydrogen chloride gas fumes. This gas is extremely irritating to the lungs and has a sharp and very irritating odor. All people south of the capitol and south of downtown Washington, DC within 1/2 mile if the railroad track, should evacuate street areas by walking steadily to the north immediately . Seek fresh air and place a dripping wet cloth over your mouth to breathe. Affected areas should be safe within one hour as the acid is neutralized and the gas disperses. Copious amounts of water can be sprayed in the air to reduce the immediate hazard. Stay tuned for further information.

This text could be sent to a text crawl, scroll, or paging device for broadcast. This text consists of 218 words and 1350 characters. As one can see, use of this many words provides plenty of room for informative alerting. Limiting alert information to 1800 characters is a realistic goal.

Below is a description of the exact assembly formula used.

1. Automatic translation of the FCC Part 11 so called "ZCZC"EAS warning string.

> *"A CIVIL AUTHORITY HAS ISSUED A HAZARDOUS MATERIALS WARNING FOR THE FOLLOWING COUNTIES/AREAS: District of Columbia, DC; AT 5:34 PM ON MAR 11, 2009 EFFECTIVE UNTIL 6:34 PM."*

It is presumed that until the FCC rules otherwise, this style of automatic translation must still be included in the broadcast of the alert. This style of translation is not without it's benefit. The style provides a consistent format and serves as a useful introduction to the alert information that follows. The negative aspect of this statement is if it is redundant to other information taken from the CAP alert.

2. A sentence auto-constructed from the <senderName> element.

> *"Message from 'CAP alert central.'"*

3.The contents of the <description> element.

> *"A dangerous chemical spill has created a hazard potentially threatening downtown Washington, DC and areas immediately south ...."*

4.The contents of the <instruction> element.

"*Liquid hydrochloric acid releases toxic hydrogen chloride gas fumes. This gas is extremely irritating to the lungs..."*

Note that the space allocation algorithm did not have to be used since the size of both the <description> and <instruction> text could fit in the space remaining after using the FCC Required text and the <senderName> field. The size of the FCC Required text and the <senderName> is 205 characters. This left almost 1600 characters for the descriptive text. Note that usually there are a few more county codes in an alert, so this example is a shorter than average. But even another 200 characters allocated to the Required string would still allow for 1400 characters of descriptive text.

Other comments regarding text elements:

It is interesting to note that the informative elements of <description> and <instruction> are all optional elements. The minimally required elements are only those needed to create a basic compliant EAS message.

The cost of omission of the descriptive elements would be the lost opportunity for providing better alert details at the CAP-EAS translation node. *Note that the EAS downstream daisy chain activations will only receive the standard EAS header information. None of the enhanced descriptive information at the CAP reception node can be inserted into the EAS FSK audio transmission stream by using the basic standard EAS* transmission method.

Version 1.0
ECIG Recommendations for CAP EAS Implementation Guide - **Version 1.0**

Audio Notes:
This particular CAP example illustrates the use of an audio resource to provide the EAS alert audio voice track. The example shows the <mimeType> element that indicates that the file is an MPEG MP3 file, and the <uri> element that gives the location of the alert on a network. The receiver of this CAP message can attempt to download this audio file for play out as part of the EAS alert. Other CAP messages could reference other types of audio, such as WAV files, or streaming audio such as streaming Mpeg . If no audio resource is given, the recommendation describes using the translated text as input to a text-to-speech engine in order to create the EAS audio voice track.

5.2 Hypothetical Test Alert: Required Monthly Test

Monthly tests are a required part of testing of the Emergency Alert System. The IPAWS CAP network could be used to activate Required Monthly Tests. Here is an example.

```
<?xml version="1.0" encoding="UTF-8"?>
<alert xmlns="urn:oasis:names:tc:emergency:cap:1.2">
<identifier>CAPNET-100-20100125130000</identifier>
<sender>laciv.com@192.168.0.210</sender>
<sent>2010-01-25T13:00:00-6:00</sent>
<status>Actual</status>
<msgType>Alert</msgType>
<source>HSTEC</source>
<scope>Public</scope>
<code>IPAWSv1.0</code>
<info>
   <event>EAS Monthly Test </event>
   <category>Safety</category>
   <urgency>Unknown</urgency>
   <severity>Minor</severity>
   <certainty>Unknown</certainty>
   <audience>All</audience>
   <senderName>Hypothetical Seattle Test Emergency Center</senderName>
   <expires>2010-01-25T14:00:00-6:00</expires>
   <parameter>
      <valueName>EAS-ORG</valueName>
      <value>CIV</value>
   </parameter>
   <eventCode>
      <valueName>SAME</valueName>
      <value>RMT</value>
   </eventCode>
   <area>
      <areaDesc> All of Island, Jefferson, Kitsap, King, Pierce, and Snohomish Counties, Washington</areaDesc>
      <geocode>
         <valueName>SAME</valueName>
         <value>053029</value>
      </geocode>
      <geocode>
         <valueName>SAME</valueName>
         <value>053031</value>
      </geocode>
      <geocode>
         <valueName>SAME</valueName>
```



```
        <value>053035</value>
      </geocode>
      <geocode>
        <valueName>SAME</valueName>
        <value>053033</value>
       </geocode>
      <geocode>
         <valueName>SAME</valueName>
         <value>053061</value>
      </geocode>
   </area>
   <headline>Required Monthly Test</headline>
   <description>This is a coordinated Monthly Test of the integrated CAP/EAS Alert system. This is only a test. Had this been
a real alert, important information would have followed. This is only a test.</description>
   <resource>
      <resourceDesc>EAS Broadcast Content</resourceDesc>
      <mimeType>audio/x-ipaws-audio </mimeType>
      <uri>http://100.0.0.111/EAS/EASaudios.wav</uri>
   </resource>
   </info>
</alert>
```

This demonstrates an actual Monthly Test of the Emergency Alert System injected via the CAP network. It is important to note that this is an actual test alert that is meant to be broadcast by EAS participants. It is not just an internal, hidden test of the CAP / EAS infrastructure. This explains why the value of the CAP <status> element is Actual rather than Test.

This CAP message translates into the following EAS header string :

ZCZC-CIV-RMT-053029-053031-053035-053033-053061+0100-0252000-LLLLLLLL

5.3 Hypothetical National Alert Notification:

CAP alerts can also be used to announce the EAS National Emergency alerts.

```
<?xml version="1.0" encoding="UTF-8"?>
<alert xmlns="urn:oasis:names:tc:emergency:cap:1.2">
<identifier>CAPNET-69-20090315165600</identifier>
<sender>natexample@example.com</sender>
<sent>2009-03-15T16:56:00-6:00</sent>
<status>Actual</status>
<msgType>Alert</msgType>
<source>DEMO</source>
<scope>Public</scope>
<code>IPAWSv1.0</code>
<info>
   <event>NATIONAL EMERGENCY ACTION NOTIFICATION</event>
   <category>Safety</category>
   <urgency>Immediate</urgency>
   <severity>Extreme</severity>
   <certainty>Unknown</certainty>
   <audience>All</audience>
   <senderName>DEMO</senderName>
   <expires>2009-03-20T16:56:00-6:00</expires>
   <parameter>
      <valueName>EAS-ORG</valueName>
      <value>PEP</value>
   </parameter>
   <eventCode>
      <valueName>SAME</valueName>
      <value>EAN</value>
   </eventCode>
   <area>
      <areaDesc>United States</areaDesc>
      <geocode>
         <valueName>SAME</valueName>
         <value>000000</value>
      </geocode>
   </area>
   <headline>National Emergency Action Notification Announcement</headline>
   <description>A state of national emergency has been declared for the United States. Listen for an important live
announcement.</description>
   <instruction>Stay tuned for further instructions.</instruction>
   <resource>
      <resourceDesc>EAS Broadcast Content</resourceDesc>
      <mimeType>audio/x-ipaws-streaming- audio</mimeType>
      <uri>http://100.0.0.111:8000/liveeas.mp3</uri>
   </resource>
   </info>
</alert>
```

This CAP message translates into the following EAS header string :
ZCZC-PEP-EAN-000000+9930-0742256-LLLLLLLLA
CAP alert announcing the dire circumstances of a National Emergency would for the most part look like any other CAP alert. The descriptive text in this example is left minimized to reduce clutter. An actual national alert message may or may not include important details in the descriptive text elements. But the earlier above examples suffice to demonstrate the use and utility of the relevant descriptive CAP elements.

The audio resource can have a very important difference in a National Alert. The EAN and EAT National alerts are designed to broadcast live (they can of course still be pre-recorded audio) from the White House to the American public. A CAP alert can reference a slightly delayed, progressively downloaded live audio
stream carrying this alert message. The audio stream SHOULD be able to start from the beginning in order that none of the important message be lost. The example shows how an audio resource could be constructed to provide this reference.

