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# Emergency Communications: The Emergency Alert System (EAS) and All-Hazard Warnings

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# Emergency Communications: The Emergency Alert System (EAS) and All-Hazard Warnings

## Summary

The Emergency Alert System (EAS) is built on a structure conceived in the 1950's when over-the-air broadcasting was the best-available technology for widely disseminating emergency alerts. It is one of several federally managed warning systems. The Federal Emergency Management Agency (FEMA) jointly administers EAS with the Federal Communications Commission (FCC), in cooperation with the National Weather Service (NWS), an organization within the National Oceanic and Atmospheric Administration (NOAA). The NOAA/NWS weather radio system has been upgraded to an all-hazard warning capability. Measures to improve the NOAA network and the broader-based EAS are underway or are being tested.

The Intelligence Reform and Terrorism Prevention Act (P.L. 108-458) addressed the possibility of using advanced telecommunications and Internet technologies for emergency notification by requiring the Department of Homeland Security (DHS) to implement pilot projects. On June 26, 2006, President George W. Bush issued an executive order stating that U.S. policy is "to have an effective, reliable, integrated, flexible, and comprehensive system to alert and warn the American people."

Congressional support for the development of a new national alert system is the cornerstone of several bills. In particular, the Warning, Alert, and Response Network (WARN) Act (S. 1753), as introduced by Senator Jim DeMint, would provide for an alert system that could meet the President's goals. Bills similar to S. 1753 were introduced in the House by Representative John Shimkus (H.R. 5556, amended as H.R. 5785). Much of the language of the WARN Act was included in the SAFE Port Act (H.R. 4954) as S.Amdt. 4927 but removed during conference negotiations. The port security bill sent to the President for signature contains little of the original language of the WARN Act. The focus of the new law is almost exclusively on developing regulations and technology that could effectively send geo-targeted alerts to commercial cell phones. Other bills in the 109th Congress that would improve emergency alert systems, domestically and internationally, include S. 50 (Senator Inouye) and H.R. 396 (Representative Menendez); these bills were prompted by the tsunami disaster but include measures that also apply to the need for a better all-hazard warning system in the United States. A bill to provide telephonic alerts as part of a national alert system has been introduced (H.R. 2101, Representative Meek). A bill to assist individuals with disabilities in emergency situations (S. 2124, Senator Harkin) includes provisions for providing information in emergencies. A companion bill to S. 2124 was introduced by Representative James R. Langevin (H.R. 4704).

This report summarizes the technology and administration of EAS and the NOAA/NWS all-hazard network, new programs in DHS, and some of the key proposals for change. It will be updated.

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The two mainstays of the U.S. capacity to issue warnings are the Emergency Alert System (EAS), which relies primarily on broadcasting media, and the NOAA Weather Radio All-Hazards Network. The National Weather Service (NWS) of the National Oceanic and Atmospheric Administration (NOAA)[1] sends alerts through NOAA Weather Radio (NWR), now expanded to include warnings for all hazards. Several initiatives are underway within the federal government to improve, expand, and integrate existing warning systems. The most important of these — in terms of using, testing and developing leading-edge technology — is the Integrated Public Alert and Warning System (IPAWS), a public-private partnership in which the Department of Homeland Security (DHS) has a leadership role. Many communities, meanwhile, are installing local alert systems that send voice, text messages, and e-mail. Locally activated alert systems are widely used for Amber Alerts.[2] Amber Alert systems are in place nationwide to aid primarily in the recovery of abducted children.[3] Amber Alerts are currently supported by a number of different technologies, including a quasi-national network based on the Internet. Amber Alert messages also can be sent through the Emergency Alert System and the NOAA Weather Radio All-Hazards Network. Many agree that the long-term goal for emergency alerts is to converge federal warning systems into an integrated network that can interface with localized warning systems and also call centers, such as those used for 911 and 211 calls.[4]

*The 9/11 Commission Report* discusses the effectiveness of emergency alerts at the World Trade Center on September 11, 2001, with a focus on communications

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[1] The National Oceanic and Atmospheric Administration (NOAA) is an agency of the Department of Commerce.

[2] Named after Amber Hagerman, kidnaped and murdered in 1996; also referred to as the AMBER Plan, for America's Missing: Broadcast Emergency Response. Websites with additional information include [http://www.amberalertnow.org], [http://www.amberalert911.org] and the site of the National Center for Missing and Exploited Children [http://www.ncmec.org]. All sites visited December 21, 2005.

[3] See CRS Report RS21453, *Amber Alert Program Technology*, by Linda K. Moore. The program and policy issues are discussed in CRS Report RL31655, *Missing and Exploited Children: Overview and Policy Concerns*, by Edith Cooper.

[4] 911 calls go to Public Safety Answering Points (PSAPs). 211 calls typically go to municipal call centers. The role of call centers in providing warnings and information in emergencies is discussed in CRS Report RL32939, *An Emergency Communications Safety Net: Integrating 911 and Other Services*, by Linda K. Moore.

systems.[5] Recent, major studies of warning systems have concluded that the United States needs a more robust emergency alert system. Recommendations for improvement include using all available means of communication, providing a standardized alert protocol, and developing infrastructure for notification to geographically specific locations and virtual communities.[6] A virtual community in the context of emergency communications refers to the technical ability to give immediate, simultaneous alerts to the appropriate community of responders and affected residents. Before its towers collapsed, the World Trade Center's occupants might have benefitted if virtual community or geo-targeted alert technology had been in place and activated.

## EAS Administration

EAS currently sends emergency messages with the cooperation of broadcast radio and television and most cable television stations. It was created as CONELRAD (Control of Electromagnetic Radiation) in 1951, as part of America's response to the threat of nuclear attack. In 1963, the system was opened to state and local participation. Through most of its existence, the alert system was known as the Emergency Broadcast System. The name was changed in the 1990's when the technology was upgraded and automated.

