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 – 0xCF country codes including Caribbean and American not included above
0xD0 – 0xDF country codes
0xE0 – 0xEF country codes
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 code. Also countries can include their economic zone of the sea in their country divisions. The U.S. has FIPS codes for these areas.

LOCATION DETERMINATION; For their jurisdictional purposes, emergency managers issue alerts based on their state or county EMO (Emergency Management Office). Counties may be divided into 9 sectors of north, middle, south and also east, central, west. While this is understandable for their management, this has a limitation. While the public almost always know what state they are in, and usually know what county they are in, I would expect that a survey asking which sector of the county they are in would not result in a score much greater than the random probability of 12%. So this would show that the public would need to have an education program and sources of information as to what their home and work state, county and sector codes are.

A goal of the EMO and of EAS design is to be able to implement SAME (Specific Area Message Encoding) successfully so that as much as practicable, only the selected people receive the message and others are not disturbed. When most messages are irrelevant, the public is inclined

to ignore the relevant ones. An alternative approach is to focus on the use of latitude and longitude to define the selected area. This may be as rectangles where two co-ordinates define the rectangle, and where more define a polygon. I suggest an upper limit of eight points to the polygon to ensure that processing capabilities are within limits for small and reasonably priced units. Precision of the determined latitude and longitude should be such that the number of digits entered after the decimal point (preferred) or of the minutes and seconds (not preferred as it is more difficult to process) shall be compared to the message specification with the last digit being rounded up and truncated down. This gives two answers, and if either is yes or the state, county and sector codes are an affirmative, then the message shall be played to the recipients for the range 0x0-0x9 as above, and if latitude and longitude data is valid, the range 0xA-0xF shall be based on latitude and longitude only. Because of liability concerns and communication of intent, it would be best if the latitude and longitude specifications be made by the relevant Emergency Management Office rather than a communications vendor such as DBS or SDARS companies. Cellphone tower sectors can be decision-making points for the SMS EAS messages to be broadcast. This saves adding software to cellphones.

Latitude and longitude are becoming of increasing interest with the decreasing cost of GPS receivers. Many of these have serial interfaces and the standard format for position data is NMEA 0183 www.nmea.org. Latitude and longitude data can be derived from street addresses using Internet map services. Some of these used to display the latitude and longitude in a decimal format, but none do so now. Reintroduction of this is a matter to consider. The zip +4 postal areas are fairly small in urban areas and the Post Office could be asked to provide translation to latitude and longitude for example on their web site. This would not be appropriate for rural and security addresses.

Another source of latitude and longitude values are topographical maps, which a few people have, and cadastral maps (property surveyors maps), which local governments have. Then local governments can add this data to the property tax bill given a reasonable implementation time.

The E911 Phase 2 extensions for cellphones are adding fairly precise positioning capabilities. While this might not be latitude and longitude, it should be practicable to add a translation capability in the network and cellphone menus so as to provide this to the cellphone users without adding a GPS in the cellphone. A few cellphones have GPS, but it adds to the price. This might not be available as a standard serial data format from the cellphone to another device that can receive EAS, necessitating manual transfer. To provide this translation for a small number of single requests for emergency services or individual users should not be much added processing for the cellphone companies. However to apply this continuously to a city of with moving cars would be a considerable amount of processing. So for vehicles I recommend that GPS be the preferred means of determining latitude and longitude. With the increasing installations of navigation on vehicles, it is becoming more desirable to specify locations in terms of latitude and longitude. This will develop whether or not EAS makes use of and encourages this trend. It has the advantage that it is a common data format that can be transferred between otherwise independent equipment and in the process make things simpler for users. Also most people can relate to it having had military or other navigational experience. While street maps do not have the latitude and longitude printed, it is in the source data and with the increasing use of GPS in cars, this should be added to street maps except where there is a security concern.

Tornadoes are an example of where latitude and longitude should be included because the path of the tornado can be transmitted at regular intervals. This can be additional information that people can follow in their storm cellars (with a receiver). Some may even find it worthwhile to have an NMEA0183 output on the receiver fed into a computer with map software and use that progress plot to pass the time while in their shelters.

+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.

-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 011111Octal 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.

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 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.

-LLLLLLLL-. This header code block identifies the originator of the message, or in the case of EAS, that of the station rebroadcasting the message. NWS offices use the World Meteorological Organization office identification, e.g., KDTX/NWS for Detroit, MI and KTOP/NWS for Topeka, KS, USA. Radio and television stations use the station call sign such as KFAB/AM or WDAF/FM. Further details are in the Outline State Plan.

The one second pause may by substituted with NUL characters in a synchronous system, but such characters shall not be repeated beyond the EAS device terminating the synchronous system.

