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In the Matter of
The Commercial Mobile Alert System
PS Docket No.07-287

Basis for Response

The comments and recommendations herein arise from studies of public warning, mass mobilization and other incident management problems over the last 10-years. These studies include technical feasibility and focus group efforts. The findings are critical to rulemaking.

Our response is organized as follows:

- Quick overview of study efforts and methodology.
- The fundamental performance (warning / mobilization) barrier and the critical performance criteria.
- Technical solution to the performance barrier.
- The policy / leadership barriers to readiness (including better warning system capabilities).
- Comments on specific rulemaking questions.
- Conclusion.

Quick Overview of Study Efforts and Methodology

Our studies considered the needs and interests of the 8 major categories of stakeholders in the nation's emergency information highway:

1) Federal Government
2) State Government
3) Local agencies with 1st responder & disaster management missions.
4) Technology providers – equipment manufacturers, communications carriers including radio / TV media, innovators.
5) Organizations with risk & liability interests – city / county risk managers, risk pool managers, insurance firms, operators of critical infrastructure including utilities, hospitals, dams, nuclear power and chemical plants.
6) Organizations with hazards research, education, policy missions.
7) Auxiliary services providers – Red Cross, Urban Search & Rescue, etc.
8) Public & public advocates for people who are deaf, elderly, or otherwise disabled.

5 principles / operating disciplines were considered in arriving at findings:

1) Incident Command System (core processes, all strategic and tactical operational functions)
2) Agility of resources (interoperability of people and equipment)
3) Systems engineering (economics, logistics, reliability, maintenance, recovery, operational efficiency)
4) Readiness (training, human factors)
5) Public / private partnership (engage all stakeholders, work to respective strengths of each sector)

The principles / operating disciplines were factored into performance metrics (representative metrics in parentheses behind respective principle / operating discipline). The metrics were quantified with collected study data.

The studies:

- Identify 4 fundamental barriers – 1 performance, 3 policy / leadership - to the timely and systematic application of science and technology to disaster management, formation of UIC/DS system, and sustained readiness in general.
- Show that the 4 fundamental barriers, plus the uncertainties and fragmentation of efforts that arise from them have had, and continue to have major consequences. These consequences can be measured in human, economic, readiness, technical, interoperability, confidence in government, discouragement of R&D, 1st responder safety, and other ugly costs.
- Point to policy / leadership solutions that best satisfy the collective of stakeholder needs and interests.
- Characterize a comprehensive, unified incident command / decision support system (UIC/DS) that meets the needs of local, tribal, state, regional and national interests, simultaneously.
- Identify the critical performance levels of warning and mobilization activities that remove the performance barrier.
- Show that the only practical means for attaining the critical warning / mobilization performance levels is a combination of 'smart' device methods and digital communications.

The Fundamental Performance Barrier & the Critical Performance Criteria

Most disaster managers recognize the need for ***better*** public warning capabilities. The Federal report, Effective Disaster Warnings, concludes, "*The major problem in modern emergency management is the [lack] of an* ***effective*** *warning system that reaches every person at risk … no matter what they are doing or where they are located*". But what specifically do the words *better* and *effective* mean? How much *better* or *effective*?

Our studies show that:

- The vast majority of 1st responder agencies and local appropriations bodies find it impossible to justify acquisition and use of threat modeling and other advanced tools when they lack basic capabilities for protecting local constituents. They commonly refer to warning system performance as that key basic capability.
- Warning, external resource mobilization and local inter/intra-agency notification activities are already too long and cumbersome to add new steps to initial response procedures. 1st responder agencies commonly estimate 8 to 15 minutes of procedural time in relatively common situations like wildfires and tornadoes.

These findings have profound implications for Chem-Bio-Radiological-Nuclear-EMP and other readiness that depend on adoption and use of various advanced technologies.

Consensus surveys associated with our studies established the essential performance criteria for removing the performance barrier, specifically the abilities to:

- Deliver warnings to at least 80% of the affected (geographic and audience specific) public in less than 90 seconds, 24/7.
- Perform initial warning, mobilization and notification activities for relatively common situations like tornadoes in less than 2 minutes.

Note the word *deliver* in the first point. Delivering information is vastly different than issuing information. The later is commonly used in defending existing systems.

Note also the word *affected* in the first point. Disaster managers need specific geographic, geopolitical and audience targeting capabilities. We'll detail these requirements in comments to specific rulemaking questions.

