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Technical Report

3rd Generation Partnership Project;

Technical Specification Group Services and System Aspects;

Feasibility study on enhancements of Public Warning System;

Stage 1

(Release 16)

** 

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# Foreword

This Technical Report has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

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x the first digit:

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y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

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# Introduction

The requirements for Public Warning System were specified from 3GPP Release 8 onwards in order to provide a text-based and language-dependent PWS message to mobile users who have conventional mobile devices that were normally assumed in 3GPP technical specifications, i.e. PWS-UEs that can display a text-based and language-dependent PWS message, over 3GPP system.

It is recently recognised that mobile devices with different or no user interface or with different roles (e.g. devices implemented as wrist bands with a tiny screen and a limited or no user interface, sensors that support a simple functionality such as the control for power on/off, or mobile devices with relay functionality) are on the market. In addition, as 5G brings the connected society with the application of the 3GPP system to non-ICT industry businesses, the number of such mobile devices in the market is expected to increase in the near future.

Such changes in the market of mobile devices make it necessary that existing PWS requirements in 3GPP TS 22.268 [2] are revisited to check whether they are applicable to such mobile devices.

In addition, the number of mobile users who internationally travel or live in other countries than their mother country without knowledge of the local language is increasing. So, other means than texts (e.g. globally standardised graphical symbols or images that are mapped to disasters or any event triggering to disseminate a PWS message) might be much more powerful and efficient to let such mobile users recognise what is happening from the PWS message they receive.

Mobile devices may have accessibility capabilities that help mobile users with disabilities (e.g. people with vision impairment) understand text-based and language-dependent PWS messages. PWS messages may also supplement current PWS content with additional content tailored to the needs of users with disabilities. Therefore, it seems desirable to identify the necessity of new or additional requirements for the improvement of the comprehension of the PWS message.

# 1 Scope

The present document describes new use cases and potential requirements applicable to Public Warning Services for

- UEs with diverse form-factors whose user interface is different from the conventional mobile phones; and

- UEs that are defined by applying 3GPP system to non-ICT industry businesses (e.g. vehicles or machines such as IoT devices or robots) and have the different UE role from what 3GPP has traditionally assumed.

In addition, it considers the improvement of the understandability of the PWS message e.g. displaying language independent or graphical content to users, especially foreigners who might not understand the language used in the text or people with physical disability who may be sight impaired and unable to read the text. So it deals with user interface related potential requirements to address the presentation of the warning message considering circumstances such as language being used (e.g. international roaming scenario where the user does not understand the local language) or users with disability (e.g. people with vision impairment).

The present document does not cover use cases or potential requirements for US WEA and Japan ETWS so the results of this document are not applicable for US and Japan. This document considers national variants of EU-Alert and KPAS related service scenarios and potential requirements.

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 22.268: "Public Warning System (PWS) requirements"

# 3 Definitions

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

**PWS-UE:** User Equipment (UE) that is defined in 3GPP TS 22.268 and is capable of displaying a text-based PWS message.

**ePWS-UE:** User Equipment (UE) that

- has the capability of receiving a PWS message by the direct network connection or the indirect network connection over 3GPP system but is not capable of displaying a text-based PWS message; or

- has the capability of receiving a PWS message and is capable of providing the improvement of the understandability of a PWS message.

# 4 Overview

The objectives of enhancements of Public Warning System are to support the legacy regulatory policy and to provide the minimum set of requirements for devices whose user interface or display method is not suitable to show text-based PWS message.

Enhancements of Public Warning System aim to introduce requirements for new functionalities for the following UEs.

- UEs with no user interface over direct network connection;

- Remote UEs with no user interface over indirect network connection;

- Relay UE for indirect network connection of remote UEs; and

- UEs with different user interface.

In addition, enhancements of Public Warning System aim to address the improvement of the understandability of a PWS message to help following users recognise what happens by a PWS message they receive.

- Users with disabilities such as vision impairment; and

- Users who internationally travel or live in other country than their mother country without knowledge of the local language.

# 5 Use cases for UEs with different or no user interface or with different UE roles

## 5.1 Use case: UEs with no user interface over direct network connection

### 5.1.1 Description

This use case describes a scenario where UEs with no user interface that are not intended for human type communication are connected to a 3GPP network and receive a PWS message when a disaster occurs. Those UEs with no user interface take pre-defined actions (e.g. shutting down air condition when an earthquake occurs to prevent fire) to minimize damages caused by disasters or protect human.

### 5.1.2 Pre-conditions

UEs with no user interface are subscribed to operator’s 3GPP network.

UEs with no user interface are connected to the 3GPP network.

UEs with no user interface monitor the 3GPP network for public warning alarms.

Pre-defined actions or procedures are stored on the UEs with no user interface and can be executed based upon the information in the content of the PWS message about the event or the disaster.

### 5.1.3 Service Flows

UEs with no user interface are deployed to manage home appliances such as powering them on and off .

An earthquake suddenly occurs in the area where UEs with no user interface are located and because of the earthquake, a PWS message is broadcast to UEs with no user interface.

UEs with no user interface take pre-defined actions or procedures about the earthquake that is notified by the PWS message.

### 5.1.4 Post-conditions

UEs with no user interface take pre-defined actions (e.g. power off) in time that made home appliances less damaged from the earthquake.

### 5.1.5 Potential Impacts or Interactions with Existing Services/Features

None identified

### 5.1.6 Potential Requirements

[PR-5.1.6-1] The 3GPP system shall enable the content of a PWS message to include information that can be mapped to an event or a disaster and is identifiable by the ePWS-UEs with no user interface per event or disaster.