Further EAN CAP alert updates can be sent later as details emerge and develop. The EAS system would automatically forward these alerts and the associated live audio.

5.4 Hypothetical National Alert Termination:

A National Emergency Action Notification would hopefully be followed eventually by a termination of the emergency. A new CAP alert could be used to announce the national emergency termination.

```
<?xml version="1.0" encoding="UTF-8"?>
<alert xmlns="urn:oasis:names:tc:emergency:cap:1.2">
<identifier>CAPNET-70-20090316160000</identifier>
<sender>natexample@example.com</sender>
<sent>2009-03-16T16:00:00-6:00</sent>
<status>Actual</status>
<msgType>Alert</msgType>
<source>DEMO</source>
<scope>Public</scope>
<code>IPAWSv1.0</code>
<info>
   <event>NATIONAL EMERGENCY ACTION TERMINATION</event>
   <category>Safety</category>
   <urgency>Immediate</urgency>
   <severity>Extreme</severity>
   <certainty>Unknown</certainty>
   <audience>All</audience>
   <senderName>DEMO</senderName>
   <expires>2009-03-16T16:26:00-6:00</expires>
   <parameter>
      <valueName>EAS-ORG</valueName>
      <value>PEP</value>
   </parameter>
   <eventCode>
      <valueName>SAME</valueName>
      <value>EAT</value>
   </eventCode>
   <area>
      <areaDesc>United States</areaDesc>
      <geocode>
         <valueName>SAME</valueName>
         <value>000000</value>
      </geocode>
   </area>
   <headline>National Emergency Action Termination Announcement</headline>
   <description>The national state of emergency has ended. Here is an important live announcement.</description>
   <instruction>Stay tuned for further instructions.</instruction>
   <resource>
      <resourceDesc>EAS Broadcast Content</resourceDesc>
      <mimeType>audio/x-ipaws-streaming-audio</mimeType>
      <uri>http://100.0.0.111:8000/liveeas.mp3</uri>
   </resource>
   </info>
</alert>
```

This CAP message translates into the following EAS header string :

ZCZC-PEP-EAT-000000+0030-0752200-LLLLLLLL

5.5 Test CAP/EAS message for the CAP IPAWS v1.0 profile

Test messages may be sent from CAP originators into the CAP/EAS translator nodes. See Section 3.9 for a discussion of CAP test messages. Here is an example:

```
<?xml version="1.0" encoding="UTF-8"?>
<alert xmlns="urn:oasis:names:tc:emergency:cap:1.2">
<identifier>CAPNET-101-20100126130000</identifier>
<sender>laciv.com@192.168.0.210</sender>
<sent>2010-01-26T13:00:00-6:00</sent>
<status>Test</status>
<msgType>Alert</msgType>
<source>HSTEC</source>
<scope>Public</scope>
<code>IPAWSv1.0</code>
<info>
   <event>CAP System Test </event>
   <category>Safety</category>
   <urgency>Unknown</urgency>
   <severity>Minor</severity>
   <certainty>Unknown</certainty>
   <audience>All</audience>
   <senderName>Hypothetical Seattle Test Emergency Center</senderName>
   <expires>2010-01-26T14:00:00-6:00</expires>
   <eventCode>
      <valueName>SAME</valueName>
      <value>ADR</value>
   </eventCode>
<parameter>
      <valueName>EAS-ORG</valueName>
      <value>CIV</value>
   </parameter>
   <area>
      <areaDesc> Island County, Washington</areaDesc>
      <geocode>
         <valueName>SAME</valueName>
         <value>053029</value>
      </geocode>
   </area>
   <headline>CAP/EAS Internal System Test</headline>
   <description>This is an internal system test of the integrated CAP/EAS Alert system. This test message is not meant to be
broadcast. This is only a system test.</description>
   </info>
</alert>
```

This demonstrates an internal system Test of the CAP/Emergency Alert System network. The value of the CAP <status> element determines if the message is Actual or a Test A test message is never meant to be broadcast into the EAS system and does not need to generate an EAS header string. Instead, it is intended to test the reception, parsing, validation, and translation of IPAWS CAP messages in the CAP/EAS reception nodes. The <eventCode> field can be anything since by definition a Test <status> message MUST NOT be broadcast. This example includes a SAME eventCode of ADR, the Administrative Message. Missing or non-conforming elements can be used to test CAP/EAS translator nodes. Translator nodes will log Test alerts and include information on the validation of the CAP/EAS message.

6 CAPtoEAS 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.

6.1 Introduction

Incoming CAP messages SHALL be subjected to a validation step prior to acceptance for translation to an FCC Part 11 EAS alert. The purpose of this step is to determine whether or not to continue the translation based upon basic syntax and semantic requirements. It is recommended that the EAS-CAP Decoder log any useful information about message validation.
This step does not address message authentication. The source will be trusted based upon other authentication steps taken in a different layer of the communication.

6.2 Validation Philosophy

In this document we discuss the rules for validation of EAS-CAP messages. There are assumed rules for basic CAP validation, "conformance rules" defined by [5], and rules defined by the EAS-CAP Industry Group.
This validation section and the Implementation Guide in general follows the OASIS IPAWS 1.0 profile conformance definitions, but notes a few differences between strict conformance to that profile and reasonable alternatives that may have application where IPAWS conformance is not required or where IPAWS may choose to change the OASIS recommendations.

6.3 Error Signaling Philosophy

We realize that EAS-CAP is a part of the larger CAP community, and that messages that are in error for EAS renderers are not necessarily errors to the CAP community. Therefore, we have taken the approach that we will not signal an error unless a message is erroneous with respect to the CAPv1.2 standard.. If the message is in error only to an EAS-CAP Decoder, we signal acceptance of the message, but do not act on it. Our intent is that the CAP community is not subjected to what they would consider to be erroneous Error messages. See the discussion on "EAS-CAP Message Result States" below to see how this is implemented. The result states optionally involve the generation of a return CAP 1.2 message with a <msgType> element of Error or Ack. The EAS-CAP Implementation Guide does not mandate the implementation of this facility.
Furthermore, a particular [4] based CAP source may not require or accept these messages. [4] based CAP servers that accept return messages will allow an EAS-CAP Decoder a ready mechanism to support server side validation of processed alert messages. If return messages are generated, they SHALL conform to the syntax rules in section B3 – "EAS-CAP Message Result States". This does not infer that other methods may or may not be used in addition to or instead of the [4] based CAP Ack/Error facility. This methodology will be reviewed by the EAS-CAP Industry Group before further recommendation.

6.4 Validation Overview

The CAP-to-EAS message validation procedure described below details the minimum requirements to enforce basic message verification. Specifically, the purpose of this validation step is to:

1) reject improperly formatted, improperly constructed, or damaged CAP messages.
2) ignore messages that do not contain sufficient information for the generation of a unique EAS message as defined by [5]and/or by ECIG recommendations.
3) ignore CAP messages that are not intended for EAS translation.
Once a CAP message passes the validation step, it may be subjected to an additional set of filters that will decide if a particular alert is to be placed on the air by a particular user. This step in the process is not further addressed in this document.
The EAS-CAP validation procedure gives the order of the validation steps. The intent of the entire EASCAP Implementation Guide is to ensure that any EAS-CAP Decoder will respond to a CAP message in the same manner– in the rendering of the message as well as error signaling. The validation order is an important part of that process.

6.4.1 CAP Required Elements

In the EAS-CAP Implementation Guide, we do NOT require that all CAP-required elements be present. We assume that a processing element in the chain before the EAS-CAP Decoder has verified the format of the alert, and that the authentication scheme has delivered an intact message to the EAS-CAP Decoder. Specific CAP message elements are defined by [4]as required, as shown in BOLD in Figure 6 below. A minimum subset of these elements is applicable to EAS translation, as indicated by "**" in Figure 6 below.
Not all CAP required elements are relevant to EAS translation in the manner prescribed by FCC Part 11. Therefore, the validation does not base this step upon strict adherence of a CAP message, based upon CAP required elements, to the CAP standard (though device certification may require it.) This guide requires that any element that is needed by the EAS-CAP Implementation Guide is valid if it is present.

