



Emergency Communications (EMTEL); Recommendations for public warning making use of pre-defined libraries

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Contents

Intellectual Property Rights	5
Foreword.....	5
Modal verbs terminology.....	5
1 Scope	6
2 References	6
2.1 Normative references	6
2.2 Informative references.....	6
3 Definitions and abbreviations.....	7
3.1 Definitions.....	7
3.2 Abbreviations	8
4 Public Warning Paradigm	9
4.1 General	9
4.2 Best Practices in Public Warning	11
4.2.0 Overview	11
4.2.1 Criteria in the Public Warning Decision Process.....	12
4.2.2 The Alert Message.....	13
4.2.2.0 Introduction.....	13
4.2.2.1 Alert Message Style	13
4.2.2.2 Alert Message Content.....	13
4.2.2.3 Size and information quantity	14
4.2.2.4 Use of templates for alert messages	14
4.3 Warning Message Recommendation.....	15
4.3.1 Conditions to Maximize Actionability Upon Alert Message Reception.....	15
4.3.2 Alert Message Recommendations.....	16
4.4 Alerting Library Concept.....	17
4.4.0 Introduction.....	17
4.4.1 Alert message content.....	17
4.4.2 Using alerting libraries.....	19
4.4.3 Updating alerting libraries	19
5 Alerting Libraries Description.....	19
5.1 Alerting Libraries Architecture.....	19
5.2 Alerting Libraries Structure.....	21
5.3 Alerting Libraries	22
5.4 Support of Time Information.....	23
5.5 Support of Location Information.....	23
5.6 Support of Unique Authority Identification	23
5.7 Common Alerting Protocol Compliance	24
5.7.1 Alerting libraries fields correspondence with CAP fields.....	24
5.7.2 Special cases	24
6 Application of Alert Libraries	25
6.1 Alert4All Project Approach.....	25
6.2 Examples of message translation.....	27
6.2.1 CMAS approach	27
6.2.2 Munich shooting on 22.06.2016	29
7 Recommendations for Alert Message Assembly Rules	31
7.1 Introduction	31
7.2 Principles of Alert Message Assembly.....	31
7.2.0 Overview	31
7.2.1 Structure Rules.....	32
7.2.2 Syntax rules	32
7.2.3 Conversion rules	32
7.3 Example Structure Rules for Text in English.....	32

7.4	Example Syntax Rules for Text in English	33
7.4.1	Syntax of First and Update Messages	33
7.4.2	Syntax of Release Messages	37
7.4.3	Syntax of Cancel Messages	37
7.5	Example Conversion Rules for Text in English	37
8	Change Management.....	38
History	40

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Foreword

This Technical Report (TR) has been produced by ETSI Special Committee Emergency Communications (EMTEL).

Modal verbs terminology

In the present document "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

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1 Scope

The present document describes the rules and procedures to implement public warning making use of pre-defined libraries that enable simple and systematic multi-language and multi-mode presentation of warning messages in any European country. This includes the definition of dictionaries for public warning, syntax rules and procedures to formulate warning messages, as well as rules and procedures to extend dictionaries when required.

2 References

2.1 Normative references

Normative references are not applicable in the present document.

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] UNISDR Terminology on Disaster Risk Reduction (2009).

NOTE: Available at www.unisdr.org/eng/terminology/terminology-2009-eng.html.

[i.2] D. S. Mileti and J. H. Sorensen: "Communication of emergency public warning, A social science perspective and state-of-the-art assessment", August 1990.

[i.3] Centers for Disease Control and Prevention, Crisis and Emergency Risk Communications: Best Practices, 2009.

[i.4] D. S. Mileti: "Warning messages and public response", Social science research findings & applications for practice, August 2009.

[i.5] Partnership for Public Warning, Protecting Americas Communities, An introduction to public alert & warning, 2004.

[i.6] W.T. Coombs: "Ongoing Crisis Communication: Planning Managing and Responding", 3rd edition, Thousand Oaks: SAGE, 2011.

[i.7] Australian Government, Emergency management Australia Evacuation planning, 2005.

[i.8] California Emergency Management Agency, Alert and Warning, Report to the California State Legislature, 2008.

[i.9] D. S. Mileti: "Factors related to flood warning response", U.S. Italy Research Workshop on the Hydrometeorology, Impacts, and Management of Extreme Floods, Italy, 1995.