In a show of hands, attendees of a 2005 warning system conference rated existing systems as poor or worse. The EM director of a hurricane prone state doubted he could reach even 5% of the public in his state at 3AM.

Home theater, TiVo, 'tight' building construction methods, and call screening undermine the effectiveness of existing systems. When the color of the sky doesn't pre-sensitize people to a threat or when the threat is colorless or odorless, it's considerably harder to reach people. People who are deaf and hard-of-hearing, staying in hotels or campgrounds, living in rural areas, or working in factories, warehouses and shopping malls are unreachable on short notice with any certainty. And all bets are off when utility power fails.

No simple fix, system integration (IPAWS), or extension through commercial services of existing systems can satisfy the critical performance goals or significantly close the performance gap. It's going to take much more.

Technical Solution

Technical efforts driven by our study findings show that the critical performance criteria can be attained. The technology to do so does exist, and is affordable. The solution requires a combination of location-aware 'smart' device methods and digital communications. Cell Broadcast / Broadcast SMS are suitable 'last-mile' warning transport solutions. But cell provisioning is used differently, specifically to dynamically adjust the warning signal coverage area and not as a means for geographically associating (targeting) the recipient audience. This difference has major disaster management implications as will be detailed later in response to a specific rulemaking question.

To achieve the critical performance criteria, two types of 'smart' devices are needed - 'fixed-site' devices for homes and offices, and mobility devices including cell phone handsets. The fixed-site devices are not fixed in the sense of being immobile but rather they are transportable devices that have some enhanced capabilities for dealing with nighttime and human factors issues. These enhancements are generally not practical or desirable in cell phone handsets.

The fixed-site devices can be built from commodity handset chipsets on the same high-volume production lines now used for handsets. The location awareness functionality is increasingly available. A recent semiconductor market study projects dramatic growth in cellular chipsets having integrated GPS / navigation functionality in a next few years. Electronic trade magazines already contain such announcements. The 'smart' warning devices are simply a matter of adding the appropriate smart-function software.

'Fixed-site' devices can be active or passive. Passive 'smart' devices for the general public are free to roam to that network which provides the best signal at the individual device location. Active devices can be commissioned to acknowledge delivery of a message to an individual device or receipt by a human, or by returning sensor information. They're intended for schools, public facilities, critical infrastructure providers, and responders. Messaging costs are borne by local, state, and federal disaster management agencies.

The 'smart' functionality enables:

- Warnings that conform to threat areas of almost any shape, size and location – small flooding stream, hazmat plume, tornado warning box, etc. These areas can be subsections of a communications cell, or straddle parts of multiple cells. They include concentric areas.
- Multiple geographic warning interest profiles – current location, location of home, children's school, business, home of elderly parents, or other.
- Geopolitical warning interest profile mechanisms.
- Multiple audience interest profiles – member of auxiliary response team, operator of heavy equipment firm or other typed resource, National Guard member by unit number and rank, personal disability (respiratory), language, etc.
- Boolean combinations of the above.
- Auto-discard of duplicate warnings.
- Auto-discard of expired warnings.
- Message cancellation and change.
- Distinctive alert tones and patterns that are indicative of message urgency – no alert for system test (routine weather or other information) to smoke alarm level – alerts reduce to low level chirp after a period of time (empty apartments, temporarily outside, and other reasons.)
- Multi-message retention and replay.
- Auxiliary outputs for local area sirens, highway signage, internal computer networks, aides used by people with disabilities, EAS decoders, etc.
- No registration, user accounts or fees for passive 'smart' devices of the general public.
- Text-to-speech and other extensions are feasible.
- Novel extensions of the functionality above to support CBRNE nanosensors.
- More.

With the functionality above, the public has little, if any reason to opt-out. Warnings are highly localized to people who are immediately affected or have an interest or role in the situation. Visitors and newcomers don't have to recognize geographic landmarks in the warning text to know whether the message is applicable. And warning recipients retain all personal information.

Our technical feasibility / demonstration work prompted emergency managers to say, "This is exactly what we need. I'd advocate building codes mandating the 'smart' devices (like smoke alarms) for a system like this."

These emergency managers also volunteered a long list of additional capabilities that they would then like incorporated into the command software that dispatches the warnings. The list includes situational

awareness, various modeling, consequence management, event logging, real-time collaboration, unified messaging, back-up connectivity, and other functionality. It characterizes a comprehensive unified incident command / decision support (UIC/DS) system.