Congress has placed responsibility for civil defense measures that include the present-day EAS with the Director of the Federal Emergency Management Agency (FEMA)[7] now part of the Department of Homeland Security (DHS). The Federal Communications Commission (FCC) has been designated by FEMA to manage broadcaster involvement in EAS. The FCC currently provides technical standards and support for EAS, rules for its operation, and enforcement within the broadcasting and cable industries. FEMA works with the emergency response officials who, typically, initiate an EAS message for a state or local emergency. Non-federal EAS operational plans are developed primarily at the state and local level, often with the participation of FEMA and other federal agencies. The FCC provides rules and guidelines for state EAS plans and many, but not all, states have filed FCC-compliant EAS plans. FEMA advisors often help to integrate EAS usage into emergency alert plans. The decentralized process contributes to uneven planning; for example, procedures for initiating a message and activating EAS differ from state to state. In comments filed with the FCC, DHS has proposed that FEMA and DHS "should be the primary point of contact" and act as the "Executive Agent" in managing alerts

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[5] Final Report of the National Commission on Terrorist Attacks Upon the United States, Official Government Edition, 2004 pp. 286-287; 295; 306.

[6] These recommendations, and others, were affirmed at a Senate Hearing,"All-Hazards Alert Systems," Committee on Commerce, Science and Transportation, Subcommittee on Disaster Prevention and Prediction, July 27, 2005.

[7] P.L. 103-337, National Defense Authorization Act for Fiscal Year 1995, Title XXXIV - Civil Defense, Sec. 603 (42 U.S.C. § 5196), amending the Federal Civil Defense Act of 1950 (64 Stat 1245).

and warning information. The FCC would continue its regulatory role for broadcasting and wireless communications.[8]

Umbrella organizations that participate in EAS planning and administration include the Media Security and Reliability Council (an FCC Advisory Committee), the Primary Entry Point[9] Advisory Committee, and associations such as the National Association of Broadcasters and state broadcasting associations. States and localities organize Emergency Communications Committees whose members often include representatives from broadcasting companies or local TV and radio stations. These committees agree on the chain-of-command and other procedures for activating an emergency message through radio and television. The constraints of the EAS technology, as specified by the FCC, limit an EAS message to no more than two minutes. Emergency alert agreements with broadcasters, therefore, usually provide for both EAS warning messages and follow-up broadcast programming.

**Broadcaster Participation.** The participation of broadcast and cable stations in state and local emergency announcements is voluntary. The FCC has designated over 30 radio stations as National Primary Stations that are required to transmit Presidentially initiated alerts and messages. Their broadcasts are relayed by Primary Entry Point stations to radio and television stations that rebroadcast the message to other broadcast and cable stations until all stations have been alerted.

The FCC requires broadcast and cable stations to install FCC-certified EAS equipment as a condition of licensing. Radio and television broadcast stations, cable companies and wireless cable companies must participate. Cable companies serving communities of less than 5,000 may be partially exempted from EAS requirements. For the broadcast of non-federal emergency messages, the FCC has ruled that the broadcasters, not a state or local authority, have the final authority to transmit a message.[10] Historically, the level of cooperation from the broadcasting industry has been high. For example, because state and local governments are not required to upgrade to EAS-compatible equipment — and therefore may lack direct access to the technology — broadcasters often volunteer to manage the task of EAS message initiation.

**Digital Broadcasting.** The FCC has promulgated new rules to include digital media carriage of EAS messages. In a Report and Order released November 10, 2005, EAS requirements have been expanded to include digital communications over direct-broadcast televison and radio, digital cable, and direct-to-home satellite television and radio. Companies using these media will be required to install EAS

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[8] Letter dated November 5, 2004 from Michael D. Brown, Under Secretary, Emergency Preparedness and Response, Department of Homeland Security, FCC, EB Docket 04-296.

[9] The Primary Entry Point (PEP) system consists of a nationwide network of broadcast stations connected with government activation points through designated National Primary Stations.

[10] FCC, *Report and Order and Further Notice of Proposed Rule Making*, Released December 9, 1994, FO Docket Nos. 91-301 and 91-171, 10 *FCC Record* 1786.

equipment to handle digital formats. As part of the Report and Order, the FCC has also asked for a new round of comments on ways to improve and expand the current emergency alert system.[11]

**EAS Technology.** EAS technology uses coders and decoders to send data signals recognized as emergency messages. Almost any communications device can be programmed to receive and decode an EAS messages. In manual mode, an EAS alert is sent to a broadcaster, either over an EAS encoder-decoder or by other means, such as a telephone call. Where agreements have been put in place with broadcasters, EAS messages can be created and activated by state or local officials and transmitted automatically to the public without the intervention of broadcasting staff. These messages use computer-generated voices. All EAS messages carry a unique code which can be matched to codes embedded in transmitting equipment; this authenticates the sender of the EAS message. To facilitate the transmittal of emergency messages, messages are classified by types of events, which also are coded. These event codes speed the recognition and re-transmittal process at broadcast stations. For example, a tornado warning is TOR, evacuation immediate is EVI, a civil emergency message is CEM. When a message is received at the broadcast station, it can be relayed to the public either as a program interruption or, for television, as a "crawl" at the bottom of the TV screen. The installed technology limits messages to two minutes; emergency managers and station operators have pre-scripted message templates that have been timed to fit this constraint; specific information is added to the text at the time of the emergency. When new event codes are added, broadcasters must upgrade their equipment to recognize the codes. To use EAS in a more flexible manner, with messages longer than two minutes, for example, also would require broadcasters to upgrade existing equipment.