[i.10] Working Group on Natural Disaster Information Systems, Subcommittee on Natural Disaster Reduction, Effective Disaster Warnings, 2000.

[i.11] C. Fitzpatrick and D. S. Mileti: "Motivating public evacuation". International Journal of Mass Emergencies and Disasters, August 1991.

[i.12] CAP V1.2: "Common Alerting Protocol Version 1.2".

- [i.13] J-STD-101: "Joint ATIS/TIA CMAS Federal Alert Gateway to CMSP Gateway Interface Specification".
- [i.14] ISO 22322-2015: "Emergency Management - Guideline for Public Warning Systems".
- [i.15] International Federation of Red Cross and Red Crescent Societies: "Community early warning systems: guiding principles".
- NOTE: Available at www.ifrc.org.
- [i.16] ISO EN 22300-2014: "Terminology".
- [i.17] Recommendation ITU-T X.680 / ISO/IEC 8824-1: "Information technology - Abstract Syntax Notation One (ASN.1): Specification of basic notation".
- [i.18] T. De Cola, J. M. Chaves, C. Parraga: "Designing an efficient communications protocol to deliver alert messages to the population during crisis through GNSS" in Advanced Satellite Multimedia Systems Conference (ASMS) and 12th Signal Processing for Space Communications Workshop (SPSC), 2012 6th volume, no. pp.152-159, 5-7 September 2012, Baiona, Spain.
- [i.19] Alert4All (A4A), EU-FP7 SEC-2010.4.3-1 funded project, 2011-2014.
- NOTE: Available at <http://alert4all.eu/>.
- [i.20] US National Weather Service.
- NOTE: Available at <http://www.weather.gov/>.
- [i.21] ETSI TR 103 335: "Emergency Communications (EMTEL); Guidelines for alert message content accessibility".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

alert decision maker: authority entitled to decide whether to warn the population or not based on the warning information gathered from the warning author

alert message: Equivalent to the term warning message in ISO 22322 [i.14].

alert message issuer: authority (or authorities) entitled to formulate alert messages, based on the information gathered from the warning author, and to send the alert message(s) to the population at risk in a direct manner or by means of one or several intermediaries

alert message recipient: citizen(s) at risk that should receive alert messages disseminated by the alert message issuer

NOTE: The citizen could either be present in a residential, business or recreation environment during the incident.

area of authority: area in which the alert message issuer is entitled to warn/alert the population

early warning system: set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities and organizations threatened by an incident to prepare and to act appropriately and in sufficient time to reduce the possibility of harm or loss, as defined in ISO 22322 [i.14]

NOTE: This definition has been established by the United Nations International Strategy for Disaster Reduction in [i.1].

incident: This term is defined in the ISO EN 22300-2014 "Terminology" [i.16].

intermediary: service provider or operator that distributes the alert message provided by the alert message issuer over its communication infrastructure

warning author: agency that implements the hazard monitoring function and provides warning information to the alert decision maker and the alert message issuer

NOTE: Examples of the warning author are agencies that monitor and provide information on meteorology, hydrology, health information, etc., and evaluate the related risks.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AC	Approval Committee
ASN	Abstract Syntax Notation
AVW	Avalanche Warning
BZW	Blizzard Warning
CAE	Amber Alert
CAP	Common Alerting Protocol
CBRNE	Chemical, Biological, Radiological, Nuclear, Explosive
CC	Certification Committee
CDW	Civil Danger Warning
CEM	Civil EMergency
CEN	Comité Européen de Normalization
CET	Central European Time
CFW	Coastal Flood Warning
CMAS	Commercial Mobile Alert Service/System
DSW	Dust Storm Warning
EAN	President has issued an alert
EQW	Earthquake Warning
EVI	EVacuate now
EWS	Early Warning System
FFW	Flash Flood Warning
FLW	FLood Warning
FRW	FiRe Warning
HMW	HazMat Warning
HUW	HURricane Warning
HWW	High Wind Warning
ISO	International Standards Organization
LAE	Local Area Emergency
LEW	Police Warning
LME	Library Management Entity
NUW	Nuclear Power plant Warning
OEZ	Olympia Einkaufszentrum
PDT	Pacific Daylight Time
PSAP	Public Safety Answering Point
PWS	Pubic Warning System
QCC	Quality Control Committee
RHW	Radiological Hazard Warning
SMW	Special Marine Warning
SPW	Take Shelter Now
SVR	SeVeRe storm warning
TC	Technical Committee
TOR	TORnado warning
TRW	TRopical storm Warning
TSW	TSunami Warning
UNISDR	United Nations International Strategy for Disaster Reduction
US	United States
UTC	Coordinated Universal Time (literally Universel Temps Coordonné)
VOW	VOlcano Warning
WEA	Wireless Emergency Alert
WSW	Winter Storm Warning
XML	eXtensible Markup Language