6.4.2 EASCAP Required Elements

In order to translate a CAP message into an EAS message, a small set of optional CAP elements are required. These elements have been defined in the EAS-CAP Implementation Guide in order to guarantee consistent translation into an EAS message. These elements of the CAP message are not necessarily required as elements in CAP, but are required by EAS (e.g. <info>). Some elements are required for proper translation into an EAS message, and thus are included in a specific minimum set of EAS-CAP required elements.
Other elements may be considered of lesser importance. Reference [5]defined a slightly larger set of required elements. Most of these elements are matched by the ECIG recommendation. Differences between the OASIS IPAWS profile [5] and ECIG recommendations are noted in the discussions that follow.
If any of the minimum set of Required EAS compatible CAP elements are present, they are examined for validity; if any are invalid, the message is in error. If the elements are missing, and a proper EAS alert cannot be generated, the message is ignored. The rationale is that such a message may not be intended for EAS, and therefore, missing EAS elements are not considered an error condition in the non-EAS-CAP community. See the discussion in "EAS-CAP Message Result States" below to see how this is implemented.
An example of a message that is correct based on the CAP schema, but is not correct for the EAS-CAP Implementation Guide, is an Area block that contains a <geocode> with value name of SAME but has a value not matching the format of the [3] based PSSCCC code.

6.4.3 Logging

Logging is an implementation detail for each vendor. Logging requirements for CAP messages are not yet defined by the FCC or other certification authorities. It is recommended that an EAS-CAP Decoder SHOULD log all received CAP messages, along with a notation of the CAP message result states, as defined later in this document.

Figure 6: CAP v1.2 Message Structure [4] and EAS-CAP Implementation Guide Required Elements

Alert**	Info**	Resource***	Area**
	Language*** <language>		
	Event Category <category>		
	Event Type <event>		
Message ID <identifier>**	Response Type <responseType>		
Sender ID <sender>**	**Urgency <urgency>**	**Resource Description*** <resourceDesc>**	Area Description <areaDesc>
Sent Date/Time <sent>	**Severity <severity>**	**MIME Type*** <mimeType>**	Area Polygon <polygon>
Message Status <status>**	**Certainty <certainty?**	File Size <size>	Area Circle <circle>
Message Type <msgType>**	Audience <audience>	URI*** <uri>	Area Geocode** <geocode>
Source <source>	Event Code** <eventCode>	Dereferenced URI <derefUrl>	Altitude <altitude>
Scope <scope>**	Expiration Date/Time* <expires>	Digest <digest>	Ceiling <ceiling>
Info** <info>	Effective Date/Time <effective>		
Handling Code* <code>	Onset Date/Time <onset>		
Note <note>	Area** <area>		
Reference IDs <references>	Sender Name <senderName>		
Incident IDs <incidents>	Headline <headline>		
Restriction <restriction>	Event Description <description>		
Addresses <addresses>	Instructions <instructions>		
	Information URL <web>		
	Contact Info <contact>		
	Parameter* <parameter> <valueName>EAS-ORG		
	Resource <resource>		
*<elements>	Required for conformance by OASIS IPAWS,	but not strictly needed for CAP to	EAS translation.
** <elements>	Required for CAP to EAS translation		
*** <elements>	Conditionally Required		
	Elements in **BOLD**	Indicate CAP v1.2	Required elements

6.5 EASCAP Message Validation Procedure

Each of the following validation steps results in a new message state. The default is that the message is passed to the next verification step. The three states are Rejected, Ignored, or Accepted. The action taken in those states is the following section of this document. For information on validation of specific elements, see the notes column under the "CAP to EAS Validation Table" below.

Version 1.0
ECIG Recommendations for CAP EAS Implementation Guide - **Version 1.0**

EAS-CAP validation is performed in the following order:
1) CAP conformance.
a. Check for legal XML format.
b. There is no requirement for receivers to validate CAP messages to the CAP schema, so ECIG has recommended that only elements required for translation to EAS be validated. But, there may be other entities that impose message validation requirements on an CAP-EAS device. Check for the presence and validity of ALL CAP elements required by any applicable certification authority or national, state, or local authority.
c. If a message fails this step, the message SHALL be Rejected.

2) CAP / EAS validation:
a. *Minimum set of CAP Required elements:* If a CAP element that is required by CAP and is also required by the EAS-CAP Implementation Guide is missing, the message SHALL be Rejected. See Figure 6 above to determine the CAP Required and EAS Required elements.
b. *Minimum set of Required EAS compatible CAP elements*: If any of the minimum set of Required EAS compatible CAP elements are present, they are examined for validity, and if any are invalid, the message SHALL be Rejected. Validity in general means that the value is a recognized CAP or EAS-CAP Implementation Guide value. If any of these required elements are missing, the message SHALL be Ignored. Note: A missing optional EAS-CAP element will have a default defined by the guide and is not cause for a Reject or an Ignore.

3) Acceptance:
A message that has passed the previous validation steps SHALL be Accepted. Once the message is accepted, in most implementations it will be further subjected to various EAS rendering filters to decide if the alert is to be aired by a particular user. Such filters are in the EAS rendering domain only, and are beyond the scope of this work.
Figure 7: is not reproduced here, but is replaced by the set of questions following as it also selects if EAS+ is applicable.

B2 EAS-CAP Message Validation Procedure

Each of the following validation steps results in a new message state. The default is that the message is passed to the next verification step. The three states are Rejected, Ignored, or Accepted. The action taken in those states is the following section of this document.
For information on validation of specific elements, see the notes column under the "CAP to EAS Validation Table" below.

EAS-CAP validation is performed in the following order:
1) CAP conformance.
a) Check for legal XML format.
b) If required by rules specified by a certification authority, check for the presence and validity of ALL CAP required elements.
If a message fails this step, the message SHALL be rejected.
2) CAP / EAS validation:
a) *Minimum set of CAP Required elements:* If a CAP element that is required by CAP and is also required by the EAS-CAP Profile is missing, the message SHALL be rejected. See Figure B-1 above to determine the CAP Required and EAS Required elements.

Q1: Is the country the U.S.A.? If no go to Q8 otherwise go to Q2.
Q2: Is the location American Samoa and using SAME weather polygons (which are not for the southern hemisphere)? If yes go to Q8 otherwise go to Q3.
Q3: Is the language English only? If no go to Q8 otherwise go to Q4
Q4: Does the message meet CAP v1.2 conformance rules? If no, reject, if yes go to Q5.
Q5: Are the minimum set of CAP elements present? If no, reject, if yes go to Q6.
Q6: Are the minimum set of required EAS compatible CAP elements present? If no, ignore, if yes go to Q7.
Q7: Are all the required EAS-CAP elements valid? If no, go to Q8, if yes accept and process as an EAS message as in b) below.
Q8: Is EAS+ mode permitted now or is this on or following an EAS+ commencement date of YYYY-MM-DD in this country? If no, reject, if yes, go to Q9. If the date is more than 30 days after the EAS+ commencement date, this question MAY be eliminated from the algorithm.
Q9: Does the message meet the current CAP conformance rules? If no, reject and log and send email to QC, if yes go to Q10.
Q10: Are the minimum set of CAP elements present? If no, reject and log and send email to QC. If yes go to Q11.
Q11: Are the minimum set of required EAS+ compatible CAP elements present? If no, log and send email to QC. If yes, go to Q12.
Q12: Are all the required EAS+CAP elements valid? If no, reject and log and send email to QC. If yes, go to Q13
Q13: Is the EAS analog Daisy Chain in use in this state or being received by another state broadcaster from this state with analog audio FSK modem tones as a message data source? If no, accept as basis to translate to an EAS+ message. If yes, process the message to the modem as in b) below, and accept the message as basis to translate to an EAS+ message for digital data transmission.

Figure B-2: Basic CAP-to-EAS(+) Validation Process (to be drawn)

6.6 EASCAP Message Result States

Based on the procedure above, the validation steps result in three states, Rejected, Ignored, or Accepted. The resulting actions that MAY be taken are described below. Returning a result provides a valuable mechanism for message validation to the sender, but note that CAP servers are not required to support this option. If the EAS-CAP Decoder does send the optional return message, it SHALL conform to the syntax rules described below. This methodology will be further reviewed by the EAS-CAP Industry Group before further recommendation.

Rejected:
An EAS-CAP Decoder SHALL NOT further process or render a rejected message. It MAY generate a return message and the syntax SHALL be a <msgType> of "Error", a <note> element describing the issue, and a <references> element containing the extended message identifier (in the form <*sender*>,<*identifier*>,<*sent*>) of the Rejected message.

Ignored:
An EAS-CAP Decoder SHALL NOT further process or render an ignored message. It MAY generate a return message and the syntax SHALL be a <msgType> of "Ack", a <note> of "Ignored" ("Ignored" MAY be followed by a colon (":") and a text description of the issue), and a <references> element containing the extended message identifier (in the form <*sender*>,<*identifier*>,<*sent*>) of the Ignored message.

