

## Early Warnings 4 All worldwide (EW4All) Overview

Franklin Bell 2026-6-17

<https://kynx.us> for more. Consider this as a set of compatible tools for your situation. It is not a one size fits all approach.

Earthquake Early Warning System is based on this technology for most rapid, selective alerts.

This is the Warning function. Data delivery of pictures, flood maps for vehicles, building plans for First Responders are a complementary app.

EW4All Overview. The narration is brief and on the notes page. Text-To-Speech is to be provided for including phonetics assistance for pronunciation. Data delivery is a complementary function, e.g. flood maps to vehicles navigation display.

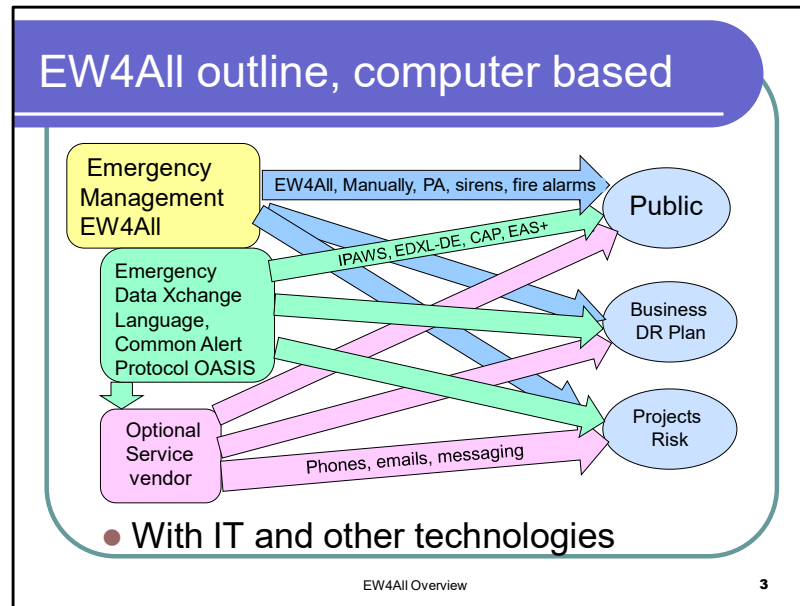
### 3 Learning Points

- EW4All is a mobile & broadcast alerting and file distribution system that saves lives, e.g. the Samoas, though the features are limited when only analog broadcasting is available.
- EW4All is a system of systems for emergency management using CAP and EDXL protocols. These protocols are developed by [www.oasis-open.org](http://www.oasis-open.org).
- Severe non-human project risks are increasingly becoming manageable instead of invoking the “Acts of G\_d” clause. Loss of life of project staff to disasters can be mitigated. Loss of time is also more manageable by allowing time for mitigation measures when appropriate. A response time of seconds is useful for tsunamis and for earthquake mitigation. Processing and transmission time is minimal.

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2

3 learning points

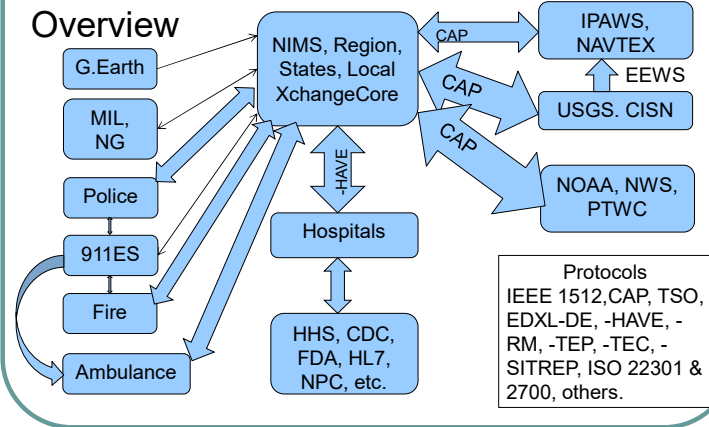


There are different types of sources and different types of audiences

Example; Are there four sunny days starting for making hay soon?