**Alerting Individuals with Disabilities and Others with Special Needs.** The FCC requires that EAS messages be delivered in both audio and visual (captions, message boards, other) formats. Regular broadcasts about emergencies, however, do not have to comply with this requirement. The community of disabled individuals, therefore, is often under-served when emergency information is disseminated outside the EAS network. Although a number of technologies exist to provide accessible formats for people with special needs — such as those with disabilities, the elderly, and those who do not understand English — many of these solutions are not supported by the current EAS system or are so expensive as to be inaccessible to most. Incorporating technologies that expand the reach of EAS, at a reasonable cost, is one of the challenges of delivering an effective warning system that is truly nationwide.[12]

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[11] FCC, First Report and Order and Further Notice of Proposed Rulemaking, EB Docket No. 04-296, released November 10, 2005.

[12] For a discussion of the issue in the context of the Americans with Disabilities Act, see CRS Report RS22254, *The Americans with Disabilities Act and Emergency Preparedness and Response*, by Nancy Lee Jones.

## NOAA Weather Radio

Digitized signal technology for EAS is the same as that used for the NOAA Weather Radio (NWR). Widely recognized as the backbone of public warning systems, NWR broadcasts National Weather Service forecasts and all-hazard warnings for natural and man-made events. The compatibility of the signals makes it possible for EAS equipment used by the media to receive and decode NWR messages automatically. Weather radios can be tuned directly to NWR channels. Many can be programmed to receive only specific types of messages — for example, civil emergency — and for specific locations, using Special Area Message Encoding (SAME). Standardized SAME codes can be used in almost any device with a radio receiver. These can sound an alarm or set off a flashing light. Similar technology is available to provide NWR messages by satellite TV and over the Internet as messages or as e-mail. Therefore, although EAS and NWR are broadcast technologies set up to operate on a one-to-many basis, these broadcasts can be screened and decoded to provide customized alerts.

The technologies available to the public to receive NWR alerts are equipped to receive any EAS message. In reality, broadcast and cable stations rarely program their EAS technology to transmit voluntary state or local messages over the NWR channels. NOAA has improved, and continues to upgrade, its technology to support an all-hazard warning system. It is encouraging public safety officials to notify them as well as their EAS broadcast contacts regarding non-weather-related emergencies so that they may be rebroadcast on NWR. The eventual inclusion of warnings and alerts from the Department of Homeland Security will bolster these efforts.

## All-Hazard Warning Technology

Given the advanced state of other communications technologies, especially the Internet and wireless devices, the reliance on delivering EAS warnings by radio and television broadcasting seems out-of-date. Some states and communities are pioneering alert systems that utilize other infrastructures. In particular, many communities participate in programs with e-mail or Internet alerts and some issue mass alerts by telephone. Among the best developed of these warning programs are those used for Amber Alerts, providing noteworthy examples of public-private partnerships. Recently, for example, more than15 states reportedly have launched or are preparing to launch Internet technology customized for Amber Alerts. It is hoped by its developers that this system might become the backbone for an expanded all-hazards warning system that would extend the reach of emergency alerts to all types of communications media.[13]

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[13] "Signing of 9/11 Bill to Bring the Emergency Warning System into the Digital Age; NASCIO will lead in developing a National All Alert System." National Association of Chief Information Officers Press Release, January 5, 2005 available at [http://www.nascio.org/pressReleases/050104.cfm]. Viewed December 21, 2005.

**Common Alerting Protocol.** A standardized format known as Common Alerting Protocol (CAP)[14] has been developed for use in all types of alert messages. CAP has received widespread support from the public safety community and has been accepted as a standard by the international Organization for the Advancement of Structured Information Standards (OASIS). One of its key benefits is that it can be used as a single input to activate multiple warning systems. It is being used as a standard for several tests of new, digitized alert networks using multiple technologies.

**Call Centers.** Some of the technological solutions for disseminating alerts and providing information rely on call centers, including 911 emergency call centers (also referred to as Public Safety Answering Points, or PSAPs). *The 9/11 Commission Report*[15] describes the often inadequate response of 911 call centers serving New York City.[16] The report's analysis of the 911 response recommends: "In planning for future disasters, it is important to integrate those taking 911 calls into the emergency response team and to involve them in providing up-to-date information and assistance to the public."[17] Such a solution would require a common infrastructure that would support a number of communications and warning needs. Many recommendations have encouraged the development of greater end-to-end connectivity among all types of emergency services.

**Department of Homeland Security.** In June 2004, the National Oceanic and Atmospheric Administration (NOAA) and the Department of Homeland Security's Information Analysis and Infrastructure Protection Directorate signed an agreement that allows DHS to send critical all-hazards alerts and warnings, including those related to terrorism, directly through the NOAA Weather Radio All-Hazards Network. Under the agreement, DHS will develop warning and alert messages that will be sent to NWR for broadcast to radios and other communications devices equipped with SAME technology.[18]

**Digital Emergency Alert System.** Working with the Association of Public Television Stations, DHS completed two successful pilots to test the implementation of digital technologies and networks, the Digital Emergency Alert System (DEAS). It has been announced that DEAS capabilities will be installed in all Public Television stations by year-end 2007. DEAS uses the additional capacity that digital technology provides for broadcasting to send digitized alerts to almost any

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[14] CAP information at [http://www.incident.com/cookbook/index.php/CAP_Fact_Sheet] and [http://www.oasis-open.org/committees/download.php/6334/oasis-200402-cap-core-1.0.pdf]. Both viewed December 21, 2005.

[15] Final Report of the National Commission on Terrorist Attacks Upon the United States, Official Government Edition, 2004 (referred to as *9/11 Commission Report*).

[16] *9/11 Commission Report* pp. 286-287, 295, and 306.

[17] Ibid., p. 318.