Accepted:
An EAS-CAP Decoder MAY generate a return message and the syntax SHALL be a <msgType> of "Ack", a <note> of "Accepted", and a <references> element containing the extended message identifier (in the form <*sender*>,<*identifier*>,<*sent*>) of the Accepted message.

If the EAS-CAP Decoder places the alert on the air, it MAY generate an additional return message with a <msgType> of "Ack", a note of "Aired on" followed by the FCC Call Sign(s) of the stations(s) that the alert was sent on, and a <references> element containing the extended message identifier (in the form <*sender*>,<*identifier*>,<*sent*>) of the aired message. This may result in multiple "Ack" messages in the case where an EAS-CAP Decoder controls more than one broadcast outlet.

Timing and Interference Immunity

Analog EAS at the standard baud rate takes a significant time to transmit the header. This duration and the triple redundancy provide immunity to impulse noise. Digital TV and radio data transmission rate is much faster. Therefore when the baud rate is in excess of 2400 baud, the sections of the header SHALL be with pauses of duration of 0.25 +/- 0.05 sec minimum between starting points.

6.7 CAP to EAS Required Elements

Below in summary are the ECIG minimum elements required within a valid EAS-CAP message. If any of these elements is missing, the message translation to EAS SHALL be ignored; if invalid, the message SHALL be rejected.
<alert> , <identifier> , <sender> , <sent> , <status> , <msgType> , <scope>
<info> , <eventCode>
<area> , <geocode>
Note that an <info> block can be present or missing when <alert><msgType> is Cancel. Handling such a CAP message does not require CAP translation into EAS, so the <info> block is irrelevant.
In addition there are two conditional required elements if the optional <resource> element is used. If any of these elements is missing, the message SHALL be ignored; if invalid, the message SHALL be rejected.
<resourceDesc> , <mimeType>, <uri>
The OASIS IPAWS CAP/EAS profile [5] also defines three more elements that must be present in CAP messages for IPAWS conformance. These are <alert><code>, with a specific value that must contain the version string of the IPAWS profile ("IPAWSv1.0"), <info><expires>, and <info><parameter> <valueName>EAS-ORG. CAP messages that do not contain these elements do not conform to the OASIS IPAWS v1.0 profile. Strict IPAWS conformance requires rejection of CAP / EAS messages that do not contain these extra elements. The ECIG Implementation guide provides a simple method to default these values if IPAWS conformance is not required. See the second table below.

Figure 8: Minimum EAS-CAP Translation Elements

Alert**	Info**	Resource***	Area**
Message ID <identifier>**	Event Code** <eventCode>		
Sender ID <sender>**	Expiration Date/Time* <expires>	**Resource Description*** <resourceDesc>**	Area Geocode** <geocode>
Sent Date/Time <sent>	Parameter* <parameter> <valueName>EAS-ORG	**MIME Type*** <mimeType>**	
Message Status <status>**		URI*** <uri>	
Message Type <msgType>**			
Scope <scope>**			
Handling Code* <code>			
*<elements>	Required for conformance by OASIS IPAWS,	but not strictly needed for CAP to	EAS translation.
** <elements>	Required for CAP to EAS translation		
*** <elements>	Conditionally Required		
	Elements in **BOLD**	Indicate CAP v1.2	Required elements

Version 1.0
ECIG Recommendations for CAP EAS Implementation Guide - **Version 1.0**

CAP to EAS Validation Table

R = Required; O = Optional; E = Extension; ND = Not Specifically discussed in IPAWS profile, so subject to CAP constraints; NU = Not Used; U = Used; C = Conditional

***** = Items that map into the EAS ZCZC string.

CAP fields in this table:

1) Are in the EAS-CAP validation process or
2)

2) Have recommended values meant to be useful to non-EAS user – in particular, those used in conjunction with the various EAS "test" messages. See the discussion on EAS Test messages elsewhere in this document.

****** = Items that have non-IPAWS conformance entries in a second table..

CAP Standard Element Name and Definition	CAP 1.2/ OASIS-IPAWS 1.0 Constraint	EAS-CAP I.G. Constraint For IPAWS	CAP to EAS Mapping and Validation Notes
Alert Block			
<alert> Identifies XML message as a CAP Standard message.	R/R	R	SHALL follow CAP defined syntax. SHALL be version 1.2. Example: <alert xmlns="urn:oasis:names:tc:emergency:cap:1.2">
<identifier> Each message SHALL contain a number or string uniquely identifying that message.	R/R	R	RECOMMENDED that the identifier value be stored as state information for an active CAP message in the EAS-CAP Decoder. SHALL be used with <sender> and <sent> to match an existing alert during <msgType> Update, Cancel, Ack, or Error.
<sender> Identifies the originator of an alert. Guaranteed by assigner to be unique globally. Can be an email address.	R/R	R	RECOMMENDED that the sender value be stored as state information for an active CAP message in the EAS-CAP Decoder. SHALL be used with <identifier> and <sent> to match an existing alert during <msgType> Update, Cancel, Ack, or Error.
<sent> Sent time. Format: "2007-05-24T16:49:00-07:00" = 24 MAY 2007 at 16:49 PDT	R/R	R	*****SHALL be converted to EAS **JJJHHMM** Effective Date/Time. If cannot be converted due to missing time zone or a syntax error then message SHALL be rejected.
<status> Alert handling code. Possible Values: Actual, Exercise (for participants), System (internal functions), Test (all should ignore), Draft (not actionable).	R/R	R	"Actual" SHALL be used for any alert destined for EAS forwarding – including all public EAS test messages such as RWT, RMT, NPT, DMO, and NMN. "Test" MAY be used to test CAP reception on a CAP to EAS platform. Use of the other CAP defined values is not defined yet.
<code> The IPAWS profile version string	O/R	R	According to [5], the value SHALL include the IPAWS version string "IPAWSv1.0" is defined as the initial version string value. CAP without a <code> element, or whose code value does not include any defined IPAWS version string, SHALL not be used as an IPAWS compliant CAP to IPAWS EAS trigger. ** See table below for non-IPAWS handling.

CAP Standard Element Name and Definition **Alert Block**	CAP 1.2/ OASIS-IPAWS 1.0 Constraint	EAS-CAP I.G. Constraint For IPAWS	CAP to EAS Mapping and Validation Notes
<msgType> Nature of alert. Possible Values: Alert, or Update, Cancel, Ack, Error. (The latter four are applied to the alert identified in <references> below, and explained in <note> below.)	R/ND	R	Valid range for values SHALL be "Alert" or "Update", or "Cancel". Messages missing <msgType> SHALL be rejected; messages with incorrectly valued <msgType> SHALL be ignored. Reference [5] does not discuss this specific element, and therefore does not place any constraint on use of <msgType> values. The presence of this element is REQUIRED by [4], thus can be assumed to be REQUIRED by [5].
<scope> Intended distribution. Possible Values: Public, Restricted, Private.	R/ND	R	Messages with a value other than Public SHALL be Private mode if permitted. Public SHALL be public mode. Reference [5] does not place any constraint on use of <scope> values. The presence of this element is REQUIRED by [4].
<references>	O/O	O	Not used directly for EAS. Used to find earlier CAP messages based on <identifier, <sender>, and <sent> in order to implement <msgType> Update and Cancel
<info> CAP and the EAS-CAP Implementation Guide allows multiple Info Blocks to support multiple languages. See below for Info Block elements.	O/O	C	At least one <info> block is Required for translation into EAS. A special case is <msgType> of Cancel, where no <info> block is required and no translation to EAS is needed. Multiple <info> blocks may be used to encode alert information in multiple languages. If the same language is defined for multiple <info> blocks, then only the first block SHALL be processed. Data SHALL encode data for the same alert. See below for Info Block elements.
Info Block elements			Only the information in the first info block will be used unless there are different languages.
<language> Code denoting the language the alert is in. CAP assumes "en-US" if blank.	O/ND	C	Usage is required when supporting multiple languages with multiple <info> blocks.
<event> Text denoting type of event of the alert.	R/ND	NU	ECIG does NOT recommend using this field in construction of alert text or other visual display. Reference [5] does not place any constraint on use of <event> values, but the presence of this element is REQUIRED by {4}
<urgency> Possible values: Immediate, Expected, Future, Past, Unknown	R/ND	NU	For test alerts (RWT, RMT, NPT, DMO, and NMN) value SHOULD be set to *Unknown* by originator. ECIG CAP to EAS translation does not use this field. Reference [5] does not place any constraint on use of <urgency> values, but the presence of this element is REQUIRED by [4].