## Why IPAWS? NIEM Compliance

### Overview



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4

The National Information Exchange Model has inter-operational requirements between the different functions software.

## IPAWS Introduction - 3

- Digital broadcast transmission redundancy for alerts and files. Convert EAS+ to or relay CAP or EDXL-DE.

Emergency Management using EDXL and CAP protocols

EAS+ broadcasting, Cable, telco and satellite.

ATSC 3.0 AEA

Cellphones (WEA)

Computer networks, ISP, business & project

Emergency Telephone Notification (R911)

Fire/Evacuation alarms, PA venues, sirens, vendors, others

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5

As the Emergency Management Wide Area Network may fail at some point, where there is no redundancy. Digital broadcasting or satellite can provide a redundant path to US IPAWS destination systems above. Also in remote locations, satellite radio or TV may be the only technology available. While there are application-level alerting implementations available, fundamentally a best solution would involve transport and network internet and operating system implementations once the basic alerting technology is more developed. The Digital Daisy Mesh redundancy to the internet is at the top.

### Opinion 1, 4 points

- Considerable dissatisfaction expressed at FEMA/FCC summit for EAS 2008
- This Federal and large disaster system is little used by local EMOs because it is currently unsuitable and it cannot be incorporated into exercises
- Original encoder/decoders mostly over 10 years old and due for replacement
- Digital radio & digital TV offer possibilities

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6

Opinion 4 points

### Opinion -2, 5 points

- Terrorists strike locally, but the current large area architecture is to the advantage of terrorists impact.
- Other languages (e.g. Spanish, French) have no provision for local implementation
- Better selectivity to avoid irrelevant messages
- Less effort by broadcast staff, perhaps EMO also with Message Templates
- Better integration into program playout automation system and hence workflow.

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7

### Opinion 5 points

Better technology for languages is needed. A multilingual keyboard is proposed in the CAP V2.3

## Value Based Paradigm

- The value of a message is the Importance of the message times the number of recipients it is important to, less the Annoyance of the population receiving the message who are not intended recipients.
- This depends on the Event code & spectra and the Customer selection ability to select important messages.
- Market research is needed

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8

## Value based paradigm introduction



## Value of different technologies

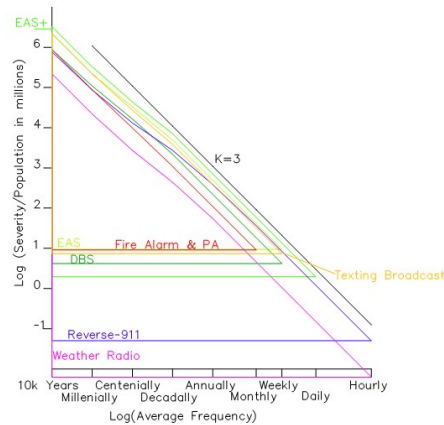
- The different technologies can vary by;
- P, the penetration into the coverage area as a fraction of the population reached at any time.
- R, the response time of the technology, earthquakes require rapid response
- F, the maximum frequency of usage
- Selective alerting with Broadcasting considerably adds to the value & resilience

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9

Value of different technologies, and comparison introduction

## EW4All Value Graph, the accuracy of the values needs research



This graph is a rough approximation, view the green EAS+ line.. A Survey to measure The source data would improve this. The K is assumed to be 3. This follows the  $y=K/f$  noise curve, which is comparable to the Zipf law, which gives rise to the Pareto Principle.

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10

This is a chart based comparison of technologies method. The data accuracy is an assessment, and the accuracy could be improved. The log-log of  $k/f$  average is compared.

## EW4All components

- Integrated Public Alert Warning System IPAWS in USA.
- Common Alert Protocol & EDXL based
- Varying alerting technologies, e.g.;
- Cellphone Text Broadcast
- Email/texting
- Emergency Telephone Notification (R911)
- Fire Alarms & PA Systems (& Sirens)
- Intelligent Internet Speakers also possible with Alert Fatigue Avoidance, FSK modem audio may be used.