[18] Department of Homeland Security, Press Room, "Homeland Security Leverages NOAA All-Hazards Network for Alerts and Warnings," June 17, 2004, at [http://www.dhs.gov/dhspublic/display?content=3724]. Viewed December 21, 2005.

communications device, including wireless.[19] The rollout is part of the Integrated Public Alert and Warning System (IPAWS). It is a joint effort of FEMA, the Information Analysis and Infrastructure Protection directorate at DHS, and the Association of Public Television Stations (APTS). It is testing digital media — including digital TV — to send emergency alert data over telephone, cable, wireless devices, broadcast media and other networks. If successful, the program will provide the base for a national federal public safety alert and warning system using digital technology.[20] The first phase of the program successfully tested the use of common standards for message formats and interfaces using CAP.

Another joint program under the IPAWS umbrella is a pilot with NOAA to test a geo-targeted alert system using "reverse 911." Reverse 911 is a term sometime used to describe any calling system that places calls generated by a public safety call center to a specific audience.

A program component of IPAWS is to improve the robustness of the communications network to Primary Entry Point (PEP) radio stations by switching from dial-up to satellite distribution. The number of PEP broadcast stations is to be expanded to provide satellite communications capability to every state and territory. These steps are meant to assure the survivability of radio broadcast communications in the event of a catastrophic incident.[21]

**Other Technology Initiatives.** Among other methods being tested to expand broadcast capabilities for emergency alerts are equipping cell phones with NOAA Weather Radio receivers;[22] developing datacasting for digital broadcasting; and using cell phone broadcasting technology. Datacasting is a one-way broadcast transmission using Internet Protocols.[23] The broadcasts can carry voice and data, including videos, graphics, and text messages. In the Digital Alert Emergency System pilot, mentioned above, datacasting is being broadcast to digital televisions and antennae linked to computer networks or directly to computers and laptops. Reportedly, commercial wireless providers that participated in the pilots have not committed to participating in DEAS because of questions about capabilities for delivering alerts as text messages.[24] Some advanced wireless phones and other portable devices can receive digital TV broadcasts, however.

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[19] "Department of Homeland Security Partners with APTS on the National Deployment of the Digital Emergency Alert System," Association of Public Television Stations, press release, July 12, 2006 at [http://www.apts.org/]. Viewed July 14, 2006.

[20] Testimony of John M. Lawson, President and CEO, Association of Public Television Stations, " Senate Hearing, July 27, 2005.

[21] Testimony of Reynold N. Hoover, Director, Office of National Security Coordination, FEMA, Department of Homeland Security, Senate Hearing, July 27, 2005.

[22] Testimony of Christopher Guttman-McCabe, Assistant Vice President, Homeland Security & Regulatory Policy, CTIA-The Wireless Association, Senate Hearing, July 27, 2005.

[23] Testimony of John M. Lawson, Senate Hearing, July 27, 2005.

[24] "DHS Funds National Rollout of Public TV Digital EAS," Communications Daily, July 13, 2006.

Some countries are advocating the use of cell broadcasting to send alerts to cell phones based on location. The Netherlands, for example, requires cell operators to transmit government warnings with cell broadcasts of text messages. The national weather service will use it to send alerts. The Dutch government paid three wireless service operators a total of $3 million to equip their networks for cellular networks.[25] In the United States, which has a variety of wireless phone technologies in use, cell broadcasting has limited applications, as it works on two standards only: GSM and CDMA, and their successor architectures. The GSM standard, and its successor standards, is the authorized standard in the European Union.

Satellite radio could also become part of the new era of digital signal alert systems. XM Satellite Radio will broadcast emergency alerts to the D.C. region through a link with the alert system of Arlington County, Virginia.[26] The Arlington Alert network is operated by Roam Secure, Inc, a company that provides text message alert systems to corporations and some governments, including Arlington and Fairfax Counties in Virginia and the District of Columbia. XM Satellite Radio is also a participant in the IPAWS Digital Emergency Alert System pilot.

## Proposals and Progress

Advocates of all-hazard warning systems are seeking interoperability among warning systems, standardized terminology, and operating procedures in order to provide emergency alerts and information that reach the right people, in a timely manner, in a way that is meaningful and understood by all. In 1999, FEMA and the Departments of Commerce and Agriculture took the lead in a multi-agency working group to explore ways to create an all-hazard warning network.[27] Their recommendations included using NWR as the backbone for a national all-hazard warning system and the establishment of a permanent group to promote improvements in warning systems. The following year, the National Science and Technology Council at the White House sponsored a report that explored the types of technologies and systems that are used or could be used for emergency alerts.[28] Among its recommendations were: the creation of a public-private partnership that would bring all stakeholders together; one or more working groups to address issues such as terminology, technology, location-specific identifiers and cost-effective warning systems; system standardization; and increasing the number of

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[25] "Mobile Providers Resisting SOS Alerts," by Kevin J. O'Brien, International Herald Tribune, January 11, 2006, page 1. For further information on cell broadcasting, one source is the site of an association, the U.S. link is [http://www.ceasa-international.com/usa/]. Viewed January 12, 2006.

[26] "Arlington and XM Satellite Radio Partner for Emergency Alert Broadcasts," Government Technology, August 3, 2005.

[27] National Partnership for Reinventing Government, "Saving Lives with an All-Hazard Warning Network," 1999, at [http://www.nws.noaa.gov/om/all-haz/all-haz1.htm]. Viewed December 21, 2005.

[28] National Science and Technology Council, Working Group on Natural Disaster Information Systems, Subcommittee on Natural Disaster Reduction, "Effective Disaster Warnings," November 2000 [http://www.sdr.gov/NDIS_rev_Oct27.pdf]. Viewed October 4, 2006.

communications channels for warnings. The report concluded that substantial improvements in early warning systems could be achieved through coordination and better use of existing technologies.

