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**Emergency Communications (EMTEL);
European Public Warning System (EU-ALERT)
using the Cell Broadcast Service**

Reference

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Emergency Communications (EMTEL).

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**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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Introduction

Initially, the Netherlands have taken the lead in an EC funded project on "Cell Broadcast for Public Warning" and enrolled NL-Alert in 2012. A number of European countries have investigated the possibility of deploying a Public Warning Service in their own country and have given their support to the EC funded project.

The generic name for the European Public Warning System is EU-ALERT. The letters EU are replaced by characters identifying a particular country (e.g. NL-ALERT signifying the Netherlands, UK-ALERT signifying the United Kingdom). Such a strategy allows each country to configure their own Public Warning System to meet their specific national requirements whilst incorporating it within a common core specification agreed by all European countries. By this approach roaming is supported and terminal behaviour is uniform, irrespective of the country which the subscriber is roaming in.

Since Public Warning became mandatory in all EU member states (see the Official Journal of the European Union, L321 [i.5]), EU-ALERT has been implemented in a number of EU countries and several EU countries are in the process of implementing EU-ALERT.

1 Scope

The present document defines the system requirements for a European Public Warning Service using the Cell Broadcast Service, defined in ETSI TS 123 041 [1], as a means of message distribution and delivery to User Equipment (UE).

2 References

2.1 Normative 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.

Referenced documents which are not found to be publicly available in the expected location might be found at <https://docbox.etsi.org/Reference/>.

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 necessary for the application of the present document.

- [1] [ETSI TS 123 041](#): "Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; 5G; Technical realization of Cell Broadcast Service (CBS) (3GPP TS 23.041)".
- [2] [ETSI TS 122 268](#): "Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; 5G; Public Warning System (PWS) requirements (3GPP TS 22.268)".
- [3] [ETSI TS 102 182](#): "Emergency Communications (EMTEL); Requirements for communications from authorities/organizations to individuals, groups or the general public during emergencies".
- [4] Void.
- [5] [ETSI TS 125 331](#): "Universal Mobile Telecommunications System (UMTS); Radio Resource Control (RRC); Protocol specification (3GPP TS 25.331)".
- [6] [ISO 3166-1](#): "Codes for the representation of names of countries and their subdivisions -- Part 1: Country codes".
- [7] [ETSI TS 123 038](#): "Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; Alphabets and language-specific information (3GPP TS 23.038)".

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] Void.

- [i.2] ETSI TR 122 968: "Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; Study for requirements for a Public Warning System (PWS) service (3GPP TR 22.968)".
- [i.3] ETSI TR 102 850: "Emergency Communications (EMTEL); Analysis of Mobile Device Functionality for PWS".
- [i.4] Void.
- [i.5] [Official Journal of the European Union, L 321, 17 December 2018.](#)
- [i.6] BoR (20) 115: "BEREC guidelines on how to assess the effectiveness of public warning systems transmitted by different means".

3 Definition of terms, symbols and abbreviations

3.1 Terms

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

amber alert: alert to seek help from citizens to find abducted children

EU-ALERT: generic term for the European Public Warning Service

NOTE: Specific Countries are identified by replacing the letters EU with the Country Identification letters in ISO 3166-1 [6]. E.g.:

- NL-ALERT: The national variant of EU-ALERT for the Netherlands.
- UK-ALERT: The national variant of EU-ALERT for the United Kingdom.
- FR-ALERT: The national variant of EU-ALERT for France.

message identifier: parameter in a Cell Broadcast message that is an indication of the topic

NOTE: A topic should be activated on the UE. The UE will only process messages with a Message Identifier that is in the topic list.

3.2 Symbols

Void.

3.3 Abbreviations

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

5G NR	5G New Radio
CBS	Cell Broadcast Service
CMAS	Commercial Mobile Alert System
CMSP	Commercial Mobile Service Provider
DBGF	Device-Based Geo-Fencing
ETWS	Earthquake and Tsunami Warning System
FCC	Federal Commission for Communications
GSM	General System for Mobile communication
IE	Information Element
IP	Internet Protocol
KPAS	Korean Public Alert System
LTE	Long Term Evolution
MI	Message Identifier
MMI	Man-Machine Interface

MMS	Multimedia Messaging Service
NR	New Radio
PWS	Public Warning System
SMS	Short Messaging Service
UE	User Equipment
UMTS	Universal Mobile Telecommunications System
URL	Unified Resource Locator
WEA	Wireless Emergency Alert
WG	Working Group

4 Background

4.0 General

For the public authorities, warning the population on the occurrence of a possible disaster is one of their responsibilities. They will use for this purpose all means of communication, in relation with the specific features of the disaster (e.g. the level of risks, it can be forecast or not; the coverage is limited or broad).