CAP Standard Element Name and Definition **Info Block**	CAP 1.2/ OASIS-IPAWS 1.0 Constraint	EAS-CAP I.G. Constraint For IPAWS	CAP to EAS Mapping and Validation Notes
<severity> Possible values: Extreme, Severe, Moderate, Minor, Unknown.	R/ND	NU	For test alerts (RWT, RMT, NPT, DMO, and NMN) value SHOULD be set to *Minor* by originator. ECIG CAP to EAS translation does not use this field. Reference [5] does not place any constraint on use of <urgency> values, but the presence of this element is REQUIRED by [4].
<certainty> Possible values: Observed, Likely, Possible, Unlikely, Unknown.	R/ND	NU	For test alerts (RWT, RMT, NPT, DMO, and NMN) value SHOULD be set to *Unknown* by originator. ECIG CAP to EAS translation does not use this field Reference [5] does not place any constraint on use of <urgency> values, but the presence of this element is REQUIRED by [4].
<eventCode> System-specific code for event. Subfields <valueName> of SAME and <value> define the code, a 3 letter code.	O/R	R	*****One and only one eventCode, with a valueName of SAME and a 3 letter value is required. Maps to EAS **EEE** Event Code field. Range is any uppercase alphabetic characters. Depending upon the specific EAS-CAP Profile Decoder implementation, message validation MAY or MAY NOT validate against the FCC defined EAS codes. Provisions for state defined EEE values can be handled optionally. Example: <eventCode> <valueName>SAME</valueName> <value>CAE</value> </eventCode> If the implementation does not handle the EEE code, the message SHALL be ignored.
<expires> Expiration time of the information of the alert.	O/R	R	*****Used to derive **EAS Valid Time Period (TTTT)** by subtracting from <sent> to derive a duration Round the resulting duration up to next valid EAS Duration length. EAS Duration Range: If greater than 0 and less than or equal to 45 minutes, '15,30,45 mins' else every half hour from '1hr' to '99hrs 30 mins'. If duration is less than or equal to 0 then the message is expired and SHALL be ignored. Required for IPAWS conformance. **See table below for non-IPAWS handling errors, the message SHALL be accepted.
<senderName> Human-readable name of agency or authority.	O/O	O	ECIG recommends optionally using this value in construction of alert text or other visual display.
<headline> Direct and actionable brief human-readable headline.	O/O	NU	ECIG does NOT recommend using this field in construction of alert text or other visual display.
<description> Extended human-readable description of event.	O/O	U	ECIG recommends using this value in construction of alert text or other visual display.
<instruction> Extended human-readable RECOMMENDED action for targeted alert recipients.	O/O	U	ECIG recommends using this value in construction of alert text or other visual display.

CAP Standard Element Name and Definition **Info Block**	CAP 1.2/ OASIS-IPAWS 1.0 Constraint	EAS-CAP I.G. Constraint For IPAWS	CAP to EAS Mapping and Validation Notes
<parameter> Any system-specific datum associated with alert.	O/E	E	EAS-CAP Profile defines three <valueName> fields: 4. **EAS-ORG (***from* [5]) *5.* **EASText** (*ECIG recommendation)* *6.* **EAS-Must-Carry** (*from* [5] *below*) **See below**
Special EAS parameter <parameter> <valueName> **EAS-ORG** </valueName> <value> EAS, CIV, WXR, or PEP </value> </parameter>	O, E/O, C, E	R	***Maps to 3 letter **EAS ORG** code. Range is; EAS, CIV, WXR, or PEP. Example <parameter> <valueName>EAS-ORG </valueName> <value>CIV </value> </parameter> Required for IPAWS profile conformance: Messages missing <parameter> <valueName>EAS-ORG SHALL be rejected. Messages with an incorrect value for EAS-ORG as defined above, SHALL be rejected. **See table below for non-IPAWS use.
Special EAS parameter. <parameter><valueName> **EASText** </valueName> <value> Originator authored alert text </value>	O, E/NU	O	*Recommended by ECIG:* If this parameter is present the value is used verbatim to construct alert text or other visual display. [5] *does not define this extension, but does include something similar for CMAS (Mobile phone alerts).*
<parameter> <valueName> **EAS-Must-Carry** </valueName> <value> TRUE </value>	O, E/O, E	O	If this parameter is present and the value is TRUE, then the CAP message has come from a state governor's office and the EAS system SHALL place the message on air according to the rules of the state plan.
<resource> CAP allows multiple Resource Blocks.	O/O	O	Multiple resource block instances allowed. See below for Resource Block elements.
<area> CAP allows multiple Area Blocks. The EAS-CAP Profile instructs to only use the information in the first area block. See below for Area Block elements.	O/R	R	One area block only. Second or more area blocks will not be processed. The presence of more than one area block SHALL NOT cause the message to be rejected or ignored. Basic syntax example (also see below): <area> <areaDesc>Arlington, VA </areaDesc> <geocode> <valueName>SAME </valueName> <value>022292 </value> </geocode> </area> See below for Area Block elements.
Resource Block elements Refers to additional file with supplemental info			Only needed if audio file or stream is sent.
<resourceDesc> Human-readable description of resource, e.g. "map", or "photo".	C/C	C	Required if there is a **Resource Block**, e.g. mp3, wav or streaming asset. Valid value for CAP IPAWS is: "EAS Broadcast Content"

CAP Standard Element Name and Definition **Resource Block**	CAP 1.2/ OASIS-IPAWS 1.0 Constraint	EAS-CAP I.G. Constraint For IPAWS	CAP to EAS Mapping and Validation Notes
<mimeType> Identifies MIME content type describing resource.	R/R	R	Valid values for OASIS CAP IPAWS are : "audio/x-ipawsaudio", "audio/x-ipaws-streaming-audio", "video/x-ipawsvideo" and "video/x-ipaws-streaming-video" . *ECIG allows testing for the file format after download of a file deemed audio/x-ipaws-audio in order to determine if the file is WAV or MP3. ECIG recommends extension to "audio/x-ipawsaudio-wav", audio/x-ipaws-audio-mp3", etc.*
<size> Approximate size of resource file in bytes.	O/O	O	
<uri> Hyperlink to the resource file; URL on the Internet, or reference to <derefUri> location within the message.	O/O	C	Needed if alert data is referenced. Required if <info><resource> is present.
<derefUri> The actual resource file data, if sent within the message. Data is sent as Base64 ASCII.	C/C	C	Needed if alert data is sent within message. *ECIG does not recommend using this feature to send multimedia resource data within CAP, due to the enormous expansion of the CAP file length. This method has use in a system where only the CAP message can be sent and received.*
<digest> Digital digest "hash" code	O/O	O	
Area Block elements CAP permits more than one.			Only the information in the first area block will be used.
<areaDesc> Text describing the affected area. Example: <areaDesc>Fifth Street overpass</areaDesc>	R/ND	NU	ECIG does NOT recommend using this field in construction of alert text or other visual display. Originators SHOULD include pertinent area information in the <description> or <instruction> fields. EAS encoded areas are taken from SAME FIPS <area><geocode> list. Reference [5] does not place any constraint on use of <areaDesc> values, but the presence of this element is REQUIRED by [4].
<geocode> Any geographically-based code to describe target area. valueName = user-defined domain of code. value = string denoting the value itself.	O/R	R	*****At least one <geocode> with <valueName> of SAME (IPAWS conformance requires "SAME". **See table below for non-IPAWS use.) and one <value> string representing the 6-digit EAS Location code must be defined. The location code must be constructed as defined in CFR 47 Part 11, that is a 5-digit **FIPS** code and a leading digit indicating no subdivision or the 1/9th area sub-division (6 total digits). Each one maps to one EAS Location Code defined as **PSSCCC.** Up to 31 geocodes SHALL be placed into the EAS ZCZC string in the order that they are encountered in the CAP message. This is required to allow duplicate EAS messages to be detected. Example of <geocode> <geocode> <valueName>SAME </valueName> <value>006013 <value>006014 </value> </geocode> A message with no geocodes, or a message with geocodes but an invalid valueName SHALL be ignored. A message with a valid valueName where the value is not in PSSCCC format SHALL be rejected. [5] has also defined the <geocode> <value> of 000000 as referring to all of the United States and US Territories. As of

			this writing the FCC has not adopted this code for Part 11.
CAP Standard Element Name and Definition **Area Block continued**	CAP 1.2/ OASIS-IPAWS 1.0 Constraint	EAS-CAP I.G. Constraint For IPAWS	CAP to EAS Mapping and Validation Notes
<circle> A circle on spherical surface	O/O	NU	
<polygon>	O/O	NU	
<altitude>	O/O	NU	
<ceiling>	O/O	NU	

Non-IPAWS compliant element handling in the CAP to EAS Validation Table

CAP fields in this table are required by IPAWS but may have different constraints outside of an IPAWS system.