NOTE: The information included in the content of a PWS message may be an identifier of an event or a disaster.

[PR-5.1.6-2] ePWS-UEs with no user interface shall be able to support the reception of a PWS message broadcast from the 3GPP network.

NOTE: Pre-defined procedures contained in the ePWS-UE with no user interface may be specified by a device manufacturer or regional regulatory requirement in order to have UEs with no user interface take such pre-defined procedures once receiving a PWS message.

## 5.2 Use case: Remote UEs with no user interface over indirect network connection

### 5.2.1 Description

This use case describes a scenario where remote UEs with no user interface that are not intended for human type communication are connected to 3GPP network via relay UE in coverage of 3GPP network and receive a PWS message via relay UE when a disaster occurs. Those remote UEs with no user interface take pre-defined actions (e.g. shutting down the heater to prevent fire when an earthquake occurs) to minimize damages caused by disasters or protect human.

### 5.2.2 Pre-conditions

A relay UE is connected to the 3GPP network and remote UEs with no user interface are in indirect network connection.

Pre-defined actions or procedures are stored on the remote UEs with no user interface and can be executed based upon the information in the content of the PWS message which is transmitted by the relay UE about the event or the disaster.

### 5.2.3 Service Flows

Remote UEs with no user interface are deployed to control machines in a factory and are connected to 3GPP network via a relay UE.

An earthquake suddenly occurs close to the factory and the relay UE receives a PWS message.

The relay UE receives a PWS message, and unconditionally forwards the PWS message to the remote UEs with no user interface.

The remote UEs with no user interface take pre-defined actions or procedures about the earthquake that is based upon the information transmitted by the relay UE.

### 5.2.4 Post-conditions

Remote UEs with no user interface take pre-defined actions (e.g. shut off the power) in time that made machines in the factory less damaged from the earthquake.

### 5.2.5 Potential Impacts or Interactions with Existing Services/Features

None identified

### 5.2.6 Potential Requirements

[PR-5.2.6-1] The remote ePWS-UE with no user interface shall be able to support the reception of the information that is related to an event or a disaster notified by PWS message and is transmitted from the relay ePWS-UE.

NOTE: Subject to regional regulatory requirements and the intended function of the ePWS-UE (e.g. IoT) which does not have a user interface, the ePWS- UE may either:  
1. Ignore PWS message, or  
2. Take actions consistent with the ePWS-UE function (e.g. IoT) in response to specific PWS messages. An example could be to shut down machinery, or  
3. Use alternative alerting mode of user alerting consistent with the ePWS-UE function (e.g. building alarm system) based on the content of the PWS message.

[PR-5.2.6-2] The remote ePWS-UE with no user interface shall automatically suppress duplicated notifications. A duplicate is a repetition of a same notification as determined by unique parameters.

[PR-5.2.6-3] The relay ePWS-UE shall be capable of unconditionally forwarding the PWS message broadcast to areas where remote ePWS-UEs with no user interface and the relay ePWS-UE are located without modification on the PWS message received from the network.

## 5.3 Use case: relay UE for indirect network connection of remote UEs

### 5.3.1 Description

This use case describes a scenario where a relay UE that provides an indirect network connection to remote UEs transmits a PWS message to the remote UEs as they are located in an area where the PWS message is broadcast from the 3GPP network.

### 5.3.2 Pre-conditions

Bob and Mary go out to the sea by taking their yacht where there is a relay UE on the deck of the yacht to provide indirect network connection to remote UEs inside the steel cabin of the yacht.

### 5.3.3 Service Flows

The PWS message is broadcast and the relay UE receives the PWS message notifying that a storm is coming to the area where the yacht is located while Bob and Mary sleep in the steel cabin of the yacht.

The UEs that Bob and Mary have with them could not receive the PWS message directly because the UEs are located inside the steel cabin of the yacht but the relay UE forwards the PWS message to the UEs of Bob and Mary.

The UEs of Bob and Mary receive the PWS message and alarm Bob and Mary about the storm.

### 5.3.4 Post-conditions

Bob and Mary woke up due to the warning alarm from the UEs that they have with them inside the cabin and come back to the port before the storm arrives at the area where they are.

### 5.3.5 Potential Impacts or Interactions with Existing Services/Features

None identified

### 5.3.6 Potential Requirements

[PR-5.3.6-1] A remote PWS-UE shall be able to support monitoring PWS messages which are received both directly from the 3GPP network and indirectly via the relay ePWS-UE or the relay PWS-UE.

[PR-5.3.6-2] When a remote PWS-UE receives a PWS message transmitted via a relay ePWS-UE or the reply PWS-UE, the remote PWS-UE shall carry out the same procedure as specified in 3GPP TS 22.268 [2] for the PWS-UE receiving the PWS message broadcast from the 3GPP network.

## 5.4 Use case: UE with different user interface

### 5.4.1 Description

This use case describes a scenario where the user interface of the mobile device is different from the conventional user interface of the mobile phone, e.g. augmented reality based user interface or hologram based user interface.

Because the network functionalities to broadcast a PWS message need to be kept as unchanged as what is currently specified in 3GPP TS 22.268, such mobile devices with different user interface take the procedure that may be specified by regional regulatory requirements or a device manufacturer if the regional regulatory requirements do not exist for such devices, e.g. displaying the content that is stored in the device and is mapped to a warning event that is extractable from the PWS message broadcast from the network.