The mobile device Public Warning System (PWS) is in this view a complement to a whole set of communication media and should be taken in consideration by the authorities organizing the Civil Safety, in the frame of an overall scheme of population protection.

The characteristics of the mobile radio services and their rather extensive coverage from GSM to 5G New Radio (5G NR) technology make it a relevant tool for addressing the population in real time with short notice, selecting the targeted area, broadcasting relevant information or advice. Additionally it can be assumed that the PWS service can be used not only for warning but also during the phases after the occurrence of the catastrophic event to distribute updated instructions to the affected population.

ETSI's Technical Committee EMTEL's Technical Specification ETSI TS 102 182 [3] provides an overview of the requirements for communication from authorities/organizations to individuals, groups or the general public in all types of emergencies. It collects operational and organizational requirements as a basis for a common notification service, including targeting of the area to be notified. Although many of the requirements relate to national public policies and regulations, there are a number of service and technical aspects which are better dealt with on the European level to ensure harmonized access and services over Europe and service effectiveness through increased user awareness by using standardized solutions.

3GPP WG SA1 conducted a study for requirements for PWS in ETSI TR 122 968 [i.2], where the EMTEL specification ETSI TS 102 182 [3], requirements from Japan for ETWS and requirements from the USA for CMAS were used as input.

From this study, 3GPP Working Group SA1 delivered a specification for PWS Requirements in ETSI TS 122 268 [2] which covers PWS in general, where ETWS, WEA/CMAS, EU-Alert and KPAS are regional adaptations of PWS.

Cell Broadcast would be the bearer technology best suited for the purpose of EU-Alert and also ETWS and WEA/CMAS are based on the Cell Broadcast Service as specified in ETSI TS 123 041 [1]. The remainder of the present document assumes usage of the Cell Broadcast Service.

3GPP was provided with a consensus of European requirements as a basis for updating the 3GPP specifications to ensure that EU-Alert requirements are taken into consideration when placing terminals on the European market.

The clauses in the present document use the results from the analysis of mobile device functionality in ETSI TR 102 850 [i.3].

4.1 Importance of NL-Alert

NL-Alert has been implemented as the first Public Warning Service in Europe which is additional to existing services like siren systems, radio and/or television, Internet, SMS, and social media. The Netherlands Government strongly believes in a multi-channel approach to optimize the reach of the service among the population. However, now the service has matured (i.e. adopted by the general public and alert originators) NL-Alert will become the main national alert service.

All professionals involved in the design and implementation of NL-Alert should therefore be aware that people's lives may depend upon this service. The service should be robust, resilient, reliable and simple.

4.2 Other countries supporting EU-Alert

After the Netherlands went live with NL-Alert in 2012, Lithuania went live a year later with LT-Alert and also Romania went live with RO-Alert.

Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 established the European Electronic Communications Code, which was published in the Official Journal of the European Union [i.5]. Article 110 mandates that "by 21 June 2022, Member States shall ensure that, when public warning systems regarding imminent or developing major emergencies and disasters are in place, public warnings are transmitted by providers of mobile number-based interpersonal communications services to the end-users concerned".

Article 110 does not require a specific technology and BEREC has published guidelines on how to assess the effectiveness of public warning systems transmitted by different means [i.6]. Cell Broadcast is one such means which is supported by the present document.

5 EU-Alert capabilities

5.1 Language

The need to support Public Warning Messages in various languages is necessary for the European Public Warning System because there are many European countries that share borders where there is a frequent and significant movement of mobile subscribers across those borders, i.e. a high instance of international roaming.

Emergency messages should be sent out to users in their own language but when not practicable, then in the language of the message originator.

It is impractical to determine the language of the user and so messages shall be sent out in the native language of the country originating the message and subject to national requirements, in any other language or languages that the originator chooses.

A CBS structure is required to accommodate the requirement to broadcast messages in multiple languages virtually simultaneously in order not to disadvantage any recipient of a message in a particular language.

ETSI TS 123 041 [1] contains an assignment of Message Identifiers for EU-Alert messages in the local language, which is the same range as for CMAS messages in English. This range of Message Identifiers shall be used when the national requirements demand that the UE receive and display the EU-Alert messages in local languages unconditionally.