CAP Standard Element Name and Definition	CAP 1.2/ OASIS-IPAWS 1.0 Constraint	EAS-CAP I.G. Constraint For IPAWS	CAP to EAS Mapping and Validation Notes
<alert><code> Handling code string.	O/R	C	ECIG notes that vendors may choose to offer EAS triggering of non-IPAWS messages from CAP sources, depending on Local and State emergency plans. In this case, <code> may be ignored or have a different requirement.
<alert><info><expires> Expiration time of the information of the alert.	O/R	O	***Used to derive **EAS Valid Time Period (TTTT) by subtracting from <sent>.** For non-IPAWS compliant systems, ECIG recommends that if this field is not present, the EAS-CAP Decoder SHALL assume that the expired time is one hour greater than the value in the <sent> element, and the value of the EAS Valid Time Period SHALL be 0100, and if there are no other errors, the message SHALL be accepted.
Special EAS parameter. <alert><info> <parameter> <valueName> **EAS-ORG** </valueName> <value> EAS, CIV, WXR, or PEP </value>	O, E/O, C, E	O	***Maps to 3 letter **EAS ORG** code. For non-IPAWS compliant systems, ECIG recommends messages missing <parameter> <valueName>EAS-ORG SHALL assume that the originator is CIV, and if there are not other errors, the message SHALL be accepted.
<alert><info><area><geocode> valueName = user-defined domain of code. value = string denoting the value itself.	O/R	R	* Each one maps to one EAS Location Code defined as **PSSCCC.** Non-IPAWS conforming systems may also use the value “FIPS6” for <valueName>.

SECTION V

Compression Systems and Transition Aspects

The approach of using SCTE J-STD-042-2002 for broadcasting has a problem. It is that the transition from the EAS compatible digital mode would involve replacing all digital TVs or cutting off EAS in the U.S. An alternative is that the PID(s) for audio program would have the EAS audio replacing program as a 200 Hz to 6 kHz mono channel with 14 bit minimum resolution. Provision for multiple languages is described in the protocol definition for JJJ and TTTT. This is adjustable so as to provide the packet timing ratio in the following paragraph. Meanwhile the program would continue on temporary alternative PID(s). The alternative audio signal SHALL begin 0.5 sec after the end of the header and any latitude-longitude section. This is to give the receiver time to determine if the message is for that location. There SHALL be 4 PID packets overlap to give the receiver time to detect and switch to the alternative if applicable. The EAS audio SHALL then begin. As the EAS audio would have the SEWS RECOMMENDED digital alert tones in the beginning, these SHALL be of a precise duration after the audio start. Receivers for analog transmitter ENCODER/DECODERS SHALL mute these tones such that the ENCODER/DECODER SHALL then insert the modem tones based on the data header that is defined for analog broadcast. This would then sound different, enabling an identification as to whether the source is digital EAS+ or analog EAS compatible mode. The other purpose of the modem tones SHALL be for message identification for monitoring receivers for QC. This SHALL NOT result in any click for program continuation. A click for EAS message starting and ending is acceptable. Message end data SHALL initiate the switch back, and a discontinuation of the alternative PID is a backup initiator. 0.4 sec of program audio overlap SHALL be to mask any switch of PID(s) back. The PID(s) available as the alternative audio SHALL be specified in the PMT (Program Map Table). This requires a new class of entry in the PMT. Incompatible TVs SHALL ignore the alternative. A default value for these SHALL be 5 added to the normal PID. While this would add bandwidth compared to the SCTE method, it is a relatively small amount for short and infrequent use.

In order to provide synchronization between the separated audio PIDS, there SHALL be an integer to one, or an odd integer to two ratio between the packets in the two streams that have the same PCR and PTS values. The compression rate in both paths SHALL be adjusted so as to enable this during the EAS message insert process.

Legacy compression systems MAY be used to emulate this operation by having the extra PIDS with program audio less the EAS message insert. However this will require more bandwidth, and PID switching capable TVs MAY produce a click and/or gap when the PIDs are switched. This is because there is no synchronization between the two streams. However it is an economy for broadcasters who do not wish to upgrade immediately. An additional AES mixer/switch MAY be required, and use of GPIs is a control provision.

The data transmission SHALL be as per SCTE J-STD-042-2002 as far as is applicable. The priorities and user selection thereof SHALL be as described previously. As priority 0 messages are ones that are not normally output to the public, these MAY be phased in as the public has an acceptable usage of EAS+ compatible TVs.

The crawl overlay from the broadcast source SHALL continue. However as EAS+ compatible TVs would generate their own crawl, the lines used for both SHALL be specified the same. The top and bottom lines SHALL be on block boundaries for MPEG2, MPEG4 and VC1 compression systems for all video formats for more efficient compression. If the situation develops in the future that practically all TVs have the internal crawl generated, then the broadcaster generated crawl may be discontinued.

This is not a capability provided in any existing compression system. A data input to a compression system SHOULD be by broadcast standard RS-422 connection or LAN. As all video streams have the same EAS message added, only one input per system SHOULD be needed. External AES processing is currently available that can be controlled by the ENCODER/DECODER.

MPEG splicers MAY be a means of inserting EAS+ signals. The output SHALL be the same as the method above. If EAS+ messages are received by MPEG splicers with the alternative audio, any local insertions SHALL be on the alternative audio for its' duration. The crawl SHALL also be added to the locally inserted video.

As the messages to switch back to the regular PID audio MAY NOT be received, the absence of that PID for a timeout period, 16 seconds proposed, SHALL result in the audio PID selection returning to the default PID for that program. As SAP, or sometimes more than two channels, of dialog are carried, the PID switching SHALL apply only to the selected language and also to English. While the alternate PID method can only provide for one language at a time, for digital radio, the EAS+ messages on TV MAY be other languages. By always including English, tourists are better provided for. Also the implementation in English speaking countries MAY be such that the presence of other languages cannot be depended on, and this is dependent on local funding and the availability of SAP programming. This function is not suitable to mute undesirable content.

Daisy chain/Mesh receivers for EAS+ would need to extract the data as transmitted, not from the modem tones. This SHALL be via a broadcast standard RS-422. Also note the Private and Public mode use of the Daisy Chain/Mesh detailed in a later appendix of the book (J intended).

Dolby AC3 enhanced AC3 and Dolby E are another format to address. The best method is not currently obvious, whether the PID switching alone as noted in this appendix, or to use the stream type switching of AC3, or to assign a custom channel value of 14, along with the 16 kHz sample rate option, are possible options. Also as Dolby E and Enhanced AC3 can both carry timecode, this SHOULD pass from the program source in the EAS inserted stream.

While there MAY be some thought given to transmitting CAP messages to consumer devices, CAP is a more verbose protocol. This adds to the transmission bandwidth and the processing requirement at the receiver. A compact and well defined protocol on a binary basis can be processed with less battery drain on a consumer device.

The above considerations apply to TV. HD Radio is using the AAC (Advanced Audio Codec) compression system. There is also a considerable delay for this system as it needs to work to cars which drive under bridges for example. The analog signal is delayed to match the digital system delay. This is not suitable for baseball fans at the stadium for example, so the Baseball Mode

forces the radios to the analog signal, and removes the delay on the analog. This is useful for alerts for earthquakes for example.

While TV does not have a Baseball Mode, the audio playout is delayed by over a second. This is in order to have the audio in time with the video. This is called lipsync. For a priority 1 emergency message, this delay is undesirable. Therefore for such alerts there SHALL be an EAS+ Mode, when the data is sent with a reasonable priority and the alert audio also. The priority order of these SHALL be (highest first) EAS+ data, Language 1, Language 2, Language 3, Language 4, for those languages present. The language data is stored in a buffer memory. The buffer playout pointer SHOULD start at between 75 and 125 ms after the start of language packets arriving. The buffer playout pointer SHALL be delayed for additional time of 2/3 of any buffer underrun time. Because this is using PIDs (Program IDs) that are an exception to the PCR (Program Clock Reference) synchronization mechanism and this is not in the current standard, and PATs and the PMT need to be able to identify this, there would need to be liaison with ATSC and vendors such as Dolby and compression system manufacturers as to how to accomplish the details of this.

The video delay is unavoidable, and therefore the crawl inserted is also delayed. However from the data received the EAS+ receiver SHALL insert the crawl as soon as the data can be used. The closed captioning functionality SHOULD be adapted to provide this.

EAS+ to CAP or EDXL-DE Conversion

The conversion of EAS+ to CAP or EDXL-DE messages SHALL ONLY be performed if this is authorized, the default value is NOT Authorized. This default value MAY change with appropriate jurisdiction decision without affecting the standard definition. The conversion SHALL ONLY be performed IF no CAP message with the same <identifier> AND <sender> for CAP, or <distributionID> AND <senderID> for EDXL-DE, has been received after 1 minute. The conversion SHALL NOT be provided for earthquake warnings, because 1 minute is too late to be of value and is more likely to annoy people. Also broadcasters are not responsible for the failures of the CAP WAN, as they are providing a backup path.