### 5.4.2 Pre-conditions

The UE with different user interface (e.g. augmented reality based or hologram based user interface) are connected to 3GPP system.

A warning event or disaster is identifiable from information that can be extracted from the PWS message.

Pre-defined content or procedure is mapped in the UE with different user interface to the warning event or disaster

### 5.4.3 Service Flows

Sally is on holidays in Seoul and her device, a UE with user interface that is different from the conventional user interface of a mobile device (e.g. augmented based or hologram based user interface), helps her find a good restaurant at Gangnam area.

Suddenly an earthquake occurs near Seoul so a PWS message is broadcast to cities in Gyeonggi-do Province as well as Seoul.

Sally’s device receives the text based PWS message broadcast from the network.

Sally’s device recognizes the warning event, i.e. the earthquake that is extracted from the PWS message and the device notifies Sally to leave the restaurant.

### 5.4.4 Post-conditions

Sally recognized in time about the earthquake occurred thanks to the notification of the device and not by the text-based public warning message itself.

### 5.4.5 Potential Impacts or Interactions with Existing Services/Features

None identified

### 5.4.6 Potential Requirements

[PR-5.4.6-1] The ePWS-UE with a different user interface (i.e. a user interface that is not capable of displaying a text-based content) shall be able to support the reception of a PWS message broadcast from the 3GPP network.

[PR-5.4.6-2] The ePWS-UE with a different user interface shall be able to support the extraction of the information on the type of a notified event or disaster from the received PWS message.

NOTE 1: The information extractable from the received PWS message may be an identifier of an event or a disaster.

NOTE 2: Pre-defined procedures contained in the ePWS-UE with a different user interface may be specified by a device manufacturer or regional regulatory requirement in order to have the ePWS-UE with a different user interface carry out such pre-defined procedures once receiving a PWS message and extracting the information on the type of a notified event or disaster.

# 6 Considerations

## 6.1 Considerations on the improvement of the understandability of the PWS message

### 6.1.1 Constraints inherent in the language-based and text-based PWS message

3GPP specified the requirements for Public Warning System in 3GPP TS 22.268 from 3GPP Release 8 onwards in order to let mobile users receive text-based PWS messages. Language-related requirements described in 3GPP TS 22.268 are as follows.

NOTE 1: Requirements described in the section 5 (Earthquake and Tsunami Warning System) and the section 6 (CMAS-Specific Requirements) of 3GPP TS 22.268 are not included to analyse constraints inherent in the language-based and text-based PWS message.

NOTE 2: Constraints identified in this section might not be applicable for US WEA and Japan ETWS so such clarification needs to be added later after proposed texts are agreed.

In the section 4.2 ‘High level general requirements for Warning Notification delivery’,

*- PWS shall only be required to broadcast Warning Notifications in languages as prescribed by regulatory requirements.*

In the section 4.3 ‘Warning Notification Content’,

*- PWS shall not modify or translate the Warning Notification content specified by the Warning Notification Provider.*

In the section 4.5 ‘Support of Warning Notification Providers’,

*- PLMN operators shall, at a minimum, be able to support the following functionalities through interaction with Warning Notification Providers:*

*Activation of Warning Notification delivery*

*- It shall be possible for multiple Warning Notifications to be activated concurrently from one or more Warning Notification Providers.*

In the section 4.6.1 ‘General Requirements’ from the section 4.6 ‘PWS-UE Requirements’,

*- PWS-UEs shall only be required to receive and present Warning Notifications in languages as presented by the Warning Notification Provider. Regional/regulatory requirements may require the Warning Notifications to be broadcast in multiple languages.*

*- There shall be no requirement for language translation in the operator’s network or the UE.*

*- The PWS-UE shall automatically suppress duplicate notifications. A duplicate is a repetition of a previous notification as determined by unique parameters.*

*- PWS-UE shall be able to support concurrent reception of multiple Warning Notifications.*

In the section 4.6.4 ‘Enabling and disabling of Warning Notifications’ from the section 4.6 ‘PWS-UE Requirements’,

*- It shall be possible for users to disable (e.g., opt-out) presentation of some or all of the Warning Notifications, subject to regulatory requirements and/or operator policy. The user shall be able to select PWS-UE enabling/disabling options via the User Interface to disable, or later enable, the PWS-UE behavior in response to some or all Warning Notifications. Depending on the regional/regulatory requirements, the user shall be able to receive Warning Notifications in one or more selected languages.*

In the section 7.2 ‘Additional PWS Requirements Specific to EU-ALERT,

*- EU-ALERT shall support Warning Notifications in various languages. To support international roaming, it is expected that countries adopting EU-ALERT use the same Message Identifier for Warning Notifications in the local language. If Warning Notifications are broadcast in other languages besides the local language, then the Message Identifier for such Warning Notifications are expected to be the same across the countries adopting EU-ALERT.*

Based on the requirements above, any user with a mobile device is supposed to receive the text-based PWS message in languages as prescribed by regulatory requirements no matter whether there is any constraint inherent in users that makes users unable to understand such message (e.g. users who do not know the language used in the PWS message such as migrants or international travellers, or users with disabilities such as vision impairment).

In addition, as the connected society is moving to the 5G era, diverse new types of mobile devices are expected to help users with disabilities overcome their difficulties for the convenience in their lives. This means that more and more mobile users with disabilities will make use of mobile devices. Further on, the number of mobile users who internationally travel or live in other countries than their mother country without knowledge of the local languages is also anticipated to rise more and more.