Also in 2000, a public-private, multi-disciplinary group was organized as the Partnership for Public Warning (PPW). In 2002, the group received funding[29] to convene meetings and prepare comments regarding the Homeland Security Advisory System (HSAS). Workshop findings were later expanded into recommendations in "A National Strategy for Integrated Public Warning Policy and Capability." The purpose of the document was to "develop a national vision and goals" for improving all-hazard warning systems at the federal, state and local levels. PPW suggested that DHS take the lead in developing a national public warning capability. The PPW discussed the role of an alert system in public safety and homeland security and concluded that current procedures are "ineffective." PPW's recommendations centered on developing multiple, redundant systems using various technologies with common standards that would be "backward compatible" with EAS (including Amber Alert codes) and National Weather Service technologies. In June 2004, PPW published an overview of emergency alert and warning systems.[30] It subsequently scaled back its activities for lack of funding.[31]

## Executive Order: Public Alert and Warning System

On June 26, 2006, President George W. Bush issued an executive order stating that U.S. policy is "to have an effective, reliable, integrated, flexible, and comprehensive system to alert and warn the American people. . . ." To achieve this policy, the President sets out a list of functional requirements for the Secretary of Homeland Security to meet, that respond to the recommendations of experts in this field. In summary, these requirements cover

- evaluating existing resources;
- adopting common protocols, standards and other procedures to enable interoperability;
- delivering alerts on criteria such as location or risk;
- accommodating disabilities and language needs;
- supporting necessary communications facilities;
- conducting training, test, and exercises;
- ensuring public education about emergency warnings;
- coordinating and cooperating with the private sector and government at all levels;
- administering the existing Emergency Alert System as a component of the broader system;
- ensuring that the President can alert and warn the American people.

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[29] Funding came from FEMA, the National Science Foundation, the National Weather Service, the U.S. Geological Survey, and private sources.

[30] PPW, "Protecting America's Communities: An Introduction to Public Alert and Warning," June 2004.

[31] Memorandum to PPW Members, June 30, 2004.

The order also specifies the level of support expected from other departments and agencies in meeting the requirements for a better warning system. The Secretary of Homeland Security is further ordered to "ensure an orderly and effective transition" from current capabilities to the system described by executive order.[32]

## Recent Legislation

The Intelligence Reform and Terrorism Prevention Act (P.L. 108-458) has requirements for a study about the use of telecommunications networks as part of an all-hazards warning system. The study is to be led by the Secretary of Homeland Security, in consultation with other Federal agencies, as appropriate, and participants in the telecommunications industry. Its goals are to consider the practicality of establishing a telecommunications-based warning system that would also provide information to individuals on safety measures that might be taken in response to the warning. The legislation specifies that technologies to consider would be "telephone, wireless communications, and other existing communications networks . . .".[33] The act also requires a pilot study using technology now being used for an Amber Alert network, to improve public warning systems regarding threats to homeland security. This is to be conducted by the Secretary of Homeland Security in consultation with the Attorney General, other federal agencies, the National Association of State Chief Information Officers, and other stakeholders in public safety systems.[34] These pilots are being coordinated through FEMA's Office of National Security Coordination as part of the IPAWS program.[35] An interim report was provided to Congressional committees in March 2006.[36]

## Emergency Alerts and the 109th Congress

There are several parts to a warning system: detection of a problem; communication of the danger to a warning system; dissemination of the warning through communications networks; and information about actions to take in response to the warning, or in the aftermath of disaster. In a natural disaster where there is good predictive capability, such as a hurricane, emergency alerts work fairly well. In a man-made disaster, such as a terrorist attack or a chemical spill, the current warning systems in the United States are vulnerable to failure. Too often, the warning

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[32] "Executive Order: Public Alert and Warning System," released June 26, 2006, available at [http://www.whitehouse.gov/news/releases/2006/06/20060626.html].

[33] Study Regarding Nationwide Emergency Notification System, Intelligence Reform and Terrorism Prevention Act, Title VII, Sec. 7403.

[34] Pilot Study to Move Warning Systems Into the Modern Digital Age, Intelligence Reform and Terrorism Prevention Act, Title VII, Sec. 7404.

[35] Testimony of Reynold N. Hoover, Director, Office of National Security Coordination, FEMA, Department of Homeland Security for the Senate Committee on Commerce, Science and Transportation, Subcommittee on Disaster Prevention and Prediction,"All-Hazards Alert Systems," July 27, 2005.

[36] Department of Homeland Security, Federal Emergency Management Agency, *Interim Study for Congress on an Emergency Telephonic Alert Notification System*. Provided by Ray Miller, Congressional Liaison, FEMA Office of Legislative Affairs, March 10, 2006.

is not communicated to any alert system. Communication with people most in need of information and assistance after a disaster is constrained by inadequate systems and often complicated by damage to communications infrastructure. Due to insufficient planning and preparation, there is often confusion about responsibility, priorities, and needed actions. Some observers have noted that the most effective emergency alerts would be able to empower the "first" first responders, those on the site of the disaster when it occurs. Many have emphasized the need for better oversight and planning for an all-hazard warning system. Experts in public safety and communications have observed that it is both possible and desirable to coordinate the development of information networking technology for various types of emergency responses, maximizing the reach of any warning or alert.

**Improving Emergency Alert Systems.** Although Congress has introduced a number of bills that propose ways to improve the emergency alert system, the language that has made it into law as Title VI of the port security bill (the Security and Accountability for Every Port Act, SAFE Port Act, H.R. 4954, Representative Lungren) focuses almost exclusively on developing regulations and technology that could effectively send geo-targeted alerts to commercial cell phones.

Once signed into law, the WARN Act will require the establishment of a Commercial Mobile Service Alert Advisory Committee by the FCC. Members will come from state, local, and tribal governments; from industry and associations; and will include representatives of persons with special needs. This committee, within a year of formation, is to provide the FCC with recommendations on technical requirements, standards, regulation, and other matters needed to support the transmittal of emergency alerts by commercial mobile service providers to their subscribers. The FCC, alone or in consultation with NIST, has the responsibility of adopting proceedings that will be used to promulgate and enforce the conclusions of the committee. The digital broadcasting capacity of public television stations, described earlier in this report, will be used to "enable the distribution of geographically targeted alerts by commercial mobile service providers," based on recommendations that will come from the committee. The Warn Act includes provisions for opting in or out of the emergency alert service, with requirements for informing consumers.

