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The Emergency Alert System

(Formerly known as the Emergency Broadcast System)

INTRO

EAS is the latest chapter in a public alerting system that traces it's lineage back to the CONELRAD (Control of Electromagnetic Radiation), program that was started by the Truman administration. Since the Federal Communication Commission's (FCC) adoption of the EAS rules in November of 1994, equipment manufacturers, broadcasters, and cable operators have been preparing to provide EAS service to their customers. Many people, both inside and outside the world of the Emergency Broadcast System (EBS), have heard of the new system but are unsure as to exactly what the new EAS is, who will use it, and what makes it better then the old system.

EBS

In order to fully realize the improvements provided under EAS, a basic understanding of EBS is helpful. Under the EBS program equipment that allows the President to reach the public through their local broadcasters is required at broadcast stations licensed by the FCC. This equipment produces what is commonly called a two-tone signal (the frequencies 853Hz and 960Hz played simultaneously) that is broadcast by stations on the main audio channel, and serves the dual purpose of getting the listeners attention and activating other EBS equipment in the listening area. Upon activation of the EBS equipment, a station would listen and record the accompanying audio message and could then retransmit this message for their audience. In general, EBS equipment can do little more then reproduce the dual tone signal and record the messages it receives upon activation. EBS equipment can only monitor one source for alerts. Once a station receives an EBS message it must broadcast the EBS message and two-tone signal in order for the next station to receive the information. If a station fails to activate their EBS equipment, the chain will be broken and a segment of the population will not receive the emergency information through EBS.

Although the EBS system was established for national messages, many broadcasters and local officials recognized that the system could be used to notify listeners about local emergency situations. As of the beginning of 1996 the FCC had received 20,341 reported activations of EBS (since 1976). Approximately 85% of these activations were for weather related emergencies. The number of activations is most assuredly higher as stations are not required to report their usage of the system to the EAS office.

What is EAS?

The EAS is basically a new and improved EBS, just has EBS was an update and redesign of CONELRAD. All three systems were devised to provide the President a means to communicate with the public in the event of a national emergency. The main difference between the EAS and EBS systems is in the method employed to alert equipment at stations about an incoming message. EBS uses a two-tone audio signal transmitted by broadcast stations to demute a receiver. EAS will utilize new equipment and Audio Frequency Shift Keying (AFSK) to send an information bearing signal on a broadcast stations main audio channel. AFSK is a method of representing digital information by using different audio frequencies modulated on a carrier.

EAS PROTOCOL

The heart of the new system lies in the standard EAS protocol that is listed in .11.31 of the EAS rules. Any manufacturer may make EAS equipment for broadcasters/cable systems as long as the equipment is compatible with this protocol and receives FCC certification. The EAS protocol is based on the Weather Related Specific Area Message Encoding (WRSAME) technique that is in use by the National Weather Service (NWS). NWS has used the digital protocol in order to activate NOAA weather radios in limited areas of the country in recent years. NOAA is currently installing equipment that will transmit the WRSAME/EAS codes (the WRSAME and EAS codes are now identical) at all of their weather transmitters. The EAS signal consist of two separate audio frequencies, the first representing a one, or mark frequency 2083.3 (Hz) and the second a zero or space frequency 1562.5 (HZ). The shifting or alternating of the frequencies will form digital information that can tell the recipient of an EAS message what event has triggered the alert, who originated the alert message, how long the alert condition will be in effect, the area that the event will effect, and what station forwarded the message to the listener.

An EAS message consists of four parts, (1) the header codes, (2) the two-tone audio, (3) the audio or text message, and (4) the end of message code (EOM). Although a full blown message has four parts, an EAS activation consisting of just the header and EOM codes can occur. The mark and space frequencies are used to make the digital header and EOM codes and are alternated to form 7 bit (the last bit is a null bit) ASCII characters. The header follows this prescribed model:

[Preamble]ZCZC-ORG-EEE-PSSCCC+TTTT-JJHHMM-LLLLLLLL

[Preamble]ZCZC: This portion is known as the identifier and allows the EAS equipment to recognize the beginning of an incoming EAS message. The preamble consists of two bytes of the hexadecimal representation of AB.

ORG: This is the originator code. This section consist of three letters that indicate who created a particular emergency message. Some examples include WXR, which stands for the National Weather Service or CIV which denotes a civil authority. Broadcasters and cable system may also originate codes by using the EAS code.