Our technical feasibility work made clear that, given sufficient public warning system performance, local agencies can then use and do want advanced capabilities. Though well intentioned, CMSAAC recommendations are insufficient.

Rulemaking Issues Arising from the Policy / Leadership Barriers to Readiness

The policy / leadership barriers to readiness below are referenced in responses to specific rulemaking questions later in this document. It's hard to overstate their significance to public warning and other disaster management infrastructure improvement efforts.

The 3 fundamental policy / leadership barriers are:

1. The lack of a master plan and performance metrics for the nation's emergency information highway infrastructure. *No stakeholder can fully define, delineate or defend respective efforts in a sea of interdependencies and uncertainties. No one can objectively compare solutions, measure progress or define success.*
2. The lack of an umbrella organization representative of all stakeholders to maintain the master plan and performance goals as science and technology advance. *Infrastructure having both national security and public safety purposes straddles federal/state/local and private sector authority. There are no clear lines of responsibility.*
3. The lack of long-term contracting authority and funding to sustain a system architect, general contractor and specialized support teams to execute the master plan and to sustain overall system readiness. *Technology is outpacing appropriations, program development, multi-tiered granting and other program management processes. Infrastructure readiness and the associated technical knowledge base dissipate between one-shot programs arising from periodic major disasters. Certain long-term problems that are beyond the mission statements and means of individual agencies cannot be addressed or solved.*

Title VI of the Safe Port Act and the CMSAAC recommendations exemplify certain barrier issues.

Comments arising from policy / leadership barrier 1 and not raised by a specific rulemaking question.

In 1895, the British scientist Lord Kelvin observed, "You cannot improve, what you cannot measure." In the public warning area, emergency managers tell us they've seen negligible improvement in their ability to reach people on short notice in decades. Title VI asks accommodation of disability and language needs but otherwise provides no performance metrics or goals. The CMSAAC did not address the void of metrics or attempt to quantify them before developing recommendations.

This oversight alone is sufficient for the FCC to reject CMSAAC recommendations and order another round of deliberations.

We find it hard to fault the CMSAAC as a whole on this oversight. It took years for the author to collect and extract certain information. The CMSAAC did not have that time. I am disturbed, however, that several members of the committee knew of my studies but withheld that information from the larger committee. The situation raises indelicate questions.

Comments Corresponding to Specific Rulemaking Questions

III. DISCUSSION

A. Warn Act Section 602(a) – Technical Requirements

6. Regarding the adequacy of CMSAAC recommendations:

CMSAAC recommendations do not satisfy the critical performance criteria.

Most disaster managers recognize the need for *better* public warning capabilities. The federal report of 2000, *Effective Disaster Warnings*[1] concludes, "*The major problem in modern emergency management is the [lack] of an effective warning system that reaches every person at risk … no matter what they are doing or where they are located.*" But what specifically do the words *better* and *effective* mean? How much *better* or *effective* is enough?

Title VI does not address these critical questions. As a result, CMSAAC recommendations are likely to relieve Congressional pressure for action but falsely signal that the problem is now solved. Government has a propensity to lose interest in further efforts once any solution - interim, partial or insufficient - is accepted.

[1] Effective Disaster Warnings, Working Group on Natural Disaster Information System, Subcommittee of National Science and Technology Council, released Nov 8, 2000, http://www.fema.gov/pdf/rrr/ndis_rev_oct27.pdf

The CMSAAC did not put public warning system issues into context (the master plan per fundamental policy / leadership barrier 1).

The FCC risks larger readiness needs in accepting current CMSAAC recommendations.

Warning systems have information technology, network, 'last-mile' channel, and other infrastructure components. These components have purposes beyond just public warnings – mobilization, public resource information in disasters (food, ice, fuel), etc. Mobilization and notification activities, in particular, must also be improved to remove the performance barrier and achieve CBRNE readiness.

The core processes of disaster management are data gathering, information management, knowledge formation, and knowledge dissemination. Public warning activities are just one aspect of the knowledge dissemination process. The core processes including public warning activities are inextricably interwoven in major situations. All components of the nation's emergency information highway need to be tightly coupled for maximum performance of the core processes. They need to be considered together.

Economic, training, technical support, logistical and readiness considerations favor a unified incident command / decision support (UIC/DS) context approach. The vast majority of local 1st responder agencies cannot manage separate, single-purpose systems for every type of threat, disaster management process and phase of operations. They have all-hazard missions and need integrated, all-hazard solutions.

Homeland Security Presidential Directive 5 proscribes use of a National Incident Management System (NIMS), a unified organizational response structure. NIMS favors the UIC/DS infrastructure context.