If an EAS+ message is sent, no data is discarded. The format may be in EAS+ binary, or a <label>*text*, or a <label=*label*> form or a group previously described. If the EAS+ message is error free, this data SHALL be used to populate the values of a preformatted CAP or EDXL-DE or a TSO format message. The TSO use is not currently defined by OASIS-open, only by Oasis-fp6. The most significant modification to the data is the use of only one polygon. A method of translation to multiple circles and polygons is an algorithm that a definition SHOULD be developed for. IF such an algorithm is not capable of deriving an accurate result, then a larger single polygon enclosing the whole area SHALL be derived using the CAP or EDXL-DE polygon limitation. IF ALL the preceding criteria are met, an appropriate message SHALL be generated. While such a message MAY not be identical with the original message, conformance testing of this application SHALL be performed to check that the functionality and human readability criteria (yet to be defined) are met. All EAS+ to CAP or EDXL-DE or TSO message conversion SHALL be fully logged and emailed to QC monitoring. Also such emails MAY be required by software developers to improve software quality.

This is not a substitute for CAP Broadcast, and any CAP WAN network failures discovered in operation SHOULD be able to use another means of delivery of which CAP Broadcast is a possibility where it is practical and implemented.

EAS+ Graphics Protocol

Currently ENCODER/DECODERs communicate with CGs (Character Generators or Computer Graphics) using a manufacturer protocol such as TFT, Sage or Gorman-Redlich. While this would be continued, it is not suitable for all the extensions that EAS+ provides. Also as there is anticipated to be a migration of the CG function into TVs, this needs consideration. For example there is the aspect of developing a consistent look of the alert crawl. The scarlet-crimson with white letters alerts and yellow with black letters information need specification in ITU-R 601 and ITU-R 709 color space, and that these formats are reserved for EAS+ use. The consumer CGs are already used to display captioning, and so EIA 708 could be adapted for this purpose. As Asian alphabets take a significant memory space, this might be a SIMM chip addition. Then Unicode can be supported. The European teletext system is now MHEG-5 v1.06, by www dtg.org.uk. They also have a document on access for handicapped people, acces_project.pdf. There is provision there for supplementary audio so people with poor visibility could gain a better appreciation of what was on TV in addition to the normal audio. Such audio SHOULD be muted during EAS+ being reproduced on the receiver speaker. The document refers to subtitles, however in the context used it is not subtitle usage, which is part of the active picture video content, but closed captioning usage which is a separate data stream. The document also comments on the difficulty of the physically handicapped using remote controls. This is a remote control design issue, and suitable remote controls SHOULD be available, and information about this distributed as part of educational material. However this is not a system design issue.

The display of snapshot pictures for AMBER Alert and other uses is to be defined. A high resolution picture for HD TV would be a reasonable size, but for SDTV this is simplest if every second row and column pixels were eliminated, this would then make the picture a reasonable size for these 480i and 576i images also. While consumer TVs decode MPEG 2, this might not be appropriate as it is a still image, and a JPEG image MAY be more appropriate. Also the originating formats MAY vary in format and be the wrong scale, so a simple means, perhaps automated, would be preferable for emergency situations.

As these extensions are beyond the manufacturer protocols, then the adaptation of EIA 708 can become a common protocol at the ENCODER/DECODER to CG connection. This would require liaison with the appropriate standards bodies. This matter can be included with those of HD radio, PID switching, Dolby adaptation and whatever else. The relevant standards bodies include, but are not limited to ATSC and EIA.

As compression systems are used, in order to make the most efficient use, the line number of the crawl SHOULD start on line 8m+1 and finish on line 8(m+n), where m and n are integers to be defined for each video system of 480, 576, 720 and 1080 lines.

Appendix K: Glossary

A2LA – American Association for Laboratory Accreditation

ACTIVATION – The initiation of the EAS by transmission of the EAS codes

AM – Frequency Band from 540 kHz to 1700 kHz

AMBER ALERT – A child abduction emergency alert event (CAE) issued by the Missing Persons Unit of the New Jersey State Police through the National Weather Service's NOAA radio system and/or the New Jersey State Police 800 MHz trunked radio system.

API – Application Programming Interface

ASCII – American Standard Code for Information Interchange, see also ISO 8859-1

ATIS – Alliance for Telecommunication Industry Solutions, also an IEEE 1512 module.

ATSC – Advanced Television Standards Committee

ATTENTION SIGNAL – Eight seconds of two tones (853 & 960 Hz) used as an audio alert

AUTOMATIC INTERUPTION – The automatic encoding and transmission of EAS Codes for pre-selected events

C3 – Command Control & Communications

CA – Class A television

CA – Conformity Assessment

CAD – Computer Aided Dispatch

CAP – Common Alerting Protocol

CAPCP – Common Alerting Protocol Canadian Profile

CBRN – Chemical, Bacteriological, Radiological & Nuclear

CDC – Centers for Disease Control

CDMA – Code Division Multiple Access

CDROM – Compact Disk – Read Only Memory

CEN – Comite European de Normalization – European Committee for Standardization

CFR – Code of Federal Regulations

CIKR – Critical Infrastructure and Key Resources

CIMS – Crisis Information Management Software

CIV – Civil Authorities

CLASS D – Non-commercial educational FM radio station with an output of less than 10 watts

CMAS – Commercial Mobile Alert System (cellphone texting)

CMS – Crisis Management System

CMSAAC – Commercial Mobile Service Alert Advisory Committee

COE – Common Operating Environment

CORBA – Common Object Request Broker Architecture

COTS – Commercial Off-The Shelf

CPG – Comprehensive Preparedness Guide

DAB – Digital Audio Broadcast (HD radio in the U.S.)

DASDEC - A trademarked name for an encoder/decoder

dB – Decibel

DB – Database

DBMS – Database Management System

DBS – Direct Broadcast Satellite

DCS – Data Collection System

DCV – Decision-centered visualization

DE – Distribution Element (normally referring to EDXL-DE)

DEM – Disaster & Emergency Management

DEO – Disaster and Emergency Operations

DFQ – Design For Quality

DHS – Department of Homeland Security (US)

DOC – Department Operations Center

DOM – Document Object Model

DSRC – an IEEE 1512 module

EAN – Emergency Activation Notification

EAS – Emergency Alert System

EAS+ - An improved or next-generation Emergency Alert System

EASplus – A name for the standard on which EAS+ is based on

EAT – Emergency Action Termination

ECIG – EAS-CAP Interoperability Group (www eas-cap.org)

EDXL – Emergency Data Exchange Language

EDXL-CAP - Emergency Data Exchange Language Common Alert Protocol

EDXL-DE Emergency Data eXchange Language – Distribution Element

EDXL-HAVE – EDXL Hospital Availability Exchange

EDXL-RM – EDXL Resource Messaging

EEE – Event code Element

EIA-608 - Analog and Standard Definition TV Closed Captioning standard

EIA-708 – High Definition TV Closed Captioning Standard

EIC – Emergency Information Center

EKU – Eastern Kentucky University

EMAC – Emergency Management Assistance Compact

EMT – Emergency Medical Technician

ENDEC – A trademarked name for an encoder/decoder

EO – Executive Order

EOC – Emergency Operations Center

EOM – End Of Message

EPIRB – Emergency Position Indicating Radio Beacon

ETN – Emergency Telephone Notification (formerly Reverse-911)

ETSI – European Telecommunication Standards Institute

EU – European Union

FCC – Federal Communications Commission (US)

FDMA – Frequency Division Multiple Access

FEMA – Federal Emergency Management Agency (DHS)

FIPS – Federal Information Processing

FM – Radio Frequency Band from 88 MHz to 108 MHz

FP6 – Framework Program 6

FPI – Front Panel Interface

FTP – File Transfer Protocol

FY – Fiscal Year

GIS – Geographic Information System

GPRS – General Packet Radio Service

GPS – Global Positioning System

GSM – Global System for Mobile communications

HazCollect – HazCollect Non Weather Emergency Messages

HAZMAT – Hazardous Material

HF – High Frequency (in the 3 to 30 MHz range)

Hibernate – A Java framework used for the persistence of business objects in DBMS (cf. JDO)

HMD – Helmet Mounted Display

HMI – Human Machine Interface

HQ – Headquarters

HSPD – Homeland Security Presidential Directive

HSPD-5 – "Management of Domestic Incidents"

HSPD-7 – "Critical Infrastructure Identification, Prioritization and Protection"

HSPD-8 – "National Preparedness"

HTTP – Hyper Text Transfer Protocol

IAP – Incident Action Plan

IC – Incident Commander

ICP – Incident Command Post

ICS – Incident Command System

ICT – Information and Communications Technology

IEC – International Electrotechnical Commission

IMDraft – an IEEE 1512 module

IMT – Incident Management Team

IMTEL – Incident Management Test and Evaluation Laboratory

IP – Internet Protocol

IPS – Incident Planning System

IP-SEC – Internet Protocol (with) Security

IPAWS – Integrated Public Alert and Warning System

ISO – International Standardization Organization

ISO 8859-1] ISO ASCII set, expanded from Microsoft Windows Latin-1.