Therefore, additional potential requirements are necessary to be identified to address the presentation of the PWS message considering circumstances such as language being used (e.g. international roaming scenario where the user does not understand the local language) or users with disabilities (e.g. people with vision impairment).

Following consideration needs to be taken into account as well when additional potential requirements are identified for such mobile users under the current network procedure

- The size of the additional content included in the PWS message shall be constrained by the existing PWS system for any content intended for mobile users with disabilities.

- Considering the PWS message is *broadcast* to mobile users, specific contents dedicated to some mobile users with any disability are impossible to notify them individually that an event or a disaster happens.

- Device manufacturers should extend accessibility support to apply to PWS message presentation as well.

- If graphical symbols or images are used to notify mobile users who do not understand text-based PWS messages about disasters or any event triggering to disseminate a PWS message, these PWS messages should use graphical symbols or images which are internationally recognised.

### 6.1.2 Potential requirements proposed for the improvement of the understandability of the PWS message

For mobile users with disabilities, the user interface of UEs that are used by them is extended by UE accessibility functions. The most effective presentation of the warning indication may be different from what is normally defined for mobile users without disabilities. Considering such difference, following potential requirements are proposed in order to improve the comprehension of the PWS message.

* [PR-6.1.2-1] The ePWS-UE with a user interface providing accessibility extensions to mobile users with disabilities shall be able to support the reception of a PWS message broadcast from the 3GPP network.
* [PR-6.1.2-2] The ePWS-UE with a user interface providing accessibility extensions to mobile users with disabilities shall be able to support the extraction of the information on the type of a PWS notified event or disaster from the received PWS message.

NOTE 1: The information extractable from the received PWS message content may be an identifier of the type of an event or a disaster.

NOTE 2: Subject to regional regulatory requirements the ePWS-UE may use alternative alerting modes for user alerting consistent with ePWS-UE accessibility extensions and based on the content of the PWS message.

For mobile users who are in a region whose local language they do not know, the following potential requirements are proposed in order to improve the understandability of the PWS message.

* [PR-6.1.2-3] The 3GPP system shall enable the content of a PWS message to include language-independent content (e.g. pictogram or symbolic icon representing an event or a disaster) and to be identifiable per event or disaster.
* [PR-6.1.2-4] The ePWS-UE shall support the presentation of language-independent content defined by regional regulatory requirements contained in a PWS message content.

## 6.2 Considerations on existing PWS requirements for UEs with different or no user interface or with different UE roles

### 6.2.1 Applicability review of existing PWS requirements

UEs with different or no user interface or with different UE roles didn’t exist when existing PWS requirements were specified in 3GPP TS 22.268 [2] so some of existing PWS requirements might not be applicable and need to be revised or to add some additional requirements for UEs with different or no user interface or with different UE roles. Table 1, Table 2 and Table 3 show which existing PWS requirements are applicable or need to be revisited for UEs with different or no user interface or with different UEs.

Table 1: General PWS requirements applicable for UEs with different UI, with no UI and with different role