Certain catastrophic threats dictate a level of infrastructure flexibility and use of advanced sensors that favor UIC/DS capabilities.

Technology trends favor a UIC/DS system context. These trends include multi-media service convergence; broadband communications technology, and cognitive radio and mesh / ad-hoc network methods.

7. Regarding the detailed CMSAAC recommendations in Appendix B:

The detailed CMSAAC recommendations reveal further problems that are not specifically addressed in the NPRM. We'll limit our comments herein but

offer further discussion of the issues upon FCC request. These discussions should include 3rd party patent and system economics issues.

Available Transport Technologies

8. Regarding suitability of point-to-point services (SMS).

University studies and European disaster experiences show that SMS capacity is inadequate for public warning purposes. On top of this, public warnings generally trigger secondary communications by the public that further congests the network.

Use of SMS capacity for public warning purposes hinders mobilization and notification activities that are, or should be occurring simultaneously with warning efforts. SMS provides 2-way communications capabilities that are needed for situational awareness, message delivery confirmation and other purposes.

SMS mailboxes are not secure. Critical messages can be overlooked in a stack of routine messages. SMS messaging protocols do not provide sufficient urgency coding levels or reserved emergency levels for disaster managers. They lack duplicate message elimination, auto-expire and recall mechanisms. Few people respond to SMS traffic at night even if they happen to hear the alert tone signaling their arrival. SMS message alert tones are insufficient to reliably awaken most people at night.

9. Regarding suitability of point-to-multipoint technologies such as cell-broadcast:

Cell-Broadcast is a suitable 'last-mile' transport mechanism.

The Broadcast SMS function in CDMA infrastructure also provides suitable transport. While this function is not currently enabled in some infrastructure, it's a matter of software. A year ago, one major equipment vendor indicated to the author that the feature was already scheduled for a 2008 software release. He then added that it was more a matter of demand by the carriers than a development issue.

Technically, cellular mobile devices do or can be made to receive signals broadcast by cellular base stations. A large percentage of GSM handsets already have Cell-Broadcast functionality. Broadcast SMS functionality could be added to new CDMA handsets or downloaded over-the-air to many existing handsets.

The greater question is whether the user interfaces of the mobile devices are sufficient to significantly improve the delivery of warning and other emergency information. Our studies show that certain human interface features are essential for attaining the critical warning performance criteria presented earlier. Current mobile devices lack most of those features. And unfortunately, Title VI does not provide authority over human interface functionality.

10. Regarding the EAS broadcast distribution model and emerging broadcast technologies:

The EAS broadcast distribution model is problematic for 1st responder agencies. There are situations where emergency managers would prefer to deliver localized information before a general public announcement. They cite transit system congestion, sightseeing problems that impede response efforts, call floods into 911 centers, and other problems. The FCC should not constrain new warning technology in this manner.

EAS event codes that indicate both message urgency and type of threat together are restrictive. The FCC should not impose this message coding approach on new systems.

MediaFLO and DVB-H lack vital human interface features that are necessary for attaining the critical warning performance criteria. They don't address the large nighttime alerting problem. In addition, higher bandwidth and higher power services are more vulnerable to power disruption, and the battery capacity issues of mobile devices. MediaFLO and DVB-H may not be available for delivery of vital update information in certain dynamic situations. Generally, control channels and basic services are the last to go and should be favored.

11. Regarding the need for a higher layer protocol to carry meta-data:

A higher layer protocol is desirable. 4G wireless technologies like WiMax are going to foster greater use of IP based terminals and browser based interfaces where XML Schema and other protocol layers will be useful. Disaster managers would like to automatically provision web sites as tip lines, to post recovery information, and for other purposes with the same incident command tools, and network portals they use for public warning activities.

XML Encryption/Decryption, XML Security, and XML Signature standards should be considered for network security mechanisms.

Encryption of information carried on the air-interface is desirable for certain sensitive mobilization and notification operations. The 'smart' device solution developed by the author qualifies access to such information with 'smart' card and biometric mechanisms.

Internet searches found a number of papers on broadcast encryption methods that would provide a measure of hardening against 'spoofing' via the air-interface. These methods should at least be considered.

Federal Government's Role

12. Regarding the federal government's role:

The FCC is being placed in an indefensible position by Title VI and CMSAAC recommendations.

Per the 2nd fundamental policy / leadership barrier, authority over the national public warning infrastructure is questionable.