Requirements specified in the law may be funded from the $106 million that will be made available through the Digital Transition and Public Safety Fund established in the Deficit Reduction Act of 2005 (P.L. 109-171). The WARN Act authorizes the advancing of these funds effective October 1, 2006. The fund is to be used to reimburse broadcast stations for reasonable costs incurred in complying with requirements for alerts under the program to be established by the committee. These monies and other appropriations could be used to provide up to $10,000,000 for grants to communities that are unserved or underserved by commercial mobile services, to acquire "outdoor alerting technologies." Funds also could be used to pay for a research and development program established under the act. This program is to support the development of technologies that can be used to expand the reach of alerts to commercial mobile devices. The program will be headed by the Homeland Security Under Secretary for Science &Technology, in consultation with NIST and the FCC.

The original WARN Act (S. 1753), as introduced by Senator Jim DeMint, would support the efforts of the Department of Homeland Security, NOAA, and others, as described in this report, and provide for an alert system that could meet the President's goals. Bills similar to S. 1753 were introduced in the House by Representative John Shimkus (H.R. 5556, amended as H.R. 5785). Provisions in these bills would change the existing lines of authority in the planning and administration of emergency alerts. Today, responsibility for the Emergency Alert System is shared between FEMA, the lead authority, and the FCC, responsible for regulating emergency alert compliance among broadcasters and others under its jurisdiction. The bills would confirm the role of the FCC as a regulatory body, with limitations. The main responsibility for developing and administering a nationwide alert system would be placed with a National Alert Office established within the Department of Homeland. The bills would also establish a National Alert System and a National Alert System Working Group. The chief purpose of the working group — to be comprised of representatives from federal, state and local agencies, emergency services, individuals with special needs and industry — would be to develop a plan for a national system, with technical and other guidelines. The director of the Office would form the Working Group and act as its chair. Other responsibilities of the Director include implementing the Working Group's recommendations, setting up and conducting a program of research and development, and managing the credentialing of public officials who would be authorized to initiate alerts. This step would federalize the procedures for designating those public officials that would be authorized to request an emergency alert in the new National Alert System. Credentialing would not be required for initiating alerts through EAS and other pre-existing alert systems. The national Office would process requests for credentialing at the federal, state, and local level. These agents would be required to undergo periodic training in programs established by the office. Overall, the National Alert System would be required to take advantage of all available technologies, both in providing access points to issue warnings and in sending and receiving alerts and information. The bills would require mobile service operators to either provide emergency alert messages or specifically opt out of providing such a service. The amendment would set up a grant program to provide alert systems in remote communities that are "effectively unserved" by broadcast and wireless technology. Funding for the title would come from the Digital Transition and Public Safety Fund established in the Deficit Reduction Act of 2005 (P.L. 109-171). The Congressional Budget Office has estimated that $10 million will be paid from the fund in 2009, followed by payments of $73 million in both FY2010 and FY2011.[37]

**Tsunami Warnings.** The horrific devastation across the Indian Ocean from the tsunami of December 26, 2004 raised the level of awareness to the need for better systems for detection and warning, as well as the associated steps for preparedness and response. The Administration has announced plans to expand the U.S. tsunami detection and warning capabilities as a contribution of the Global Earth Observation System of Systems, or GEOSS — the international effort to develop a comprehensive, sustained and integrated Earth observation system. The plan commits

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[37] Congressional Budget Office Cost Estimate, S. 1932, Deficit Reduction Act of 2005, January 27, 2006, page 21, [http://www.cbo.gov/showdoc.cfm?index=7028&sequence=0].

a total of $37.5 million over the next two years.[38] Congressional bills that have measures to improve all-hazard warning systems in the United States include S. 50 (Senator Inouye) and H.R. 396 (Representative Menendez). These two bills provide different perspectives on emergency alert planning, activation, and response but they both recognize the need for aggressively advancing the development and deployment of warning systems. S. 34 (Senator Lieberman) would strengthen tsunami detection and warning systems worldwide but focuses on detection and communications among authorities and does not include provisions specifically for improving emergency alerts to the general populace.

***S.50.*** The Tsunami Preparedness Act (Senator Inouye) builds on the Administration's plan for an improved tsunami monitoring system. Additionally, the bill would improve federal coordination and would establish a task force of representatives of federal agencies, coastal states and territories.[39] The bill directs the Administrator of NOAA to maximize the effectiveness of detection and warning systems for U.S. coastal communities and to take actions to assist other countries in achieving similar goals. The main purposes of the bill are

- Improve tsunami detection, forecast, warnings, notification, preparedness, and mitigation.
- Extend coverage of existing Pacific Tsunami Warning System to include other vulnerable areas such as the Caribbean, Atlantic Coast and the Gulf of Mexico.
- Increase efforts to improve forecasting, preparedness, mitigation, response and recovery, including education and outreach.
- Provide technical and other assistance to international efforts.
- Improve federal, state, and international coordination for tsunami and other coastal hazard warnings and preparedness.

System components covered in the bill include a number of provisions for detection and information sharing and require a communications infrastructure to alert communities vulnerable to the occurrence of a tsunami. Program components include outreach, education, preparedness and risk management. The bill authorizes a tsunami research program that includes communications technology. The NOAA Administrator, in consultation with the Assistant Secretary of Commerce for Communications and Information[40] and the Federal Communications Commission, is to investigate the potential for improved communications systems for hazard warning networks. Technologies mentioned include telephones, cell phones and other wireless devices, satellite communications, the Internet, automated alerts on television and radio, and technologies that might be suitable for reaching remote areas at a low cost. Provisions for assistance on a global level include technical assistance to international organizations in developing a global tsunami warning

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[38] Plans for An Improved Tsunami Detection and Warning Systems, Fact Sheet, [http://www.ostp.gov/html/TsunamiFactSheet.pdf], located on NOAA's Tsunami Page at [http://www.tsunami.noaa.gov/]. Both sites viewed December 21, 2005.

