

Experts Agree on Common Alerting Protocol

Experts have agreed on a standard for hazard warnings across all manner of communications channels. The Common Alerting Protocol (CAP) standard addresses the long-standing need to coordinate the wide variety of mechanisms used for warnings and alerts. The CAP interoperability standard was agreed upon in the Emergency Management Technical Committee of the international Organization for the Advancement of Structured Information Standards (OASIS).

Benefits of the Common Alerting Protocol

With adequate warning, people can act to reduce the damage and loss of life caused by natural and man-made hazard events. The key is to get timely and appropriate alerts to everyone who needs them and to only those who need them. Yet, appropriate and complete alerting is a complex challenge. A great variety of warning systems exist. Many are specific to certain types of disaster, such as earthquakes or typhoons, or to certain channels for delivering the warning, such as sirens or television announcements. The diversity of the systems, which were developed independently, is now a challenge to effective coordination. CAP provides a means of addressing this problem.

CAP serves as a universal adaptor for alert messages. CAP defines one message format with the essential features to handle existing and emerging alert systems and sensor technologies. This standard format can replace a whole range of single-purpose interfaces among warning sources and dissemination channels. From the perspective of warnings technology, CAP addresses the concerns about compatibility and operational complexity that have been stifling development. CAP is a breakthrough standard that opens the door to new alerting systems and technical innovation. For example, location-aware receiving devices can use the standardized geospatial information in a CAP alert message to determine whether that particular message is relevant based on the current location of the device.

A key benefit of CAP for sending alert messages is that the sender can activate multiple warning systems with a single input. Using a single input reduces the cost and complexity of notifying many warning systems. A single input message also provides consistency in the information delivered over multiple systems. People receive exact corroboration of the warning through multiple channels. This is very important, as research has found that people do not typically act on the first warning signal but begin looking for confirmation. Only when convinced that the warning is not a false alarm, do they act on it.

CAP is designed to be compatible with all kinds of information systems and public alerting systems, including broadcast radio and television as well as public and private data networks. Rather than being defined for one particular communications technology, CAP is essentially a "content standard": a digital message format that can be applied to all types of alerts and notifications. In this way, CAP is compatible with emerging technologies such as Internet Web services, and with existing formats such as the U.S. national Emergency Alert System and the Specific Area Message Encoding (SAME) used for NOAA Weather Radio in the U.S. CAP is also compatible with alerting systems designed for multilingual and special-needs populations. By reducing the barriers of technical incompatibility, CAP creates the foundation for a technology-independent national and international "warning internet".

A further benefit of CAP for emergency managers is that standardized warnings from various sources can be compiled in tabular or graphical form as an aid to situational awareness and pattern detection. When CAP is applied extensively, managers will be able to monitor at any one time the whole picture of local, regional, and national warnings of all types. CAP alert messages can also be used at sensor systems as a format for direct reporting of relevant events to centers for collection and analysis.

CAP Format

Effective warning systems need to reach everyone who is at risk, wherever they are and whenever the event occurs, yet must not alarm people unnecessarily. Systems must be easy to use, reliable and secure. An effective warning message delivered by such a system must be accurate, specific, and action-oriented. And, warning messages must be understandable in terms of languages and special needs, with attention to the prior knowledge and experience of the receivers. It is also critical that times, places, and instructions are easily understood. The CAP format is designed to contain a broad range of information about the alert message, the specific hazard event, and appropriate responses.

Each CAP message includes information that describes the message itself. Messages have unique identification numbers, and may reference other, related CAP messages. Identifying information about the message also includes the status and time sent, allowing messages to serve as updates and cancellations of previous messages. In addition, messages are identified by source, and are compatible with digital encryption and signature techniques that ensure the reliability and security of the message.

The information about an event in a CAP message may be contained in multiple informational segments. Each informational segment includes a description of the event in terms its urgency, severity, and certainty. CAP has separate descriptions for each of these three characteristics. Urgency describes how much time is available to prepare; Severity describes the intensity of the impact; and Certainty is a measure of confidence in the observation or prediction being made. The event may be assigned to a category (e.g., geophysical, meteorological, safety, security, rescue, fire, health, environmental, transportation, infrastructure), and is also described in text. CAP also supports the inclusion of associated digital images and audio. The inclusion of audio messages, for example, allows warnings to be broadcast directly on radio, without requiring an announcer to read the message text aloud.

Multiple informational segments allow the message to be transmitted in multiple languages or to multiple audiences. Because each segment is associated with a geographic description, the multiple segments may also be used to convey information about bands of intensity. For example, an industrial fire might develop the potential for a major explosion. The incident commander needs to specify several components: evacuation of the area within half a mile of the fire; shelter-in-place instruction for the dispersion plume; and a request for media and aircraft to remain above 2500 feet in the vicinity of the fire. Using CAP, the incident commander can send one message including the appropriate message elements for each area. The incident commander supplies the geographic descriptions, expressed using latitude, longitude, and altitude, by outlining a polygon on a displayed map as he enters the CAP message.

CAP Development and Implementation

The information provided in the CAP format reflects best practices for effective warnings identified through academic review and real-world experiences. In 2001 and 2002, Art Botterell led the initial design of CAP through an international working group of more than 120 emergency managers and emergency information technologists. The Partnership for Public Warning, a U.S. public-private partnership of agencies, vendors and academic experts, then sponsored CAP to the OASIS Emergency Management Technical Committee. Working with Art Botterell, other technical experts refined and tested CAP throughout 2003 and approved CAP version 1.0 standard in 2004.

CAP has been endorsed by the U.S. National Emergency Management Association's Preparedness Committee, the Partnership for Public Warning, the ComCARE Alliance, the Emergency Interoperability Consortium and the Capital Wireless Integrated Network (CapWIN). Applications using CAP have been deployed in multi-vendor events and field trials in Washington, D.C., Virginia, Florida, Nevada and California. Implementors of CAP already include: U.S. Department of Homeland Security; U.S. National

Weather Service; California Office of Emergency Services; Virginia Department of Transportation; Capital Wireless Integrated Network (CapWIN); GeoDecisions, Inc.; E Team; Blue292; Warning Systems, Inc.; Comlabs, Inc.; mobileFoundations; Ship Analytics; MyStateUSA; Integrated Environmental Management, Inc.; Hormann America, Inc.; Oregon RAINS; and NDS, Ltd.; among others.

Reference

Common Alerting Protocol Version 1.0. Edited by Art Botterell (Partnership for Public Warning). Committee Specification. From the OASIS Emergency Management TC. 10-February-2004. Document available on the Internet at: <http://www.oasis-open.org/committees/emergency/>. 32 pages. See also the accompanying CAP v1.0 XML Schema.