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11

# EW4All components

## 6 Improvements for Broadcasting

- Low Data protocol for Radio Broadcast
- Forward Migration from existing systems.
- Priority scheme, 1 is immediate override, others can be scheduled by automation
- First responders exercise mode
- Future delivery to computers of alerts and publication files (CAP Broadcast on ATSC 3 TV)
- A Broadcast tunneling mode is possible to provide internet redundancy. This is called a Digital Daisy Mesh.

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12

## 6 Broadcast improvements

## 4 Broadcast improvements - 2

- Response time in seconds for priority 1, can be an earthquake warning system.
- Selectivity by location by county sector or polygon with recipient category defined
- Car radios can use polygons with navigation systems, good for jurisdictions
- More Event Codes for local emergencies

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13

## 4 Broadcast improvements

## 4 EW4All improvements -3

- Selectivity by polygons to 1 yard/meter resolution
- Selectivity by receiver category (vehicles, Intelligent Highway Sign)
- Selectivity by user category (e.g. first responder)
- Customer adjustable selectivity, by feature or other (e.g. priority)

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14

## 4 EW4All improvements

## 7 EW4All improvements -4

- Country code, Language code, and up to four languages of audio on TV.
- AMBER (Child Abduction Alert pictures
- To Fire Alarm/PA systems possible
- Multistate broadcast coverage possible for message routing (e.g. NYC to 3 states)
- Automated QC and value calculation with monitoring receivers and emails using the FSK header information format
- CAP Broadcast mode for file broadcast.

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15

## 7 EW4All improvements

## 2 EW4All improvements -5

- Standards based architecture means that consumer electronics manufacturers can add this as a feature for the small additional cost. Also, other countries adopting this would be aided by the volume economics of consumer electronics. Selectivity in Broadcast Receivers
- CAP becoming world standard, EDXL is a standard, Suggested Message Templates based on historical English messages available for spectra for over 40 languages.

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16

## 2 EW4All improvements

Megaphones, sirens, bells are not excluded, but may have operational limitations and data capacity limitations. E.g. a siren may be for a tsunami (run uphill), but a fire may require a run to the sea for safety. Lahaina Hawaii observation



### 3 EW4All improvements -6

- An EW4All radio message can be used to regenerate a CAP/EDXL message. This is useful in the event of CAP distribution network failure.
- Existing EAS encoder/decoders are already available, with an application upgrade that also supports the EW4All specification available soon
- Compatibility of EW4All with broadcast playout automation is VERY important.

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17

## 3 EW4All improvements

## EEWS Processing Time Budget

- P wave processing & message 0.4s
- Earthquake Message processing 0.1s
- Transmission time 0.2s
- EW4All encoder processing 0.1s
- Consumer receiver processing 0.3s
- Alert tone duration SEWS 0.7s
- "Earthquake" audio duration 0.3s
- TOTAL 2.1s
- Expanding rings of receiver countdowns possible

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18

## Early Earthquake Warning System Time Budget

## Conclusion

- Numerous problems, and numerous solutions to address them, including market research
- Standards for Computer Aided Dispatch can be compatible e.g. IEEE1512, TSO.
- Some complementary software appropriate
- Deployment will take time, but transistor prices are falling. Should become an insignificant extra cost for this consumer electronics feature. Consumer electronics software is VERY important . <https://kynx.us> for downloads

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19

## Conclusion.

Relevant but not included are Message Templates drafts in many languages, authorization mechanisms, the translation problem distinguishing between communicable and contagious diseases.

There are many details. It is possible to deliver alert countdown messages to expanding hexagonal or octagonal rings. Also, there is enough flexibility for different jurisdictions adaptation, with a single radio station, and/or TV station/Emergency Management facility plus a mobile operator at the simplest in one country. Work is in progress to deliver World Sign Language via ATSC 3.