| Existing requirements in the section 4 of 3GPP TS 22.268 [2] | UEs with different UI | UEs with no UI | UEs with different role |
| --- | --- | --- | --- |
| 4.2 High level general requirements for Warning Notification delivery | | | |
| PWS shall be able to broadcast Warning Notifications to multiple users simultaneously with no acknowledgement required. | Applicable | Applicable | Applicable |
| PWS shall be able to support concurrent broadcast of multiple Warning Notifications. | Applicable | Applicable | Applicable |
| Warning Notifications shall be broadcast to a Notification Area which is based on the geographical information as specified by the Warning Notification Provider. | Applicable | Applicable | Applicable |
| PWS capable UEs (PWS-UE) in idle mode shall be capable of receiving broadcasted Warning Notifications.  NOTE: A bandwidth reduced low complexity UE or a UE supporting eDRX may not support all requirements for PWS, including ETWS, CMAS, EU-Alert and KPAS. | Applicable | Applicable | Applicable |
| PWS shall only be required to broadcast Warning Notifications in languages as prescribed by regulatory requirements. | Applicable | Applicable | Applicable |
| Warning Notifications are processed by PWS on a first in, first out basis, subject to regulatory requirements. | Applicable | Applicable | Applicable |
| Reception and presentation of Warning Notifications to the user shall not pre-empt an active voice or data session. | Applicable | Applicable | Applicable |
| Warning Notifications shall be limited to those emergencies where life or property is at imminent risk, and some responsive action should be taken.  NOTE: This requirement does not prohibit the use of the operator’s network (i.e. broadcast technology) implemented for Warning Notifications to be used for commercial services. | Applicable | Applicable | Applicable |
| 4.3 Warning Notification Content | | | |
| PWS shall not modify or translate the Warning Notification content specified by the Warning Notification Provider. | Applicable | Applicable | Applicable |
| Warning Notifications should not contain anything that would drive immediate and debilitating traffic loads into the PLMN (i.e., URLs or dialable numbers). | Applicable | Applicable | Applicable |
| 4.4 Granularity of the distribution | | | |
| Based on the geographical information indicated by the Warning Notification Provider, it shall be possible for the PLMN operators to define the Notification Area based on their network configuration of the area coverage such as distribution of cells, Node Bs, RNCs, etc. | Applicable | Applicable | Applicable |
| 4.5 Support of Warning Notification Providers | | | |
| PLMN operators shall, at a minimum, be able to support the following functionalities through interaction with Warning Notification Providers: | Applicable | Applicable | Applicable |
| - Activation of Warning Notification delivery  It shall be possible for multiple Warning Notifications to be activated concurrently from one or more Warning Notification Providers. | Applicable | Applicable | Applicable |
| - Cancellation of Warning Notification delivery  A cancellation is a command from the Warning Notification Provider to stop dissemination of a specific Warning Notification. | Applicable | Applicable | Applicable |
| - Updating of Warning Notification delivery  Warning Notification Providers update a previous Warning Notification to provide new instructions/information to the PLMN operator. When the Warning Notification Provider updates a previous Warning Notification they provide an identifier that allows the PLMN operator to associate the updated Warning Notification with the previous Warning Notification. | Applicable | Applicable | Applicable |
| Additional functionality may be required based on regulatory or operator policy requirements. | Applicable | Applicable | Applicable |
| 4.6 PWS-UE Requirements | | | |
| 4.6.1 General Requirements | | | |
| PWS-UEs shall only be required to receive and present Warning Notifications in languages as presented by the Warning Notification Provider. Regional/regulatory requirements may require the Warning Notifications to be broadcast in multiple languages. | Applicable | Applicable | Applicable |
| There shall be no requirement for language translation in the operator’s network or the UE. | Applicable | Applicable | Applicable |
| It shall be possible for the Warning Notification to be displayed on the PWS-UE upon reception and without any user interaction. | Applicable | Applicable | Applicable |
| It shall be possible for users to configure the behavior of a PWS-UE with regard to Warning Notification alerting and should allow at least volume adjustment. | Applicable | Applicable | Applicable |
| The PWS-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 Warning Notification purposes. The User Interface shall support the ability for the user to suppress the dedicated audio attention signal and/or the dedicated vibration cadence when a Warning Notification is received. | Need to be revisited | Need to be revisited | Applicable |
| The alerting indication for a specific Warning Notification shall continue until suppressed by users' manual operation (e.g. by pushing keys). The frequency and duration of the continued alerting indication is mobile device implementation specific. This shall not suppress the alerting indication for subsequent Warning Notifications. | Applicable | Need to be revisited | Applicable |
| The PWS-UE shall automatically suppress duplicate notifications. A duplicate is a repetition of a previous notification as determined by unique parameters. | Applicable | Applicable | Applicable |
| The PWS-UE shall not support any capabilities to forward received Warning Notifications, to reply to received Warning Notifications, or to copy and paste the content of Warning Notifications. | Applicable | Applicable | Need to be newly specified for e.g. relay UE |
| PWS-UEs should have the ability to present previously displayed Warning Notifications if requested by the user. | Applicable | Applicable | Applicable |
| PWS-UE shall be able to support concurrent reception of multiple Warning Notifications. | Applicable | Applicable | Applicable |
| 4.6.2 Support of non-Warning Notification capable UEs | | | |
| Support of non-Warning Notification capable UEs is subject to regulatory requirements and/or operator's policy. | Applicable | Applicable | Applicable |
| 4.6.3 Battery Life of PWS-UE | | | |
| Battery life of the PWS-UE shall not be significantly reduced by PWS. | Applicable | Applicable | Applicable |
| 4.6.4 Enabling and disabling of Warning Notifications | | | |
| The PWS-UE shall be configured to receive all Warning Notifications. | Applicable | Applicable | Applicable |
| It shall be possible for users to disable (e.g., opt-out) presentation of some or all of the Warning Notifications, subject to regulatory requirements and/or operator policy. The user shall be able to select PWS-UE enabling/disabling options via the User Interface to disable, or later enable, the PWS-UE behavior in response to some or all Warning Notifications. Depending on the regional/regulatory requirements, the user shall be able to receive Warning Notifications in one or more selected languages. | Applicable | Applicable | Applicable |
| Where regional or national regulations allow, the HPLMN operator shall be able to instruct the PWS-UE to ignore all Warning Notifications in the HPLMN and in PLMNs equivalent to it, by means of a setting on the USIM. | Applicable | Applicable | Applicable |
| Where regional or national regulations pertaining to a VPLMN allow, the HPLMN operator shall be able to instruct the PWS-UE to ignore all Warning Notifications that are received whilst in this VPLMN, by means of a setting on the USIM, when the integrity of Warning Notifications in this VPLMN is known by the HPLMN operator to be compromised. This setting need not distinguish VPLMNs. | Applicable | Applicable | Applicable |
| Subject to regional or national regulations, a PWS-UE in limited service state shall be able to receive and display Warning Notifications.  NOTE 1: Non-existing or empty USIM data files results in all Warning Notifications being presented to the PWS application. | Applicable | Applicable | Applicable |
| 4.7 Roaming Requirements | | | |
| It shall be possible for PWS-UEs that are enabled for Warning Notifications in the HPLMN to receive Warning Notifications from the VPLMN supporting PWS when roaming. | Applicable | Applicable | Applicable |
| A PWS-UE that does not support the PWS requirements of the VPLMN’s PWS service may not receive Warning Notifications from that VPLMN.  NOTE: See section 4.9 for roaming impacts to PWS due to regional regulatory requirements. | Applicable | Applicable | Applicable |
| 4.8 Security Requirements | | | |
| PWS shall only broadcast Warning Notifications that come from an authenticated authorized source. | Applicable | Applicable | Applicable |
| The following requirements only apply when not roaming internationally:  - When required by regional or national regulations, the integrity of the Warning Notification shall be protected. If no such regulatory requirement exists, there shall be no integrity protection of Warning Notifications, and all Warning Notifications shall be presented to the PWS application on the PWS-UE.  - When required by regional or national regulations, the PWS shall protect against false Warning Notification messages. If no such regulatory requirement exists, there shall be no protection against false Warning Notifications, and all Warning Notifications shall be presented to the PWS application on the PWS-UE.  NOTE 1: These requirements are subject to regulatory policies.  NOTE 2: The authentication and authorisation of the source are outside the scope of 3GPP Specifications. | Applicable | Applicable | Applicable |
| 4.9 Regulatory Requirements | | | |
| The PWS offered by a PLMN may be subject to PWS regional regulatory requirements and thus, the PWS offered may differ from PLMN to PLMN as well as from region to region within a PLMN. | Applicable | Applicable | Applicable |