[39] From Remarks by Senator Ted Stevens on the introduction of S. 50, *Congressional Record* for January 24, 2005, published January 25, 2005.

[40] Administrator of National Telecommunications and Information Administration (NTIA).

system. Also, the NOAA Administrator is to give priority in assisting vulnerable areas with needs such as planning, obtaining detection and reporting equipment, and establishing communications and warning units. This bill has been incorporated in S. 1753.

***H.R. 396.*** The Early Warning and Rapid Notification Act (Representative Menendez) provides for the establishment of U.S. programs lead primarily by the Department of State and the United States Agency for International Development (USAID),[41] to give technological and financial support to foreign countries for the development of all-hazard warning systems, and to strengthen existing lines of communication for the dissemination of information on disasters. The bill centers on early warning systems, the work of organizations such as the International Early Warning Program,[42]and the contributions of USAID to international detection and warning programs. The Secretary of State is to lead a study that would evaluate the effectiveness of existing communications links and ways to improve them. The bill provides for assistance, through the Department of State and USAID, for international programs that enhance effective public warning systems. The bill would also expand the scope of American research on public warning systems by providing for sharing results, where appropriate, with the international community. Specifically, it would broaden the scope of the Study Regarding Nationwide Emergency Notification System and the Pilot Study to Move Warning Systems Into the Modern Digital Age — required by the Intelligence Reform and Terrorism Prevention Act — to include a component for evaluating the applicability of various alert technologies to other countries. The Secretary of State, cooperating with the Department of Homeland Security, the Federal Communications Commission and the Assistant Secretary of Commerce for Communications and Information (Administrator of the National Telecommunications and Information Administration), among others, is to lead these research activities. Other responsibilities involve the study of evolving technologies that could be used in providing all-hazard warnings in the United States and abroad.[43] The named agencies are also to study the role of satellites, wireless technology and radio frequency assignments in providing emergency alerts, working with the World Radio Conference[44] and other international forums.

***Tsunami Detection.*** The Global Tsunami Detection and Warning System Act (S. 34, Senator Lieberman) deals almost exclusively with provisions for

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[41] USAID is an independent federal government agency that receives overall foreign policy guidance from the Secretary of State. It provides economic and humanitarian assistance in over 100 countries [http://www.usaid.gov/].

[42] The International Early Warning Program, which has been planned for two years, is to be created by the United Nations to increase international cooperation in the development of warning systems and related programs.

[43] Specific technologies mentioned are "broadcast media, wireline and wireless telephones, other wireless devices, instant messaging via computer , and electronic bulletin boards."

[44] The World Radio Conference is the forum for the negotiation of international agreements that coordinate and enable global telecommunications. It is held under the aegis of the International Telecommunication Union (ITU), a specialized agency of the United Nations.

improving detection of tsunamis and the earthquakes that generate them. Programs that would include identifying deficiencies in existing systems worldwide, increasing the number of sensors for detecting tsunamis, and improving predictive capabilities and communications infrastructure would be the responsibility of the Secretary of Commerce, working with the Secretaries of State and of the Interior, where appropriate. The bill provides the sense of Congress that the President of the United States should convene an international conference on global tsunami detection and warning. The Secretary of State, working with the Secretary of Commerce, is to prepare and implement a strategy that would provide for a global network for detection and warning for tsunamis. This strategy is to include a "warning communications system involving telephone, Internet, radio, fax, and other appropriate means to convey warnings as rapidly as possible to all potentially affected nations."

***Other Bills.*** A bill comparable to S. 34 has been submitted in the House (H.R. 499, Representative Shays). Other bills include S. 361 (Senator Snowe); S. 452 (Senator Corzine); H.R. 882 (Representative Boehlert);H.R. 890 (Representative Pallone); H.R. 1584 (Representative Weldon); and H.R. 1674 (Representative Boehlert) — are concerned with tsunami detection and the initial stages of notification.

**Telephonic Alerts.** Representative Kendrick B. Meek has introduced a bill (H.R. 2101) that would require the deployment of a national alert system using "to the maximum extent possible . . . national private sector networks, technology, personnel, and infrastructure to develop and implement the system." The network, referred to as the READICall emergency alert system, would provide a federal network of notification by telephone, based on geographic location, to alert telephone subscribers of disasters and inform them of steps to be taken in response.

**Alerting Individuals with Disabilities.** The Emergency Preparedness and Response for Individuals with Disabilities Act (S. 2124, Senator Harkin) and its companion bill (H.R. 4704, Representative Langevin) would amend the Homeland Security Act (36 USC 316) to require the Secretary of Homeland Security to appoint a Disability Coordinator "to ensure that the needs of individuals with disabilities are being properly addressed in emergency preparedness and disaster relief." Among the duties specified for the coordinator to assist individuals with disabilities are: ensuring the accessibility of telephone hotlines and websites with information on emergencies; and working with the FCC to assure that distribution channels for video programming (TV broadcasters and others) make emergency information accessible to those with hearing or vision disabilities.