4 Public Warning Paradigm

4.1 General

Public Warning is aiming to support the public audience with information about incidents/crisis and recommendation on remediating measures during incidents/crisis situations, incidents which could disrupt the safety and security of lives and/or assets.

Public warning is one important part of the entire emergency communication within the emergency and/or crisis management process. The complementary part of the emergency communication during such incidents/crisis is the information provision to the emergency management staff in the field enforcing the efficient implementation of effective response actions, thus limiting harm/damages to lives and assets.

Enabler for the emergency communication is well established risk knowledge/risk management functions, a monitoring function as well as response capabilities. These three functions outline/define content to the messages, which have to be disseminated either to the public or the emergency management staff.

The emergency communication should be capable of supporting man made as well as natural disasters based incidents/crisis situation. In this respect the most prominent global references UNISDR [i.1] and ISO technical committee "Security and Resilience" [i.14] are supplying two well-funded frame works (see figure 1), which are both covering the main area addressed in the present document, i.e. dissemination of public warning.

<i>UNISDR EWS frame work</i>	<i>ISO PWS frame work</i>
Risk knowledge	Monitoring function, incl. risk management
Monitoring service	
Warning dissemination	
Response capabilities	

Figure 1: UNISDR and ISO frameworks: functions

According to the UNISDR mandate the EWS frame work is only targeting natural disasters (meteorological, geological, biological, etc.) while the ISO PWS framework also addresses manmade disasters (incidents/crisis situations, e.g. 9/11, Oslo bombing, etc.) and also aims to cover the information provision to emergency management staff (first responders, volunteers, etc.) in the field (see figure 2).

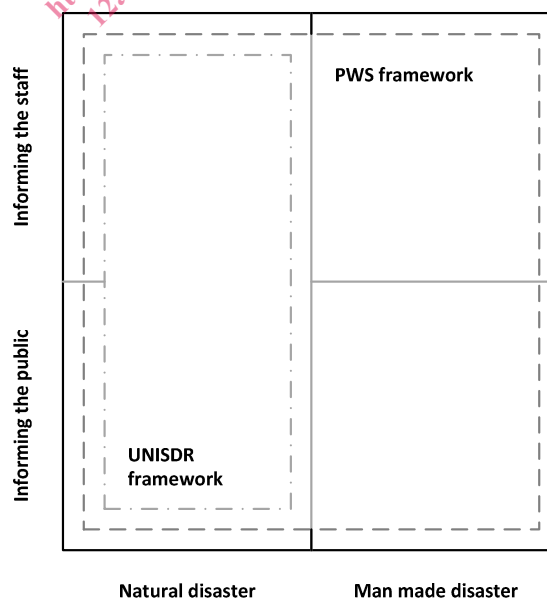


Figure 2: UNISDR and ISO frameworks: scope

Referring to both frameworks, the functions are characterized as follows:

- **Risk knowledge.** This term refers to prior knowledge of risks being faced by communities, for example by means of risk assessment, mapping of incidents and vulnerabilities, their patterns and trends.
- **Monitoring and warning function.** This term refers to the solid scientific basis for risk prediction and detection of incidents, as well as to the consequent decision process to disseminate warning messages to affected communities.
- **Dissemination and communication.** This term refers to the process of formulating and disseminating messages to affected communities upon detection or prediction of a risk situation.
- **Response capability.** This term refers to communities understanding their risks and reacting upon reception of warning messages.

This clause refers to best practices on the dissemination and communication process that yield best results in actionable warning and information, i.e. providing timely messages that reach, are understood and are acted upon by the population at risk [i.15].