Table 2: EU-ALERT specific requirements applicable for UEs with no or different user interfaces or UEs with different role

| Existing requirements in the section 7 of 3GPP TS 22.268 [2] | UEs with different UI | UEs with no UI | UEs with different role |
| --- | --- | --- | --- |
| 7.2 Additional PWS Requirements Specific to EU-ALERT | | | |
| EU-ALERT shall support three types of Warning Notifications: Alert messages to warn citizens of an imminent emergency situation, Advisory messages of lesser urgency, and Amber alerts. | Applicable | Applicable | Applicable |
| The Alert messages shall be supported with three levels of severity. EU-Alert level 1 shall have no opt-out; levels 2 and 3 shall allow opt-out by the user. All levels of EU-ALERT messages shall be associated with a dedicated alerting indication.  NOTE: EU-Alert level 1 is compatible with the Presidential Alert in CMAS. EU-Alert level 2 is compatible with CMAS Extreme Alerts and EU-Alert level 3 is compatible with CMAS Severe Alert. | Applicable | Applicable | Applicable |
| The Advisory messages have only one level. Advisory messages shall not be associated with any dedicated alerting indication. | Applicable | Applicable | Applicable |
| Depending on national requirements, Amber alerts may need to be broadcast as part of the EU-ALERT service. Amber alerts shall not be associated with any dedicated alerting indication. | Applicable | Applicable | Applicable |
| EU-ALERT shall support Warning Notifications in various languages. To support international roaming, it is expected that countries adopting EU-ALERT use the same Message Identifier for Warning Notifications in the local language. If Warning Notifications are broadcast in other languages besides the local language, then the Message Identifier for such Warning Notifications are expected to be the same across the countries adopting EU-ALERT. | Applicable | Applicable | Applicable |
| EU-ALERT shall be supported on GERAN, UTRAN and E-UTRAN radio access technologies. | Applicable | Applicable | Applicable |

Table 3: KPAS specific requirements applicable for UEs with no or different user interfaces or UEs with different role

| Existing requirements in the section 8 of 3GPP TS 22.268 [2] | UEs with different UI | UEs with no UI | UEs with different role |
| --- | --- | --- | --- |
| 8.1 Introduction to Korean Public Alert System | | | |
| the system supporting Korean Public Alert System (KPAS) shall transmit the public alert message with high priority in order to provide up-to-date information on emergency situations. (e.g. In Tsunami situation, it is recommended to deliver message between CBC and UE in several seconds.). | Applicable | Applicable | Applicable |
| 8.2 Additional PWS Requirements Specific to Korean Public Alert System (KPAS) | | | |
| Two classes of Warning Notification shall be supported; class 0 & class 1. | Applicable | Applicable | Applicable |
| The classes are differentiated per opt-out function. Class 0 shall have no opt-out and class 1 shall allow opt-out by the user. | Applicable | Applicable | Applicable |
| The characteristics of the Warning Notification shall follow the requirements specified in clause 4. | Applicable | Applicable | Applicable |
| The current implementation requirement is for the message of up to 180Bytes (90 Korean Characters) text. | Applicable | Applicable | Applicable |

### 6.2.2 Proposals on existing PWS requirements

Proposed texts are given in Table 4 in order to make existing PWS requirements with proposed texts applicable for UEs with different or no user interface or with different role as well as for legacy UEs with the conventional user interface that 3GPP assumed when these existing PWS requirements were specified in 3GPP TS 22.268 [2].

NOTE: Proposed texts for general PWS requirements described in the section 4 of 3GPP TS 22.268 [2] do not take into account US WEA and Japan ETWS so such clarification needs to be added later once proposed texts are agreed.

Table 4: Proposed texts on general PWS requirements applicable for UEs with different UI, with no UI and with different role