## Other Federal Emergency Warning Systems[45]

Federal agencies administer numerous emergency notification systems. Briefly noted below are other warning systems that are used to warn the public and authorities.[46]

**National Warning System (NAWAS).** In 1957, the National Warning System (NAWAS) was established.[47] NAWAS, still in use as an operational warning system, is a dedicated telephone network that FEMA administers and uses to coordinate with national, regional, state, and local emergency management officials.[48] Today the system connects over 22,000 national, regional, state and local emergency management offices. NAWAS disseminates emergency information and instructions.[49]

**Federal Emergency Management System (FEMIS).**[50]FEMIS is an independent network of different communication devices that operate over various media (microwave, fiber optics, and wireline). The U.S. Army installs and operates the system and notifies state and local emergency management officials in the vicinity of chemical and biological weapon stockpiles designated for destruction of accidental, terrorist, or criminal release of the chemical and biological weapon stockpiles. The system provides digital image files of the contaminated geographical area.[51]

**Homeland Security Advisory System (HSAS).** HSAS, the system most recently established in response to the terrorist attacks of September 11, 2001, provides a color coded terrorist attack warning system to federal, state, and local authorities, as well as the public. At this date, Office of Homeland Security (OHS) manages HSAS, with guidance from the U.S. Attorney General. Daily advisories are posted on the Internet, and the Attorney General notifies the federal, state and local authorities of any change to the advisory color code. Public warnings, resulting in

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[45] This section prepared by Shawn Reese, Analyst in American National Government, Government and Finance Division.

[46] The systems are described in detail in *Effective Disaster Warnings*, Report by the Working Group on Natural Disaster Information Systems, Subcommittee on Natural Disaster Reduction, National Science and Technology Council, Committee on Environment and Natural Resources, November 2000 [http://www.fema.gov/news/newsrelease.fema?id=9985]. Viewed August 8, 2005.

[47] Harry B. Yoshpe, *Our Missing Shield: The U.S. Civil Defense Program in Historical Perspective* (Washington: Federal Emergency Management Agency, 1981), p. 537.

[48] *Effective Disaster Warnings*, p. 52.

[49] Federation of American Scientists [http://www.fas.org/nuke/guide/usa/c3i/nawas.htm]. Viewed August 8, 2005.

[50] Federal Emergency Management System [http://www.pnl.gov/femis]. Viewed August 8, 2005.

[51] National Science and Technology Council, *Effective Disaster Warnings*, p. 51.

a change to the color code, are issued through statements made by the OHS through the media.[52]

**Advanced Weather Information Processing System.**[53] AWIPS is a telephone network administered by the Weather Forecast Office (WFO), which is part of NWS. This network is a dial-up telecommunications link, also accessible by an Intranet server, that provides for two-way exchange of severe weather information between the weather tracking and news industry and NWS.[54] This system is used primarily by the NWS to inform the weather tracking and news industry of severe weather, which is then reported to the public through the news media.[55]

**Emergency Managers Weather Information Network (EMWIN).**[56] EMWIN is a satellite communications network operated by NWS. EMWIN broadcasts severe weather information to a commercially marketed1610mHz radio that provides weather warnings to the public and emergency management officials.[57]

**NOAA Weather Wire Service (NWWS).**[58] NWWS is operated by NWS and transmits severe weather information to mass news disseminators and emergency management officials. The severe weather information is transmitted by weather satellites and then broadcasted to the public via NWR or EAS.[59]

The systems briefly described in **Table 1**, below, are intended to warn the public, federal officials, state and local authorities, or the weather tracking and news industry, of imminent danger to public health and safety.[60]

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[52] "Homeland Security Advisory System," Department of Homeland Security Press Room [http://www.dhs.gov/dhspublic/interapp/press_release/press_release_0046.xml]. Viewed August 8, 2005.

[53] Field Systems Operation Center [http://www.nws.noaa.gov/ops2/]. Viewed August 8, 2005.

[54] National Science and Technology Council, *Effective Disaster Warnings*, p. 33.

[55] Tim Putprush, Federal Emergency Management Agency, Mt. Weather Emergency Operations Center, telephone conversation with Shawn Reese, December 16, 2002.

[56] EMWIN Implementation Report, Computer Sciences Corporation, September 28, 2001 [http://iwin.nws.noaa.gov/emwin/Report.htm]. Viewed August 8, 2005.

[57] National Science and Technology Council, *Effective Disaster Warnings*, p. 50.

[58] NOAA Weather Wire Service [http://www.weather.gov/nwws/]. Viewed August 8, 2005.

[59] National Science and Technology Council, *Effective Disaster Warnings*, p. 32.

[60] Tim Putprush, Federal Emergency Management Agency.

## Table 1. Federal Emergency Warning Systems

| Warning system | Type of threat | Primary administering agency | Warning recipients | Information issued | Required receiving equipment |
|---|---|---|---|---|---|
| AWIPS[a] | Severe weather | NWS | Weather tracking and news industry | Satellite weather imagery | Satellite antenna receiver |
| EAS[b] | Any emergency | Operated by FCC, administered by FEMA | Public, news media | Voice message detailing information and instructions | AM or FM radio, television, or NWR |
| EMWIN[c] | Severe weather | NWS | Emergency managers, public | Digital message detailing severe weather | 1610mHz radio receiver |
| FEMIS[d] | Chemical and biological weapons designated for destruction contamination | U.S. Army | State and local emergency managers | Digital image files of contaminated geographic area | Dedicated computer network |
| HSAS[e] | Terrorist attack | DHS | Public, media, and federal, state and local authorities | Color code characterizing terrorist attack risk and needed protective measures | Internet, news media |
| NAWAS[f] | Any emergency | FEMA | National, regional, state and local emergency managers | Voice message detailing information and instructions | Dedicated telephone network |
| NWR[g] | Severe weather or any emergency broadcast by EAS | NWS | Public, emergency managers | Voice warnings, watches, forecasts, and advisories | NOAA weather radio |
| NWWS[h] | Severe weather | NWS | Media, emergency managers | Digital images of severe weather | Satellite antenna receiver |

**Source:** National Science and Technology Council, *Effective Disaster Warnings*, and Department of Homeland Security.

a. Advanced Weather Information Processing System
b. Emergency Alert System
c. Emergency Managers Weather Information Network
d. Federal Emergency Managers Information System
e. Homeland Security Advisory System
f. National Warning System
g. National Oceanic and Atmospheric Administration Weather Radio
h. National Oceanic and Atmospheric Administration Weather Wire Service