A second Message Identifier range (defined by 3GPP in ETSI TS 123 041 [1]) shall be used for EU-Alert message broadcast in languages that require the UE to conditionally display the EU-Alert messages based on the pre-configured language settings in the UE (see clause 6.1.1). The Data Coding Scheme IE identifies the actual language of that EU-Alert. The UE shall use the language indicator of the Data Coding Scheme IE, as specified in ETSI TS 123 038 [7], to filter out the displaying of EU-Alert messages.

5.2 Message Types

5.2.0 General

EU-Alert has identified the need for the following types of messages, and it is subject to regulatory requirements if all levels or only a subset of the levels are used in a country:

- Alert messages to warn citizens of an imminent emergency situation
- Advisory messages of lesser urgency
- Amber alerts (child abduction alerts)
- Test messages

The Alert messages may have four levels of severity:

- EU-Alert level 1
- EU-Alert level 2
- EU-Alert level 3
- EU-Alert level 4

EU-Alert level 1 shall have no opt-out; levels 2, 3 and 4 shall allow opt-out by the user.

The Advisory messages have only one level:

- EU-Info

EU-Info messages shall not be associated with the dedicated alerting indication specified in clause 6.1.2.

NOTE: EU-Alert level 4 has been introduced in the current version of the present document as a comparable level with the WEA Public Safety Message which obsoletes the use of the EU-Info. EU-Info only exists for backwards compatibility reasons.

Depending on national requirements of a particular European country, Amber alerts may need to be broadcast as part of the EU-Alert service:

- EU-Amber

EU-Amber messages shall allow opt-in by the user.

The following message types are added for compatibility with CMAS:

- EU-Monthly Test
- EU-Test
- EU-Exercise
- EU-Reserved
- EU-Geo-fencing trigger message

EU-Monthly Test messages may be broadcast with a separate Message Identifier, but test messages may also be broadcast on a regular basis as an EU-Alert message to the general public. Test messages could for example be broadcast at the same time as the monthly test of the sirens is done. UEs may be made available with the capability of receiving EU-Monthly Test messages. The ability of a UE to receive and present EU-Monthly Test message is an optional capability.

EU-Test messages may be used for proficiency training of alert originators and public outreach, and shall allow opt-in by the user.

EU-Exercise messages are for further study.

EU-Reserved messages are reserved for national government- specific use.

All types of EU-Alert messages shall be associated with a dedicated alerting indication (see clause 6.1.2).

5.2.1 Message Identifiers

The use of CBS Message Identifiers defined in ETSI TS 123 041 [1] is one mechanism that would allow Message Types to be identified. Message Identifiers for EU-Alert are related to the level of the severity of the message and to the language.

The use of EU-Alert message types is as follows.

Table 1

Type	Similar CMAS message type	Comment
EU-Alert level 1	National Alert	Broadcasting of level 1 alerts where opt-out is not allowed.
EU-Alert level 2	Extreme Alert	Broadcasting of level 2 alerts where opt-out is allowed.
EU-Alert level 3	Severe Alert	Broadcasting of level 3 alerts where opt-out is allowed.
EU-Alert level 4	Public Safety Alert	Broadcasting of advisory messages. Users should be able to opt-out from these messages.
EU-Info	none	Broadcasting of advisory messages. Users should be able to opt-out from these messages.
EU-Amber	Child Abduction Alert	Allocated for Amber (child abduction) alerts. Users should be able to opt-in to these messages.
EU-Monthly Test	Required Monthly Test	Allocated for monthly test messages that may or may not involve the general public and may or may not require special UEs.
EU-Test	State/Local Test	Allocated for messages used for proficiency training and public outreach. Users may be able to opt-in to these messages.
EU-Exercise	Exercise	Allocated for use during exercises. Its use is for further study.
EU-Reserved	Reserved for CMSP use	Reserved for operator specific use. In EU-Alert this MI is reserved for national government requests to operators.
EU-Geo-fencing trigger message	Geo-fencing trigger	Allocated for geo-fencing trigger message for Device-Based Geo-Fencing.

Message Identifiers for EU-Alert shall be the same as their comparable CMAS message types.

Roaming on a network that offers a CMAS compliant service will provide a similar user experience as is offered by the EU-Alert service, and vice versa. Roaming individuals with a CMAS compliant UE should receive alert messages of similar severity levels as they may expect in their home network.