The problem arises from the following:

- The nation's public warning infrastructure ('civil defense' sirens, EAS, weather radio, telephone auto-dialers) has both national security and public safety purposes.
- Mixed policies by federal agencies.
- The muddy lines of authority over various parts of the public warning and other incident command infrastructure.
- Self-interest practices of certain federal agencies that raise serious bias and fairness concerns.
- The limited influence of 1st responder agencies in the warning system dialog.

The federal government sends very mixed messages about authority / responsibility for the nation's public warning and other disaster management infrastructure. FEMA says, "Public warning systems are a local responsibility." Until recently, state and local readiness, and post-disaster grants from FEMA could not be used for public warning system purposes. At the same time, NOAA says, "We have a mandate to operate the weather radio system." Then, Title VI provides no authority over the mobile device characteristics when those characteristics are critical for solving certain difficult human response issues. And Executive Order 13,407 designates other warning and related preparedness responsibilities to DHS.

The author recently submitted policy papers to NEMA and the IAEM that address the authority issue. Our studies favor a shared authority approach

for balancing the needs and interests of all stakeholders. The approach includes:

1. Adoption of a building construction business model with public and private sector components for the development, deployment and operation of a unified incident command / decision support system that satisfies local, state, regional and national interests.
    - Building Committee – Set strategic goals and functionality, oversee architect and general contractor activities, provide final review and approval of plans.
    - Architect – Develop master and detail plans, conduct preliminary engineering studies.
    - General Contractor – Manage development and deployment.
    - Supporting services – Provide maintenance, training and support.
2. Asking Congress to charter an umbrella organization with the following charter provisions to serve as the Building Committee:
    - Representation
        - Stakeholders – federal gov (DHS led), state gov (NEMA), local EM, tech providers, orgs with risk / liability interests, orgs with hazards research missions, aux service providers, and public including advocates of disabled.
        - All major stakeholder categories are fairly represented.
        - Each stakeholder category elects respective representatives.
        - All representatives have at least 5-years of practitioner experience in respective stakeholder categories.
    - Duties
        - Commission, approve and publish a master infrastructure plan every 5-years.
        - Review and approve final products of working subcommittees.
        - Publish periodic progress reports.
    - Authorities - long-term contracting and oversight of:
        - Architectural services
        - General contractor services
        - Specialized support services
    - Principals of Operation - govern all technical efforts: working groups, final work product approval.
        - Incident command system (NIMS, all-hazards, all-phases, all-strategic and tactical functions)
        - Agility of resources (interoperability of people and equipment)
        - Systems engineering (economics, performance, reliability, maintainability, technical interoperability)
        - Readiness (training and human factors)

    - Public / private partnership (engage all stakeholders according to strengths)
3. Funding architectural and contracted services with an apportioned funding pool. The funding pool combines some per-capita portion of appropriations for state and local readiness with federal major incident readiness moneys.

At present, Federal agencies with vested interests in legacy systems maintain the status quo by means of anecdotal information. When NOAA was asked for signal reliability, public survey and other research data relating to the weather radio system, the author was told, "This kind of information does not exist." When pushed on this point, the NOAA official stated, "You know the answer to that question. If this kind of data was public, we couldn't defend budget monies in front of Congress." This attitude is unacceptable in any agency or organization that might be assigned message aggregation or other gatekeeper responsibilities.

The views of 1st responder agencies are considerably under-weighted in federal decision-making. Local emergency managers find it hard to openly express their views on public warning matters:

- "Our first goal in a disaster is to maintain pubic confidence in government. We can't talk about infrastructure problems when people are paying attention to us."
- "We can't complain about 1950's systems and tools after the [mayor or county executive] has assured the public that we're made all possible preparations."
- "What career path do I have, if I speak against the federal orthodoxy?"

But in off-the-record settings, local emergency managers become quite cynical, and sometimes irate when discussing authority related issues. "They [the federal government or specific agency] tout their state and local partners in the war on terrorism in major reports but then ignore our operational limitations and trump our needs in recommendations. How dare they call it a *national* strategy?" Many 1st responder agency officials laugh at weather radio claims of being an all hazard solution. They cite geographic resolution and other system limitations that hinder public acceptance and their use of the system.

The 'alert aggregator system' should be subject to the shared authority mechanism like that suggested above. Sustained readiness favors private sector implementation and maintenance that is driven by performance goals and a master UIC/DS infrastructure plan. Technology is outpacing government processes despite the pressures of Sept. 11th and Hurricane Katrina.