In the dissemination and communication process, four main actors are involved, see figure 3:

- The warning author: agency that implements the hazard monitoring function and provides warning information to the alert decision maker and the alert message issuer. Examples of the warning author are agencies that monitor and provide information on meteorology, hydrology, health information, etc. and evaluate the related risks.
- The alert decision maker: authority entitled to decide whether to warn the population or not based on the information gathered from the warning author. Depending on the civil protection organization of a specific region, this role is typically covered by the Mayor, authorized personnel at civil protection agencies, or similar.
- The alert message issuer: authority entitled to (i) formulate alert messages, based on the information gathered from the warning author, and (ii) send these alert messages to the population at risk in a direct manner or by means of one or several intermediaries. This role is typically covered by civil protection agencies (or entities having similar functions) or specific responders, such as fire brigades. The actors model in [i.15] refers to the "alert message issuer" as "mediator", as its major role is to shape the alert message to be understandable by the community at risk, avoiding jargon and technical language, which can be expected from the warning author (agencies involved in the monitoring function), who has typically a scientific background.
- The intermediary: a service provider that distributes the alert message over its communication infrastructure for delivery to the alert message recipient. The intermediary may adapt the format of the alert message to make it compatible with the technology that will be used for delivery. Examples of intermediaries are telecommunication operators or radio or TV broadcasters.
- The alert message recipient: the citizen(s) at risk that should receive (read and understand) alert messages.

It is worth noting that this actors' model represents generic roles in the communication process for public warning that can be mapped into agencies and authorities in different manners, depending on the civil protection organization of each region or country. Several warning authors can provide warning information to a single or several alert decision makers and alert message issuers. The alert decision maker and alert message issuer may make use of information systems to aggregate the information from several warning authors to build a comprehensive risk situation awareness. Also PSAPs can be understood as warning authors when a risk situation is identified by means of citizens calling the emergency number. The roles of alert decision maker and alert message issuer may be fulfilled by the same authority, even by the same physical person in a specific context.

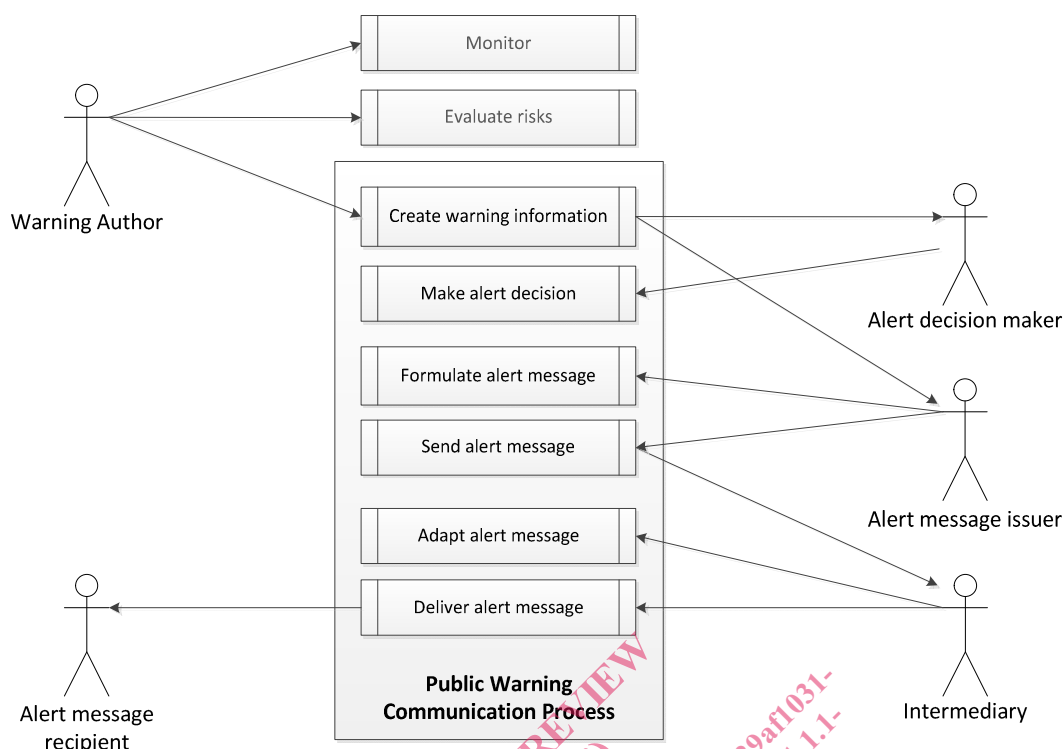


Figure 3: Communication process in public warning

The process depicted in figure 3 shows the actors and functions involved in the communication process in public warning. It should be noted that the monitoring and evaluation functions are functions that the warning author fulfil, but are considered previous to the communication process.