It depends on national requirements which Message Types will be used for broadcasting.

The use of Message Identifiers for the support of additional languages is described in clause 5.1.

5.3 Service activation

With regards to service activation, EU-Alert may be subject to local regulatory requirements, such as:

- Provisioning of the UE by the operator with the service activated by default.
- Activation of the Cell Broadcast capability in the UE remotely through the network (see ETSI TS 125 331 [5]).

Activation of CBS is possible through the Index Message, but may also be available through a specific menu in the MMI. The Cell Broadcast services that are referred to are EU-Alert and also other, commercial services that may be offered by the operator.

NOTE: The Index Message may not be supported on today's smart phones.

5.4 Bearer technology

The EU-Alert service is based on the Cell Broadcast Service as specified in ETSI TS 123 041 [1] and shall be supported on 2G as well as technologies beyond 2G.

Since a Public Warning System is usually deployed for many years, future technologies beyond 5G, shall also provide a broadcast capability that fulfils the requirements set forth in the present document.

5.5 Security considerations

For a reliable use of the Cell Broadcast service the user should have the highest possible confidence in the validity of the message received. As Cell Broadcast Service does not provide any capability for the UE to authenticate that the EU-Alert messages received are from a genuine source, it is possible that malicious EU-Alert messages can be transmitted. Therefore, additional security measures should be provided in the network to ensure that the source of the EU-Alert message is genuine.

It is possible that malicious Cell Broadcast messages could be sent from a spoofed base station, which the network or the UE may not be able to detect. A long-term solution to authenticate the source of a Cell Broadcast message may require specific functionality in the UE.

In general it may therefore be necessary for a recipient of an EU-Alert message to cross check with other means of public warning messages that the received message is genuine (TV messages, Radio, social media for additional information). It should be supposed that in the context of an EU-Alert, the public authorities will use several mechanisms for transmitting the alert notification. Attention is therefore drawn to the corresponding issues which require a combination of security and reliability measures to be observed by all.

Hereunder are some examples of possible measures:

- maintain strict access control to all facilities (firstly control rooms) used in the transmission line;
- adopt strict processes in checking the validity of IP addresses of servers involved in the transmission of a message from the authorities to each network operator;
- have clearly established procedures between those who will be involved at the time of an Alert (personal contacts, planned exercises, regular updates, etc.).

5.6 Delay Requirements

There are no strict delay requirements for PWS.

From an operational point of view two transmissions of a 93 character warning message within 3 minutes could be sufficient. Each transmission represents the use of one language using an "EU" or a "legacy" Message Identifier.

5.7 Device-Based Geo-Fencing

Device-Based Geo-Fencing (DBGF) allows the presentation of the warning message to be limited to UEs that are inside the targeted warning notification area. This will effectively eliminate the effect of overshoot of the radio signal for cell broadcast outside the targeted warning notification area.

DBGF is specified in ETSI TS 123 041 [1] for E-UTRAN and NG-RAN.

EU-Alert shall support DBGF.

6 UE specific aspects

6.0 General UE aspects

It is assumed that at least the capabilities that are provided through the Cell Broadcast Service are supported by the UE. These capabilities are for example:

- Support for CBS, regardless of if the UE is connected to a 2G, 3G, 4G or a 5G network.
- Detection and suppression of duplicate messages.
- Support for Class 0 and Class 1 type messages as per ETSI TS 123 038 [7].
- Support of the Index Message to select the message types with the desired alert level and desired language.
- Support the capability to opt out of lower level type alerts.

In ETSI TR 102 850 [i.3] an analysis was done into existing requirements for UE specific aspects for use in a PWS. The requirements listed below are based on the result of the analysis.

6.1 UE requirements

6.1.0 General UE requirements

UE requirements in this clause are related not only to EU-Alert messages, but to all message types, unless specifically mentioned otherwise.

6.1.1 Maintaining user preferences

The following are the requirements on the UE for the support of user preferences for EU-Alert:

- 1) The UE shall be able to maintain user alert opt-out selections for all Message Types, with the exception of EU-Amber and EU-Test for which an opt-in selection shall be available, and EU-Alert Level 1 for which no opt-out shall be allowed. Depending on national regulatory requirements, it may not be allowed to opt-out of all types of Alert Messages.
- 2) The UE shall be able to maintain user EU-Alert language preferences. If the user has opted-in to receiving EU-Alert messages then these will be presented in the local language. The user may wish to receive messages in other languages than the local language as well. A typical example would be the additional selection to receive messages in English for those users that do not understand the local language, assuming that messages in English are broadcast next to messages in the local language.
- 3) It shall be possible for users to configure the behaviour of a UE with regard to alerting and should allow at least volume adjustment.