13. Regarding a centralized aggregator:

Single point failure weaknesses are intolerable.

The author has recommended a fiber optic disaster management network backbone having EMP, satellite and other hardening. This network would include redundant switch/router/server nodes. The nodes were considered in a tiger-team engineering effort (PREPnet) at FEMA's training academy in the fall of 2006. They'd provide privileged access via the Internet, GuardNet, various satellites, amateur radio packet nets, etc. They're intended to host redundant gateways to critical infrastructure and to special disaster management resources including all 'last-mile' channels. The tiger-team factored multi-media distance learning, real-time disaster collaboration and other functions including warning message aggregation and distribution. The system has features that address certain small cable system EAS problems. The effort anticipated multi-factor biometric authentication and other access control measures. 'Smart' card and other credentialing mechanisms are needed anyway, particularly in mutual-aid situations.

Use of the Common Alerting Protocol (CAP)

14. Regarding use of the CAP:

The current revision of the CAP lacks essential features.

CAP provides only one geo-targeting mechanism. Disaster managers need two separate mechanisms in some situations. The first mechanism affiliates people by geographic area. The second specifies the signal coverage area. Use of cell provisioning as a means for affiliating people by cell precludes the dual mechanisms.

The need for dual mechanisms is particularly important once people have settled on a response plan and been dislocated by a first warning message. It's very difficult to reliably deliver vital information once this is done. Consider Hurricane Francis. Meteorological data originally favored landfall around the Port Richie area just South of Tampa. Disaster managers issued warnings and evacuation recommendations. A percentage of evacuees headed South. Then suddenly, during the night, the hurricane cut inland towards the Ft. Meyer area so that Southbound evacuees headed directly into the storm.

With CAP, CMSAAC cancellation messages will only be received by people who remain in the original warning area. People who evacuated and are now outside the original cell-broadcast area will receive nothing. *Recall* or *change*

messages that are subsequently broadcast over a much larger geographic area will disturb lots of people who are unaffected by the situation or did not receive the original warning. The subsequent messages are likely to confuse a percentage of people causing inappropriate responses.

In cases where changes in storm or plume cloud direction allow warning cancellation in a portion of the original warning area, CMSAAC recommendations cause additional, unnecessary alerts for some people.

The CAP does not provide for mass mobilization or inter/intra-agency notification operations. It lacks certain recovery phase capabilities. As noted elsewhere, the 'last-mile' channels and the information technology tools that enable public warnings should also support dissemination of resource and other public information (locations of ice, food, shelter, fuel, etc.) during recover efforts. Mutual-aid organizations may have to carry 'last-mile' and other communications capabilities into areas that are destroyed by catastrophic events. Logistics considerations favor a standardized multi-role communications system over multiple single-function systems.

The CAP accommodates weather service SAME coding. Continued use of SAME will completely devalue new systems that provide greater geographic granularity. Unfortunately, the FCC receives no authority from Title VI over this matter.

NOAA has announced that it will disseminate watch and warning box coordinates plus direction and speed of travel info for video media presentations. This geo-description mechanism should be used for all network communications. The alert gateways should translate precise watch and warning box coordinates into SAME or other codes used by legacy warning systems or required by older air-interfaces.

Alert Formatting, Classes, and Content Issues

15. Regarding character limits:

The character count recommendations are reasonable for display of 'basic' warnings but CMSAAC recommendations should accommodate supplemental and verbose message formats. 4G wireless services are fueling interest in IP-based terminal devices that can accommodate larger messages. These terminals will help deliver public resource information (locations for ice, food, fuel, etc.) and other vital information during future disaster recovery efforts.

Regarding the 'payload vs. displayable text' question, the system developed by the author attaches non-displaying geographic, expiration time, urgency and other control information to displayable text. The 'smart' devices can

concatenate segmented messages and display supplemental message information. They have scroll bar and visual message urgency indications to focus and otherwise expedite viewing of larger messages.

16. Regarding the need for message classification:

The 3 classification levels are insufficient. End-to-end test (no alarm) and general information classifications (short chirp?) are mandatory. To build and maintain system reliance and public confidence, disaster managers need the ability to dispatch routine weather, road closure and other community relevant information. Disaster managers sometimes need to notify (low level alarm) people in areas surrounding a disaster area to minimize rumor and other problems.

'Imminent' is a geographically relevant term. A tornado can be more imminent and urgent to people in a Kansas community than a tactical nuclear or major tsunami event in a coastal U.S. city.