| Existing requirements in the section 4 of 3GPP TS 22.268 | UEs with different UI | UEs with no UI | UEs with different role |
| --- | --- | --- | --- |
| 4.6 PWS-UE Requirements | | | |
| 4.6.1 General Requirements | | | |
| The PWS-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 Warning Notification purposes. The User Interface shall support the ability for the user to suppress the dedicated audio attention signal and/or the dedicated vibration cadence when a Warning Notification is received. | Need to be revisited | Need to be revisited | Applicable |
| Proposed texts:  The PWS-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 Warning Notification purposes. The User Interface shall support the ability for the user to suppress the dedicated audio attention signal and/or the dedicated vibration cadence when a Warning Notification is received.  [PR-6.2.2-1] NOTE: In case of a ePWS-UE that does not have a user interface or has a user interface that is not able to support a dedicated alerting indication, modification of this requirements needs to consider several factors:  1. Recent regulations  2. Intended functions for devices (e.g. IoT)  3. Device’s support for the alerting indication (audio attention signal and a dedicated vibration cadence) or alternative alert indications | | | |
| The alerting indication for a specific Warning Notification shall continue until suppressed by users' manual operation (e.g. by pushing keys). The frequency and duration of the continued alerting indication is mobile device implementation specific. This shall not suppress the alerting indication for subsequent Warning Notifications. | Applicable | Need to be revisited | Applicable |
| Proposed texts:  The alerting indication for a specific Warning Notification shall continue until suppressed by users' manual operation (e.g. by pushing keys). The frequency and duration of the continued alerting indication is mobile device implementation specific. This shall not suppress the alerting indication for subsequent Warning Notifications.  [PR-6.2.2-2] NOTE: In case of a ePWS-UE with no user interface, modification of this requirements needs to consider several factors:  1. Recent regulations  2. Intended functions for devices (e.g. IoT)  3.Device’s support for the suppression of Warning Notification | | | |

# 7 Potential Requirements

## 7.1 General

This technical report has described new use cases and potential requirements for UEs with different or no user interface or for UEs with different roles that were not taken into account when specifying existing requirements in 3GPP TS 22.268 [2] but that are expected to be commonly used by mobile users in the near future. Proposed potential requirements are consolidated in two categories; one category for potential requirements for UEs with different or no user interface or with different roles and another category for potential requirements for the improvement of understanding the PWS message and for the inclusion of additional consideration in the existing requirements that is applicable to UEs with different or no user interface.

## 7.2 Consolidation of potential requirements

### 7.2.1 Consolidated potential requirements for UEs with different or no user interface or with different roles

This section consolidates the potential requirements proposed for ePWS-UEs with different or no user interface or with different roles.

[PR-5.1.6-1] The 3GPP system shall enable the content of a PWS message to include information that can be mapped to an event or a disaster and is identifiable by the ePWS-UEs with no user interface per event or disaster.

NOTE: The information included in the content of a PWS message may be an identifier of an event or a disaster.

[PR-5.1.6-2] ePWS-UEs with no user interface shall be able to support the reception of a PWS message broadcast from the 3GPP network.

NOTE: Pre-defined procedures contained in the ePWS-UE with no user interface may be specified by a device manufacturer or regional regulatory requirement in order to have ePWS-UEs with no user interface take such pre-defined procedures once receiving a PWS message.

[PR-5.2.6-1] The remote ePWS-UE with no user interface shall be able to support the reception of the information that is related to an event or a disaster notified by PWS message and is transmitted from the relay UE.

NOTE: Subject to regional regulatory requirements and the intended function of the ePWS-UE (e.g. IoT) which does not have a user interface, the ePWS-UE may either:

1. Ignore PWS message, or

2. Take actions consistent with the ePWS-UE function (e.g. IoT) in response to specific PWS messages. An example could be to shut down machinery, or

3. Use alternative alerting mode of user alerting consistent with the ePWS-UE function (e.g. building alarm system) based on the content of the PWS message.

[PR-5.2.6-2] The remote ePWS-UE with no user interface shall be able to automatically suppress duplicated notifications. A duplicate is a repetition of a same notification as determined by unique parameters.

[PR-5.2.6-3] The relay ePWS-UE that supports PWS relaying shall be capable of unconditionally forwarding the PWS message broadcast without modification on the PWS message received from the network.

[PR-5.3.6-1] and [PR-5.3.6-2] When the remote PWS-UE receives a PWS message transmitted via a relay ePWS-UE, it shall behave in the same fashion as if it received the message from a 3GPP network.

[PR-5.4.6-1] The ePWS-UE with a different user interface (i.e. a user interface that is not capable of displaying a text-based content) shall be able to support the reception of a PWS message broadcast from the 3GPP network.

[PR-5.4.6-2] The ePWS-UE with a different user interface shall be able to support the extraction of the information on the type of a notified event or disaster from the received PWS message.

NOTE 1: The information extractable from the received PWS message may be an identifier of an event or a disaster.

NOTE 2: Pre-defined procedures contained in the ePWS-UE with a different user interface may be specified by a device manufacturer or regional regulatory requirement in order to have the ePWS-UE with a different user interface carry out such pre-defined procedures once receiving a PWS message and extracting the information on the type of a notified event or disaster.

### 7.2.2 Consolidated potential requirements for the improvement of understanding the PWS message and for the inclusion of additional consideration in the existing requirements applicable to UEs with different or no user interface

This section consolidates the potential requirements proposed to improve the understanding of the PWS message or to include additional consideration in the existing requirements described in 3GPP TS 22.268 [2] that is applicable to UEs with different or no user interface.

[PR-6.1.2-1] The ePWS-UE with a user interface providing accessibility extensions to mobile users with disabilities shall be able to support the reception of a PWS message broadcast from the 3GPP network.

[PR-6.1.2-2] The ePWS-UE with a user interface providing accessibility extensions to mobile users with disabilities shall be able to support the extraction of the information on the type of a PWS notified event or disaster from the received PWS message.

NOTE 1: The information extractable from the received PWS message content may be an identifier of the type of an event or a disaster.

NOTE 2: Subject to regional regulatory requirements the ePWS-UE may use alternative alerting modes for user alerting consistent with ePWS-UE accessibility extensions and based on the content of the PWS message.