EEE: The EEE block designates the three letter event code. The EAS rules contain a listing of 32 different codes used to denote the reason for activation, such as TOR for tornado warning or FFW for a flash flood warning. The FCC maintains a listing of all valid event codes in conjunction with the National Weather Service (NWS) and this list may be expanded in the future as the need arises.

PSSCCC: This is the location code. This six number code tells the EAS equipment what areas may be affected by an emergency. This code consist of three separate parts. The SS portion is a two letter code that represents what state the emergency is in. The CCC portion designates the county or city that is affected. A maximum number of 31 counties may be included in a single activation or test. The P portion is optional and it allows the message originator to divide a county into nine sections and further specify an affected portion of a particular county. The SSCCC portion is also known as the Federal Information Processing Standard (FIPS) code and is maintained by the National Institute of Standards and Technology.

TTTT: This portion of the protocol denotes the length of time that the emergency message will be in effect. The valid time period of messages is measured in 15 minute increments for time periods less than one hour, and in 30 minute increments beyond one hour.

JJHHMM: Next is the calendar date and 24 hour Universal Coordinated Time (UTC) section. The date is represented by Julian calendar days (JJJ), with January 1 represented by 1 and December 31 represented as 365, unless it is a leap year. All time will be transmitted as UTC time (HHMM) but the unit will provide for conversion to local time once it is set up at it's work station.

LLLLLLL: A stations call sign or cable system ID number will be inserted in the LLLLLLLL block. The ID will be inserted prior to the EAS message being forwarded to the next cable system or broadcast station.

EOM: An End of Message code, consisting of [Preamble]NNNN will be sent at the end of an EAS message.

All of the header and EOM information listed above will be sent via AFSK as ASCII characters. Information is sent at a slow baud rate. This slow rate aids transmission of alerts through poor or noisy channels. The header and EOM codes are transmitted three times with a one second interval in between transmissions.

The next portion of the EAS message sent during a complete activation is the two-tone signal. It is the same tone that has been used at stations since 1976. The duration of the tone has been shortened from the previous minimum time of 20 seconds to eight seconds but stations/cable systems may still transmit the tone for as long as 25 seconds. In fact in areas where two-tone activated receivers have been distributed to the public, for instance around some nuclear facilities, stations are asked to use at least a 20 second tone during an activation in order to trigger any unmodified receivers that may be in homes in the affected area. It is also possible to modify most two-tone receivers so that they will de-mute when an eight second two-tone is received. The two-tone use was preserved because it is well recognized by the public and will act as an attention getter.

The two-tone attention signal will then be followed by an audio message. The audio message may be from the NWS or a voice over done at a broadcast station or cable facility. It may also be generated from the EAS header codes themselves by using additional equipment. Finally the EOM codes will be sent via AFSK and this will allow the EAS equipment to return stations operating in the automatic mode to regular programming. Stations also have the option of sending state and local EAS messages consisting of the header and EOM codes only. No two-tone attention signal or audio message is required in this instance. Some participants may wish to forward a message to EAS decoders with minimal program interruption particularly if the event in question does not affect their coverage area.

EAS ADVANTAGES

The digital AFSK signalling procedure EAS uses will allow EAS equipment to have many capabilities that were not possible under EBS. Manufacturers will be able to incorporate a number of features in the EAS equipment and, at the same time, be sure that their EAS equipment will be compatible with others throughout the country. Participants may operate unattended because EAS equipment can receive a message, break regular programming, play the alert or test message and then return the station to normal programming automatically. Participants may also choose what type of emergencies will automatically break programming. For example, in areas where tornados are frequent, EAS equipment can be programmed to interrupt programming and transmit the tornado warning message immediately after receipt. EAS equipment can also be programmed to broadcast only those messages that affect a participants viewing or listening area. EAS rules require that equipment monitor two assigned sources, but the station will have the option to monitor as many additional sources as they desire. Multiple inputs will help increase message transport reliability. EAS codes can be sent to a character generator through a RS-232 port and be translated directly into text for use by cable systems or television stations. Because the codes will be broadcast over the main channel, any broadcast receiver will have the ability to "hear" the EAS codes. The EAS codes can also travel on non-broadcast frequencies and telephone lines as well. It would be possible for a local emergency management official with an EAS encoder to dial into a station and transmit the EAS codes. This would occur under a previously arranged agreement established between a station and local emergency management personnel.