IT – Information Technology

ITFS – Instructional Television Fixed Service

IT IS – an IEEE 1512 module

J2EE – The Java framework for the implementation of a service oriented architecture. Its counterpart in the Microsoft world is .NET

JDO – Java Data Objects. A Java framework used for the persistence of business objects in DBMS (cf. also Hibernate)

JIC – Joint Information Center

JIS – Joint Information System

JXDD – an IEEE 1512 module

KHz – Kilohertz or 1,000 Hertz

KVM – Keyboard, Video Mouse interface

LAN – Local Area Network

LDAP - Lightweight Directory Access Protocol

LOCAL AREA -A geographic area of the state which has been designated by the EAS plan to function as one portion of the EAS distribution network

LP – Local Primary, a source of EAS Local Area messages

LPFM – Low Power FM station

LPTV – A low power television station

LRMS – an IEEE 1512 module

MAC – Multiagency Coordination

MACS – Multiagency Coordination System

MDS – Multipoint Distribution Service

MMDS – Multichannel Multipoint Distribution Service

MHz – Megahertz or one million hertz

MIC – The European Commission Monitoring and Information Center

mp3 - MPEG 1 audio layer 3

MPEG – Motion Picture Experts Group. Version 2 and 4 are normally used for digital TV.

NAB – National Association of Broadcasters

NATO – North Atlantic Treaty Organization

NDA – Non-Disclosure Agreement

NFPA – National Fire Protection Agency

NGO - Non-Governmental Organization

NIC -National Information Center, National Integration Center

NIMS – National Incident Management System

NIPP – National Infrastructure Protection Plan

NJSP – New Jersey State Police (substitute letters for other States)

NMS – Network Management System

NN – Non-Participation National Source

NOAA – National Oceanic and Atmospheric Administration (US)

NRF – National Response Framework

NSPD – National Security Presidential Directive

NTCIP – an IEEE 1512 module

NWEM – Non-Weather Emergency Message

NWS – National Weather Service

NWWS – NOAA Weather Wire Service

Oasis – Open Advanced System for dISaster and emergency management. www oasis-fp6.org

OASIS(-Open) – Organization for the Advancement of Structured Information Standards. OASIS is a not-for-profit, international consortium that drives the development, convergence, and adoption of e-business standards. www oasis-open.org

OGC – Open GIS Consortium

OIC – Office for Interoperability and Compatibility

ORG – EAS Originator code

OS - Operating System

PAT – Program Association Table

PCR – Program Clock Reference

PDA – Personal Digital Assistant

PEP – Primary Entry Point

PID – Program ID

PMCP – PSIP Metadata Control Protocol

PMO – Project Management Office

PMR – Professional (or Private) Mobile Radio

PMT – Program Map Table

PN – Participating National source

PNG – Portable Network Graphics

POP – Post Office Protocol

POS – Pre-Operational System

PSIP – Program Supplementary Information Protocol

PSTN – Public Switched Telephone Network

QA – Quality Assurance

QC – Quality Control

QPL – Qualified Product List

RBDS – Radio Broadcasting Data System, a defined protocol for data that is transmitted on the 57 kHz subcarrier of FM radio broadcasting stations. Based on RDS in Europe.

R&D – Research and Development

RDBMS – Relational Database Management System

RDS – Radio Data System (European)

RFC – Request For Comments

RKB – Responder Knowledge Base

RMT – Required Monthly Test

RPU -Remote Pickup Unit

RSPA – an IEEE 1512 module

RWT – Required Weekly Test

SAIC – Science Applications International Corporation

SDARS – Satellite Digital Audio Radio System (Sirius-XM in US)

SDO – Standards Development Organization

SDoC – Suppliers Declaration of Conformity

SECC – State Emergency Communications Committee

SIP – Session Initiation Protocol

SMTP - Simple Mail Transfer Protocol

SOA – Service Oriented Architecture

SOAP – Simple Object Access Protocol

SOP – Standard Operating Procedure

SOS – State Override System, a system by which EAS can be activated through the NJSP Division Headquarters, whenever a government official cannot establish direct contact with a broadcast station or cable system.

SP – State Primary, a primary source of EAS state programming, which can originate from the governor or authorized representative.

SUBCARRIER – An inaudible portion of the broadcast signal that is added to the program signal of the FM or TV sound.

TCB – Telecommunications Certification Body

TCIP – an IEEE 1512 module

TCL – Target Capabilities List

TCP – Transmission Control Protocol

TIA – Telecommunications Industry Association

TMDD – an IEEE 1512 module

TTS Text To Speech

TSO – Tactical Situation Object

TV – Television

UC – Unified Command

UDDI – Universal Description, Discovery and Integration

UHF – Ultra High Frequency (A frequency of 300 to 3000 MHz)

UML – Unified Modeling Language

URI – Uniform Resource Identifier (URI=URL + URN, RFC3305)

URL – Uniform Resource Locator

URN – Uniform Resource Name

USB – Universal Serial Bus

UTC – Coordinated Universal Time

VDCP – Video Device Control Protocol

VHF – Very High Frequency (a frequency of 30 to 300 MHz)

VoIP – Voice over IP

VPF – Vector Product Format

VPN – Virtual Private Network

WAN – Wide Area Network

WATCH – A message that describer a potential threat to the safety of life and/or property.

WARNING – A message that describes imminent or actual threat to the safety of life and/or property.

WCDMA – Wideband Code Division Multiple Access

WLAN – Wireless Local Area Network

WPM – Words Per Minute

WRSAME – Weather Radio Specific Area Message Encoder, a device used by the National Weather Service to broadcast data on the national Weather Radio for day-to-day forecast and weather related emergency announcements.

WSDL – Web Service Description Language

WXR – National Weather Service Originator Code

XML – eXtensible Markup Language e.g. CAP, EDXL.

Emergency Alert System proposed plan outline responses.

	Oppose	Disagree	Refuse to say	Appreciate or Interested	Support	Endorse
ACLC (Archbishop Stallings verbal) USA	----	----	----	----	----	Y
American Radio Relay League USA						Y
Assembly of God USA	----	----	----	Y		
Australia					Y	
Baha'i of USA	----	----	----	----	Y	
Benny Hinn Ministries USA				Y		
Bill & Melinda Gates Foundation USA (statement)	----	----	----	----	Y	
Canada					Y	
Catholic, Paterson Diocese NJ	----	----	----	----	Y	
City Alert Texting System UK						Y
Congressman Joe Wilson SC	----	----	----	----	Y	
Demoss Associates (USA PR company)					Y	
Fred Baumgartner (verbal)					Y	
Hindu Association Baps NJ	----	----	----	N		
International Association of Emergency Managers (verbal) USA				Y		
International Society of Krishna Consciousness USA	----	----	----	----	Y	
Jay Ballard Dir. Technology & ABC Labs (verbal)					Y	
New Zealand				Y		
Orthodox Judaism USA	---	----	----	----	Y	
Papua New Guinea				Y		
Presbyterian Church USA (verbal)	---	----	----	----	Y	
Qualcomm				Y		
Red Cross USA	----	----	----	----	Y	
Rev. Walter Fauntroy (verbal)					Y	
Senator John McCain AZ				Y		
Southern Baptist/North American Mission Board USA			----	Y		
Sweden				Y		
Thailand (vendor & ADPC information)	---	----	----	Y		
Tibetan Buddhism, His Holiness the Dalai Lama					Y	

Support means supporting the proposal goals. Endorse means endorsing the proposal technical plan. Those who have yet to respond are not listed. Except for verbal, responses are documented.

Summary of responses;

Oppose	0
Disagree - - - - - - - - - - - - - - - -	0
Refuse to say	1 (counted as a no)
Appreciate or Interested - - - - - - - - - - - -	13
Support	11
Endorse technical plan - - - - - - - - - - - -	4

From;

Countries	7
Religious groups - - - - - - - - - - - - - - - -	12
Community/National/other groups	8
Congressmen or Senators - - - - - - - -	2