[PR-6.1.2-3] The 3GPP system shall enable the content of a PWS message to include language-independent content (e.g. pictogram or symbolic icon representing an event or a disaster) and to be identifiable per event or disaster.

[PR-6.1.2-4] The ePWS-UE shall support the presentation of language-independent content defined by regional regulatory requirements contained in a PWS message content.

[Requirement existed in 3GPP TS 22.268] The PWS-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 Warning Notification purposes. The User Interface shall support the ability for the user to suppress the dedicated audio attention signal and/or the dedicated vibration cadence when a Warning Notification is received.

[PR-6.2.2-1] NOTE: In case of an ePWS-UE that does not have a user interface or has a user interface that is not able to support a dedicated alerting indication, modification of this requirements needs to consider several factors:

1. Recent regulations

2. Intended functions for devices (e.g. IoT)

3. Device’s support for the alerting indication (audio attention signal and a dedicated vibration cadence) or alternative alert indications

[Requirement existed in 3GPP TS 22.268] The alerting indication for a specific Warning Notification shall continue until suppressed by users' manual operation (e.g. by pushing keys). The frequency and duration of the continued alerting indication is mobile device implementation specific. This shall not suppress the alerting indication for subsequent Warning Notifications.

[PR-6.2.2-2] NOTE: In case of an ePWS-UE with no user interface, modification of this requirements needs to consider several factors:

1. Recent regulations

2. Intended functions for devices (e.g. IoT)

3. Device’s support for the suppression of Warning Notification

# 8 Conclusion and Recommendations

The feasibility study for enhancements of Public Warning System has analysed use cases for

- mobile devices with different or no user interface or with different roles for which a text-based PWS service is not applicable; and

- mobile users who

- do not understand the written language used in a PWS message; or

- need an accessibility function supported from their mobile devices to improve the understanding of a PWS message.

This technical report identifies potential requirements that were not taken into account when existing PWS requirements were specified in 3GPP TS 22.268 [2] and that are applicable for these use cases.

It is recommended that the consolidated potential requirements in the section 7.2.1 as well as the clarification that these newly introduced requirements are not applicable to US WEA and Japan ETWS are added in a new section of 3GPP TS 22.268 [2].

In addition, it is also recommended that the consolidated potential requirements in the section 7.2.2 are included in the section 4 of 3GPP TS 22.268 [2] with the clarification that these newly added or revised requirements are not applicable to US WEA and Japan ETWS.

Annex <A>: Change history

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Change history** | | | | | | | |
| **Date** | **Meeting** | **TDoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 2016-11 | SA1#76 | S1-163232 |  |  |  | TR Skeleton | 0.0.0 |
| 2016-11 | SA1#76 | S1-163394 |  |  |  | Addition of the scope | 0.1.0 |
| 2017-02 | SA1#77 | S1-171448 |  |  |  | Use case on UEs with no user interface over direct network connection | 0.2.0 |
| 2017-02 | SA1#77 | S1-171449 |  |  |  | Use case on UEs with no user interface over indirect network connection | 0.2.0 |
| 2017-02 | SA1#77 | S1-171450 |  |  |  | Use case on relay UE for indirect network connection of remote UEs | 0.2.0 |
| 2017-02 | SA1#77 | S1-171451 |  |  |  | Use case on UE with different user interface | 0.2.0 |
| 2017-05 | SA1#78 | S1-172060 |  |  |  | Potential requirements in the section 5.1.6 | 1.0.0 |
| 2017-05 | SA1#78 | S1-172355 |  |  |  | Potential requirements in the section 5.2.6 | 1.0.0 |
| 2017-05 | SA1#78 | S1-172062 |  |  |  | Potential requirements in the section 5.4.6 | 1.0.0 |
| 2017-05 | SA1#78 | S1-172356 |  |  |  | Consideration on the improvement of the understandability of the PWS message | 1.0.0 |
| 2017-05 | SA1#78 | S1-172357 |  |  |  | Considerations on existing PWS requirements for UEs with different or no user interface or with different UE roles | 1.0.0 |
| 2017-08 | SA1#79 | S1-173402 |  |  |  | pCR for numbering potential requirements and clarifying three potential requirements | 1.1.0 |
| 2017-08 | SA1#79 | S1-173401 |  |  |  | pCR of addressing the issue in Editor’s Note | 1.1.0 |
| 2017-08 | SA1#79 | S1-173400 |  |  |  | Introduction and overview | 1.1.0 |
| 2017-08 | SA1#79 | S1-173403 |  |  |  | Potential requirements proposed for chapter 7 | 1.1.0 |
| 2017-08 | SA1#79 | S1-173404 |  |  |  | Conclusion and recommendations for chapter 8 | 1.1.0 |
| 2017-09 | SA#77 | SP-170701 |  |  |  | Raised to v.2.0.0 for presentation for approval to SA | 2.0.0 |
| 2017-09 | SA#77 |  |  |  |  | Raised to v.16.0.0 following SA’s approval | 16.0.0 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Change history** | | | | | | | | | | | |
| **TSG SA#** | **SA Doc.** | **SA1 Doc** | **Spec** | **CR** | **Rev** | **Rel** | **Cat** | **Subject/Comment** | **Old** | **New** | **WI** |
| SP-78 | SP-170991 | S1-174493 | 22.869 | 0001 | 1 | Rel-16 | F | Distinction of PWS-UE and UE | 16.0.0 | 16.1.0 | FS\_ePWS |