NNNN. This code block is the End Of Message (EOM) code.

The applicable details of most of this should be defined in the state plan, an outline version of which follows.

The Society of Cable Television Engineers (SCTE) have published a standard (J-STD-042-2002) for the transmission of EAS on digital cable systems, to be decoded by cablecards. I had some questions as to the interpretation of the standard, which are answered below.

1) How does the EAS audio override the program audio to be transmitted, e.g. what PID and format?

Normally, the audio portion of an EAS event comes by "tuning" to the Details channel. An "audio_oob_source_id" may be optionally specified in that case, when an out-of-band channel is available (CableCARD is in place), the receiver may access audio by resolving the audio_oob_source_id reference through the out-of band virtual channel table (see SCTE 65), which provides the TSID and program number of the MPEG-2 program carrying the audio. Alternatively, private means may be used (these are outside the scope of the standard).

There are situations where EAS messages are not relevant to the location served, and so should not override the program audio.

The cable operator must arrange to distribute messages as applicable to the subscriber. For the out-of band- case, the CableCARD may filter out irrelevant EAS messages. Various proprietary methods are possible.

2) What is the specification of how the message is to be displayed in relation to the program in an MPEG-2 system?

The method is specific to MPEG-2 transport signaling (the MPEG-2 Transport Stream defined in ISO/IEC 13818-1), but not specific to MPEG-2 video. A Character Generator in the STB is used to generate a crawl in the manner akin to TV broadcast EAS messages.

3) What is the current (MPEG-2) implementation of the joint standard?

The standard is implemented in all "Digital Cable-Ready" retail devices, as specified by FCC regulations.

4) Are there any considerations for how this may be implemented in MPEG-4/H.264 and VC1 systems?

The method is independent of the video codec used.

5) What about international application with country codes and Unicode alphabet application?

Test strings are coded per ATSC A/65 sec. 6.10. The encoding options include Unicode and other international alphabets.

Time and Date.

The EAS protocol is based on UTC and the Julian day number is as of that time. Radio and TV facilities use LTC (Linear Time Code) and VITC (Vertical Interval Time Code). Neither of these have a date specification. However they both provide for 8 digits of user bits, and this could be used for a date. The ISO preferred order of YYYYMMDD would therefore be recommended. The time in both of these is usually available as an accurate local time of day, sometimes GPS referenced. With daylight saving, the LTC/VITC time is often switched at the time that it is officially changed. However sometimes it is at a time that is more convenient for station purposes, and occasionally it is not changed at all for daylight saving. So bearing this in mind, this may be a time reference for EAS equipment by appropriately setting the offset. Another time source is NTP (Network Time Protocol). This is available on LANs often, but may not be as accurate as the LTC/VITC time. NTP should have a UTC reference. As different jurisdictions can specify different daylight saving switch dates (and even change the specifications), there is no universal solution to that. Digital cellphones have time transmitted from the cell tower. HD radios and digital (DVB or ATSC or DBS) TVs can have time transmitted to them, but this has not been a focus of consumer electronics or broadcast, satellite or cable implementation. Car radios integrated with navigation systems have time available from GPS, but the offset needs entering, and this changes with daylight saving and time zone, but the UTC time is in there even if it is not easily available. The date may be user settable and therefore possibly incorrect.

WARning Systems Entry Points (WARSEPS)

There may be installed an internal network for the nation and each state called a WARSEPS network. This is a generic name and actual systems have various names. This is a reliable, secure network connecting relevant departments' intranets. Terminals may be portable or located in special non-governmental facilities such as nuclear power plants. For EAS purposes the CAP, EPAD and other emergency management protocols are used and these translate to EAS format messages for broadcast and other public distribution. Some states already have such networks executed in varying manners and with different names. This is a subject that can be expanded on as appropriate to the situation of each nation and state or province. Originally EAS messages were distributed by a broadcasters' daisy chain, but that should be secondary and backup to the WARSEPS network. The WARSEPS network can carry photographs and video clips that are a problem for EAS. In the U.S., this is not called WARSEPS, but the function is part of the Integrated Public Alert and Warning System (IPAWS). The U.N. is developing policy for International Strategy for Disaster Reduction (ISDR) of which Early Warning Conference (EWC3) is part.