EAS TESTING

Testing of the EAS system will occur on a weekly basis. Three weekly test are originated from local or state primary stations at random times and each EAS participant must receive and transmit an EAS test once per week. A weekly test consists of transmitting a brief announcement, the EAS header codes and End of Message codes (EOM) only. Depending on the length of the script, which will be created at the local level, this unobtrusive test will take approximately 15 seconds to conduct because only the script and digital information is transmitted. A monthly test is also performed and takes the place of a weekly test. During the monthly test the EAS header codes, at least eight seconds of two-tone attention signal, and an audio test script are transmitted. The EOM codes are then sent, signaling the completion of the test which will last approximately 30 seconds. Unlike the weekly test, the monthly test must be transmitted by participants within 15 minutes of receipt. The monthly test can be scheduled however and stations and cable systems are encouraged to choose a time convenient to all by participating in the EAS planning process at the local level. The monthly test script can be developed locally as well and may be used to place added emphasis on emergency events that may

occur in that particular area.

STATE & LOCAL PLANS

Who determines when a test takes place? Who decides which station/cable system monitors which? Who has the authority to activate EAS? These questions are answered at the state and local level by volunteers that form the EAS State Emergency Communications Committees (SECC) and Local Emergency Communications Committee (LECC).

Under EAS all states and territories have a SECC with two SECC chairpersons, usually one representative from both the broadcast and cable industries. In some states a member of the emergency management community serves as a vice chair. Most states formed SECC's under the EBS system so they will basically be "grandfathered" into EAS system. The chairpersons are appointed by the FCC and create the state EAS plan. Although the chairs need to create a plan for their state while serving on a voluntary basis, they won't have to go it alone because the SECC group itself is composed of LECC chairs, members of industry and government officials that the SECC chair can appoints. All members serve on a voluntary basis.

Most states are broken up into local EAS areas as well. These areas are determined by the state chairs and often have their own chairperson. The LECC chairs will then designate at least two Local Primary (LP) sources. The LP's serve on a voluntary basis and are entry points for EAS messages. Initially, the LP's will almost always be broadcast stations due to the structure of the national system but eventually cable systems may serve as primary sources. Participants that are not information entry points are known as Participating National (PN). LECC chairs also help the SECC sent up the state plan. Many states utilize a state relay network that has at least one National Primary (NP) stations as an input. NP's are the source of national messages. The state network will also include a State Primary (SP) sources as well. SR's will complete the backbone of the network and should ensure that the national and state messages can cover the entire state.

Stations volunteer to serve as primary sources. Stations are not required by the FCC to broadcast state or local EAS alerts but usually do so in order to serve their community. Stations have the option of adopting Non-participating National status (NN). NN stations must have EAS equipment but are required to remove their carrier from the air in the event of a national alert. NN stations may also transmit state and local messages at their discretion with no prior FCC approval. All participants must broadcast a national message. Testing of equipment is required of all stations regardless of status.

The FCC mapbook contains the broadcast stations in the EAS database which list some basic information like their city of license, what their FIPS code (location) is and what their EAS designation is (NP,LP, SP, SR or PN). Cable systems will also be listed. The EAS plan itself assigns monitoring assignments, lets participants know who has the authority to activate the system at local and state levels (participants may activate EAS as well), and may contain testing information, such as when to expect a monthly test. It will also list commonly occurring EAS events for the local areas that should be automatically programmed into their EAS equipment. Pre-programmed messages will help speed activation time during a crisis. Each station will have two sources to monitor for EAS messages. Initially these will probably be broadcast stations but they can be participating cable systems, as well. This will insure that the national message will be able to reach all participants. Stations may obtain EAS equipment that monitors more then the minimum however and this will allow direct inputs from sources such as NOAA weather radio, local emergency management officials, state police microwave networks, or any other source the station desires as long as the monitor their assigned sources. Some stations for instance, are near state borders and may now monitor sources in both states.

EAS rules (11.33 (3) (ii)) require EAS decoders to store at least 10 preselected event code for use at the local level. The storage of the codes will ensure that stations operating in automatic mode will be able to forward alerts that are common in a particular area. The state and local planners can identify events that are common to their areas and notify participants via the state plan about these 'top ten' codes.

Information taken directly from the F.C.C.

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