The threshold for 'warning fatigue' varies widely. A person bathing a baby or operating a large manufacturing system generally wishes only the most urgent of warnings compared to someone casually reading a newspaper.

Message classification needs further work.

17. Regarding a minimal text based common alerting message format:

A minimal format recommendation is desirable but should not be mandatory. See next comment section.

18. Regarding the elements of the CMAM:

Format element 2 (area affected) should be further considered. Campers, visitors and newcomers to areas often do not recognize the geographic landmarks in warning messages. Some elderly and other population segments have cognitive limitations.

In the system developed by the author, the location aware 'smart' devices compute the geographic applicability of each message. Verbal descriptions of the affected area can be included in the text but geographic information is no longer so important. Area information can be simplified leaving more room for additional response instructions – "evacuate westward via Edgewood to fairgrounds. Those without vehicles should watch for school and church buses in affected neighborhoods. Please remember disabled neighbors."

Expiration time is also less important with the system developed by the author for similar reasons.

EAS event codes are clearly problematic and should be abandoned. They convey both threat and urgency (tornado warning). They don't provide sufficient urgency coding flexibility for certain adjacent area notification and message recall operations.

19. Regarding automatic generation of alert text:

The message dispatch software that was written for the system developed by the author provides both pre-scripted message templates (includes auto-insert mechanisms for time, date, and other run-time dependent information) and free-form messaging. Automatic message generation can be problematic in unusual warning situations (a bear wandering city streets).

20: Regarding standardized alerting messages:

Pre-scripted templates are preferable. Warning systems have purposes in recovery and other phases of disasters where they provide resource (locations and pickup times for ice, food, fuel, etc.) and other information. This messaging is not standardized and is unlikely to fit standard alert formats.

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Geographically Targeted Commercial Mobile Alerts

21. Regarding the precision of geographical targeting:

Disaster managers often require greater geographic granularity than that permitted by CAP and the CMSAAC recommendations. They indicate that weather radio SAME coding is clearly inadequate. They need the ability to localize warnings according to degree of risk for areas that include a small flashflood plain area, industrial chemical plume, neighborhood of lost child, apartment fire (deaf residents), etc.

Wide area warnings have undesirable consequences – sightseeing, anxiety in the elderly, call floods into 911 centers, 'warning fatigue', etc. Disaster managers are loath to enable warning systems that disturb unaffected populations, particularly at night. It's common for day care operators to disable weather radios during nap times and then forget to re-enable them later.

The system developed by the author provides ellipsoidal and polygon areas with scalable resolution. It can target an area as small as the lot of a single house. Jurisdictional authority limits the maximum area.

The author queried people who are deaf and have used pager-based warning systems. They all disliked and quickly discarded the system for lack of geographic resolution and related problems. Typical responses included, "I got tired of being awakened only to find out the warning didn't apply to me."

22. Regarding pre-defined smaller target areas:

Disaster situations rarely conform to pre-defined / pre-designated areas.

The system developed by the author includes FIPS geopolitical targeting mechanisms. The mechanisms accommodate annexations and other FIPS changes. The system allows Boolean combinations of geopolitical and geographic descriptors so that portions of cities (highly irregular shapes) can be alerted or notified.

CMAS for Individuals with Disabilities and the Elderly

23. Regarding accommodations for people with disabilities and the elderly.

Urgency coding of messages is vital. Mothers bathing infants, operators of certain industrial facilities, and people who are sick or disabled need unique alert tone patterns / amplitudes to quickly reprioritize activities. Do they have time to dry and wrap the infant or do they grab and run? Is the situation so immediate that it requires an emergency plant shut down? The disabled and elderly risk dizziness, falls and other problems associated with rapid movement.

People who are deaf and hard-of-hearing (collectively about 11% of the population) need auxiliary outputs (WiFi, contact closure, USB, or other) that can drive auxiliary alerting devices. The author used wireless strobe lights in focus group efforts. We were told, "For the first time, I feel like I'm part of the community rather than part of the problem." One participant stated, "I've always hated knowing that my special needs take responders away of others who may be badly injured."

We recommend that the FCC encourage standardized interfaces and protocols for the various devices used by people with disabilities.

Transmission of CMAS Alerts In Languages Other than English

24. Regarding accommodation of alternate languages:

Alternate language mechanisms are necessary. The system developed by the author is limited only by the font sets of the 'smart' devices and ability of disaster management agencies to prepare warnings in other languages.