EAS MODES of OPERATION

EAS can operate in various modes. The first of these are operation modes;

a) Basic mode. This is the original mode where all EAS messages override program audio, and either replace or add a crawl over video. The video replacement is being phased out by cable companies as it is more intrusive, but the technology for crawls was too expensive. Latitude and longitude are only user text in the NWR format which is only valid for the north-west quadrant of the globe. Override mode always occurs in basic mode. This mode is for English language only, Unicode is not supported, and the country code is USA.
b) DEAS mode. This is specified by SCTE J-STD-042-2002. This enables the receiver to insert EAS crawls and override audio when appropriate.
c) EAS+ mode. This extends DEAS mode by providing priorities, with optional user priority selection, and improves Specific Area Message Encoding (SAME) with optional latitude and longitude polygon selection with an improved latitude and longitude format. Override mode is for specific message types in this mode.
d) CAP broadcast mode. This is only on DEAS or EAS+ transmission.
e) There are also transmission modes where pauses are replaced by null bytes. Such null bytes shall be removed at the reception before forwarding to subsequent equipment.
f) EAS compatible mode on analog AM, FM or composite TV. The data is by modem tones in the audio. The reference level for voice is 0 VU (+4 dBm or +8 dBm according to facility). The level for modem tones is -4 VU. The video crawl or video replacement is done at the studio or headend. Override of program for all messages is expected. However unlike basic mode, latitude & longitude polygons, language selection, country code and such header extensions are permissible. However receiver processing of this data is not required other than displaying it. As a consequence, EAS endecs may have multiple output ports which transmit the message in different modes.
g) Digital transmission. This may be HD radio, DVB or ATSC. However the program audio is replaced by the EAS audio and the video may be replaced or have a crawl superimposed at the studio or headend. The reference level is -20 dB FS for voice and -24 dB FS for modem tones. This value may be adjusted if measurements of dialnorm justify that. Otherwise refer to f) above.
h) DEAS transmission. The audio is separate and the data also separate from the program. While the audio contains the modem data, this is not intended to be the data transmission path. The reference levels are the same as for digital.
i) EAS+ transmission. This adds to DEAS with prioritization for nationwide EAS channels via DBS (e.g. DirecTV, Echostar, Sky) or SDARS (e.g. Sirius or XM). Reference levels are the same as for digital.
j) Cellphone messages may be transmitted in broadcast mode locally or by text transmission for subscription services. The source may be EAS or CAP messages.
k) Transmission to computers is by TCP/IP or IPv6 broadcast for local messages or email for subscription services. The broadcast messages would emulate TV transmitted EAS. The source may be EAS or CAP messages, but the security of the system against unauthorized alerts is a very important factor in the system design.
l) 7&1 bit mode. This uses 7 bit ASCII followed by the MSB (most significant bit) instead of normal 8 bit ASCII or other data. This applies to basic, analog and EAS

compatible digital mode. The SCTE standard makes no reference to 7 bit ASCII so it is normal 8 bit ASCII.

m) Unicode mode. This uses byte pairs or others defined by ISO 2022 and 6049 and the Unicode consortium.

CAP BROADCAST

As it is desirable to transmit CAP messages to public computers in a secure manner, this can be accomplished using EAS+. The protocol differs in that the header has CZCZ replacing ZCZC. This will cause all inappropriate devices to ignore the message. The event code will be CAP and the priority will be 2. The latitude and longitude string can be included. The CAP message with forward error correction (FEC) will then follow, and the preamble NNNN will end as usual. The action expected at the computer is 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.

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>dBr100-MMSS.S 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. 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>, UPTIME=VVVVVHRS, FAN=<OK or BAD or NNNNRPM>. 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

Appendix G: Receiver Category for Additional Selectivity

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 Everyone
0x001101 Vehicle receivers (including first responders)
0x001110 Domestic or household receivers (business if purchased as a domestic model)
0x001111 First Responders special receivers.
0x010000 Telephone company #1
0x010001 Telephone company #2
0x010010 Telephone company #3
0x010011 Telephone company #4
0x010100 to
0x010110 reserved for other telephone or cable TV company.
0x010111 Cable TV company
0x011000 Cellphone company #1
0x011001 Cellphone company #2
0x011010 Cellphone company #3
0x011011 Cellphone company #4
0x011100 to
0x011110 reserved for other radio transmission company.
0x011111 Messaging Company (e.g. RIM)
0x100000 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 Everyone 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.

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 might 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.

App. B World 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	
Hindu Association Baps NJ			N			
International Association of Emergency Managers (verbal) USA				Y		
International Society of Krishna Consciousness USA					Y	
New Zealand				Y		
Orthodox Judaism USA				Y		
Papua New Guinea				Y		
Presbyterian Church USA (verbal)				Y		
Qualcomm				Y		
Red Cross USA				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.

Summary of responses;

Oppose	0
Disagree	0
Refuse to say	1 (counted as a no)
Appreciate or Interested	13
Support	8
Endorse technical plan	4
From;	
Countries	7
Religious groups	11
Community/National/other groups	6
Congressmen or Senators	2