6.1.2 Presentation of the message

The following are the requirements on the UE for the presentation of EU-Alert messages:

- 1) The presentation of EU-Alert messages shall take priority over all other UE functions, but shall not pre-empt active voice or data sessions.
- 2) A momentary interruption of a voice or data session to alert the user that an EU-Alert message has been received is not considered pre-emption as long as the voice or data session is not terminated.
- 3) The UE shall support a dedicated alerting indication (audio attention signal and a dedicated vibration cadence) and be distinct from any other device alerts and restricted to use for EU-Alert notification purposes.

- 4) The alerting indication requirements may be specific for a European country. This implies that such a country may require support of alerts with the default device audio attention signal and default device vibration cadence and support of alerts that are silent (no audio attention signal and no vibration cadence).
- 5) It shall be possible for an EU-Alert message to be displayed on the screen of the UE upon reception and without any user interaction. (This assumes support for Class 0 type messages.) The need for scrolling to view the entire message should be minimized.
- 6) The EU-Alert message shall stay on the display, until the message indication is cancelled by the user (e.g. by pushing keys). The frequency and duration of the continued alerting indication is UE implementation specific.
- 7) It shall be possible for the user to review the EU-Alert messages at a later time.
- 8) The UE shall not support any capabilities to forward received EU-Alert messages, to reply to received EU-Alert messages, or to copy and paste the content of EU-Alert messages.
- 9) The UE shall be able to support reception of multiple EU-Alert messages that are received within short spaces of time (e.g. less than 5 seconds).
- 10) The UE may be able to process a Uniform Resource Locator (URL), which is a reference (an address) to a resource on the internet, or an embedded telephone number.

NOTE: In case regulatory requirements prohibit the use of URLs or embedded phone numbers, then the message text should not contain such a URL or phone number.

- 11) The UE shall not automatically fetch resources referenced by the URL.
- 12) The UE shall support Device-Based Geo-Fencing (DBGF).

6.1.3 Feature behaviour

An EU-Alert message shall not pre-empt any active voice or data sessions, and it is desired feature behaviour of the UE that the UE shall alert the user that an EU-Alert message has been received with the alerting indication that is specific for EU-Alert messages, and the EU-Alert message shall be displayed immediately.

When an EU-Alert message is displayed, it shall remain on the display until it is acknowledged by the user. When during that time another EU-Alert message is received, the UE will notify the user of this through the EU-Alert attention signals. This new message will be displayed after the user has acknowledged the previous EU-Alert message.

The UE will continue to display EU-Alert messages when any non-EU-Alert messages (e.g. another Cell Broadcast message, an SMS or an MMS message) or voice call is received, till the user has acknowledged the EU-Alert messages. After the EU-Alert messages have been acknowledged shall the user be able to respond to non-EU-Alert messages or voice calls.

The user may be notified of any incoming non-EU-Alert message or voice call in a manner consistent with normal device behaviour for such messages or calls, but the displaying of the EU-Alert message shall not be interrupted.

6.2 Considerations for individuals with special needs

Special consideration shall be required in the UE receiving a PWS message for hearing impaired persons. Whilst a UE receiving a Public Warning Message is expected to give an unmistakable audible warning sound, this is of no use to a hearing impaired person. The UE could of course "vibrate" in a special way but that will only be of use to a hearing impaired person if the phone is in contact with the person's body. There will be cases where the hearing impaired persons UE are not in contact with the person's body and so another means of indicating the receipt of a PWS message is required. That may take the form of a visible flashing indication on the UE.

Annex A (informative):
Void

Annex B (informative): Bibliography

Doc. FCC 08-99: "The Commercial Mobile Alert System, First Report and Order", 9 Apr 2008.

Doc. FCC 08-164: "The Commercial Mobile Alert System, Second Report and Order", 8 July 2008.

Doc FCC 08-184: "The Commercial Mobile Alert System, Third Report and Order", 7 August 2008.

Doc FCC 17-143: "Wireless Emergency Alerts, Order on Reconsideration", 1 November 2017.

Doc FCC 18-4: "Wireless Emergency Alerts, Second Report and Order and Second Order on Reconsideration", 31 January 2018.

History

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