Pre-scripted templates help the latter problem. Neural net methods may advance language translator performance in coming years.

B. WARN Act Section 602(b) – CMAS Election Rulemaking

25. Regarding CMS licensee disclosure obligations to subscribers about CMAS:

The proposed notification obligations will discourage program participation by licensees.

We don't see sufficient progress towards the critical performance criteria of public warning / mass mobilization activities to justify the burden on licensees.

Notice of Point of Sale

26, 27, 28 and 29: Regarding point of sale disclosure obligations to subscribers:

See comments in paragraph 25 above.

Notifications to Existing Subscribers

30.

See comments in paragraph 25 above.

Related Filings and Other Requirements

31, 32, 33, 34, 35, 36, and 37.

We don't see sufficient progress towards the critical performance criteria of public warning / mass mobilization activities to justify the filings burden on licensees.

38. Regarding separate or additional charges.

The 'separate and additional charge' provision should apply only to message recipients in the general public. Licensees should be able to recover reasonable operations costs. Our studies favor a bulk air-time bandwidth-reservation fee approach. Costs should be apportioned by local, state and federal government agencies. This approach provides some revenue predictability and cost underwriting for licensees that may encourage system expansion in low population density areas. It would encourage improvements in uninterruptible power capacity and system reliability in certain cases.

C. WARN Act Section 602(c) - Digital Television Transmission Towers Retransmission Capability Rulemaking

39. Regarding satisfaction of the WARN Act by use of DEAS Datacasting:

The current DEAS Data-casting approach does not satisfy geo-targeting granularity and other needs of the 1st responder community. Disasters managers require two-way connectivity that's not supported by Data-casting methods.

40. Regarding the DEAS interface:

The DEAS Data-casting channel should be treated like other 'last-mile' channels. It should have redundant alert gateways and CSMP components.

D. WARN Act Section 602(f) – Testing

41. Regarding system test:

Test procedures are inadequate from the local agency perspective as noted previously. Event logging is not enough. Disaster managers want end-to-end test capabilities. They'd like to know what infrastructure worked and what did not in real-time so they can compensate (door-to-door methods at night if necessary). They want to know how quickly message propagated through the system so they discuss improvements with service providers if necessary.

E. Overall Relationship of CMAS to EAS and Development of a National Alert System by FEMA

42. Regarding the relationship of CMAS to EAS and Development of a National Alert System.

The CMAS should be fully compatible with, and integral to a National Alert System per EO 13,407. The National Alert System, in turn, should be integral to comprehensive UIC/DS system considerations that arise from Homeland Security Presidential Directive 5 (NIMS) and long-standing domestic readiness needs. Unfortunately, the survey and gap analysis requirements of EO 13,407 are delayed or unmet. And we can find no one who is specifically tasked with overall UIC/DS system issues.

Conclusion

Given the collective of problems in the CMSAAC recommendations, questions of infrastructure authority, and uncertainties arising from other directives and initiatives, we recommend the FCC defer final rulemaking indefinitely. We urge the FCC to use it's influence to help remove the 3 policy / leadership barriers to readiness that we discussed earlier in this document. And absent

development of other objective performance metrics and defensible goals, we urge the FCC to reconstitute the CMSAAC and request new recommendations that meet the critical performance criteria identified herein.

Author Bio

Kendall (Ken) E. Post, Principal Investigator & CTO, Alert Systems Inc.
Ken Post received his BSEE from the Univ. of Wisconsin. He has 30 years of product engineering, time-to-market engineering management, and entrepreneurial experience. He has a history of innovation. His early work included space astronomy and other instrumentation for diverse university research. After a university led assignment to Singapore for the UN, Post joined a telecom firm where he ultimately became engineering director. He was then invited to partner in a turnkey engineering firm that developed biomedical, radio and telephone communications, radio navigation and other advanced products over 15 years.

An introduction to several adjunct faculty members of FEMA's Emergency Management Institute in 1996 led to discussions of long-standing public warning, mass mobilization and other disaster management problems. Thus began 10 years of research, technical feasibility work, and focus group effort.

The research enabled "A Strategy For A National Incident Command Architecture" and recommendations that were incorporated into the federal report, Effective Disaster Warnings (Office of Science and Technology Policy of the White House, issued Nov 2000). Post was a founding trustee of the Partnership for Public Warning.

Through Alert Systems, Post has and continues to offer consulting services. He's proposed novel public warning, incident command tool suite, network connectivity, standardized communications pod and other technology.