The purpose of this process is to create awareness about the occurring risk during an incident and to trigger a specific reaction or action plan at the alert message recipient site.

In this process, the warning author monitors hazards and evaluates the related risks to create warning information. This warning information is taken as input by the alert decision maker to decide whether to warn. The alert message issuer acts upon the decision formulating the alert message based on the input warning information and sends the alert message through the intermediary. The intermediary adapts the alert message to make it compatible with the technology or technologies that will be used to deliver the alert message and finally delivers it to the alert message recipient.

The alert message recipient will make a decision about his/her reaction/action plan as a result of an own risk evaluation in consideration of the alert message received, the own perception of the situation/environment and the available response capacity.

The perception of the situation by the alert message recipient is influenced by a number of factors; some of those factors may be autogenic (including cognition and physical abilities), others may be caused by a social and environmental context, others may be caused by the own perception of the situation by means of other information sources. Therefore, the dissemination and communication process should be managed by the alert message issuer in a manner that maximizes the probability that the alert message recipient understands and acts upon alert message reception in the intended manner.

4.2 Best Practices in Public Warning

4.2.0 Overview

There is a number of variables that the alert message issuer can steer to foster that the alert message recipient receives, understands and acts upon alert message reception in the intended manner:

- The alert message content and style.

- The channels used to disseminate the alert message.
- The frequency with which the alert message is repeated and updated.

This clause compiles best practices in the terms of the three variables listed above. Such best practices are a collection of standards and guidelines built from past experiences.

4.2.1 Criteria in the Public Warning Decision Process

The warning decision process encloses several decisions as listed below:

Whether to warn

The decision whether to warn is commonly supported by available emergency plans derived from past experiences or risk analysis of expected incidents in/for the area of authority. The decision has to consider a number of factors, e.g.:

- certainty of the available information;
- expected warning impact;
- long term trust in warning messages;
- costs.

The impact of false alarms can be negative (especially in the long term). On the one hand, emergency communication services can get overloaded (e.g. by significantly increased calls to PSAPs); on the other hand, several false alarms can yield the alert message recipient to dismiss other warning messages. Nevertheless, there is evidence that if the reasons that triggered false alarms are explained with a valid and rational explanation, the public is more tolerant to them. Hence, most authors recommend to warn in case of doubt, see Communication of emergency public warning, A social science perspective and state-of-the-art assessment [i.2]. Furthermore, the citizens at risk are exposed to additional information sources that can spread rumours. It is preferable to warn and state the certainty of the information than remaining silent and letting rumours spread, see Crisis and Emergency Risk Communications: Best Practices [i.3].

When to warn

The decision when to warn is related to the decision whether to warn. Once the risk is quantified and the warning need is identified and the action requested from the affected citizens has been determined, the alert message should be issued as soon as possible. However, low certainty of the available information may cause that the alert issuer waits for more data to increase the certainty of the warning decision. Furthermore, if the warning is issued too early, the available information may not be sufficient to provide accurate recommendations for protective actions. Further update messages should be issued including more details as they become available, see Communication of emergency public warning, A social science perspective and state-of-the-art assessment [i.2], and Warning messages and public response, Social science research findings & applications for practice [i.4].

Where and who to warn

An alert message should be addressed to all people at risk with regard to an occurred or expected incident within the area of authority. This means all people located at a geographical area that is or may be affected by the incident. The definition of the risk area boundaries may depend on the type of incident, existing emergency plans and additional information (e.g. weather forecast). Nevertheless, the public should not be understood as a whole group, but as a set of groups and the alert messages should address all of them. One solution is to issue different messages addressing each group. However, a more efficient solution is to shape the alert messages in a manner that they address all groups with a single message, unless different actions are recommended to different groups.

Consideration should be given to the fact that the area where the alert message is going to be distributed is partly determined by the technology that is used (e.g. radio propagation does not stop at boundaries).

Updating information

After having sent the first alert message, it is important to maintain the communication with the public, updating information when it becomes available until there is sufficient evidence to consider the situation "all clear". As soon as the risk situation is "all clear", a message should be disseminated stating the end of the risk situation to return to normality [i.5] and [i.6]. The frequency to provide update messages should be adapted to the time dynamics of the concrete incident [i.2].