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*Technical Specification*

**3rd Generation Partnership Project;  
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Earthquake and Tsunami Warning System (ETWS)  
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Stage 1  
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## Foreword

This Technical Specification has been produced by the 3<sup>rd</sup> 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:

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

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## Introduction

Earthquake and Tsunami Warning System (ETWS) introduces a means to deliver Warning Notification simultaneously to many mobile users who should evacuate from approaching Earthquake or Tsunami. Mobile user who received Warning Notification is able to know a threat is approaching or already happened nearby. Then the user is able to determine where and when to evacuate according to delivered Warning Notification. Mobile phone is a kind of the closest media for people. This system helps people to prevent from disaster situation or mitigate damage.

The characteristic of this service is the need of quick and optimised information delivery. Currently, it is not possible to know beforehand the fact that an Earthquake is imminent.

The Japanese government intends to create Earthquake early detection systems, which is called Earthquake Early Warning (EEW) System, during 2007 and expects that mobile operators study the feasibility of realizing a system for delivering Earthquake Early Warning information to mobile phone users.

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# 1 Scope

This Technical Specification defines the stage one description of the Earthquake and Tsunami Warning System (ETWS) Requirements. Stage one is the set of requirements seen primarily from the users' and service providers' points of view.

This TS includes information applicable to network operators, service providers, terminal and network manufacturers, in case of deployment of ETWS. ETWS deployment depends on operator decision or national regulations.

This TS contains the core requirements for the Earthquake and Tsunami Warning System, which are sufficient to provide a complete service.

This TS also contains regional requirements for Earthquake and Tsunami Warning System.

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# 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 TR 22.968: "Study for requirements for a Public Warning System (PWS)"

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# 3 Definitions and abbreviations

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in 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 TR 21.905 [1].

**Earthquake and Tsunami Warning Service:** is a service that delivers Earthquake and Tsunami *Warning Notifications* provided by *Warning Notification Providers* to the UEs which have the capability of receiving *Warning Notifications* within *Notification Areas* through the 3GPP network.

**Earthquake and Tsunami Warning System:** is a subsystem of Public Warning System that delivers *Warning Notifications* specific to Earthquake and Tsunami provided by *Warning Notification Providers* to the UEs which have the capability of receiving *Warning Notifications* within *Notification Areas* through the 3GPP network.

**Notification Area:** is an area where *Warning Notifications* are sent.

**Primary Notification:** is information which is used specifically in *Earthquake and Tsunami Warning System* in order to notify users about the most urgent event in seconds rather than minutes, such as imminent occurrence of Earthquake.

**Secondary Notification:** is information which is used specifically in *Earthquake and Tsunami Warning System* in order to notify users supplementary information that is of lesser urgency such as instructions on what to do / where to get help, for example, map to refuge facilities, time table of food distribution. These information, in general, would be issued by local government.

**Warning Notification Provider:** is an agency (e.g. government, local government, public service organisations) that provides *Warning Notifications* and requests PLMN operators to deliver them.

**Warning Notification:** is information which notifies users of the imminent occurrence of the events and may provide users with additional information, such as instructions on what to do / where to get help as long as the emergency lasts. *Warning Notification* is classified into two types depending on the urgency, which are *Primary Notification* and *Secondary Notification*.

## 3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

EEW	Earthquake Early Warning
ETWS	Earthquake and Tsunami Warning System

# 4 Overview of the Earthquake and Tsunami Warning Service and System

## 4.1 Overview of the service

Earthquake and Tsunami Warning service is provided to users by PLMN operators. Warning Notification Providers produce Warning Notification to PLMN operator when an event occurs e.g. an Earthquake. PLMN operators distribute Warning Notifications to users by utilizing ETWS.

## 4.2 Overview of the system

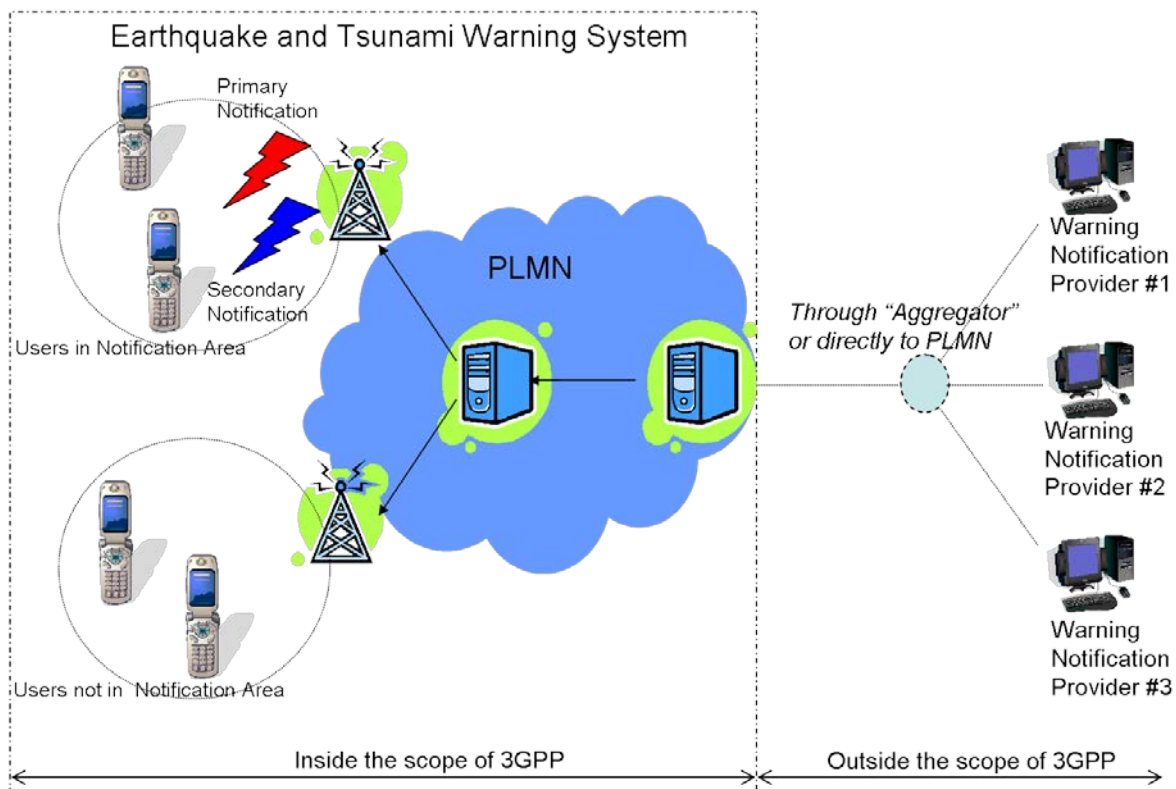


Figure.1 Overview of Earthquake and Tsunami Warning System

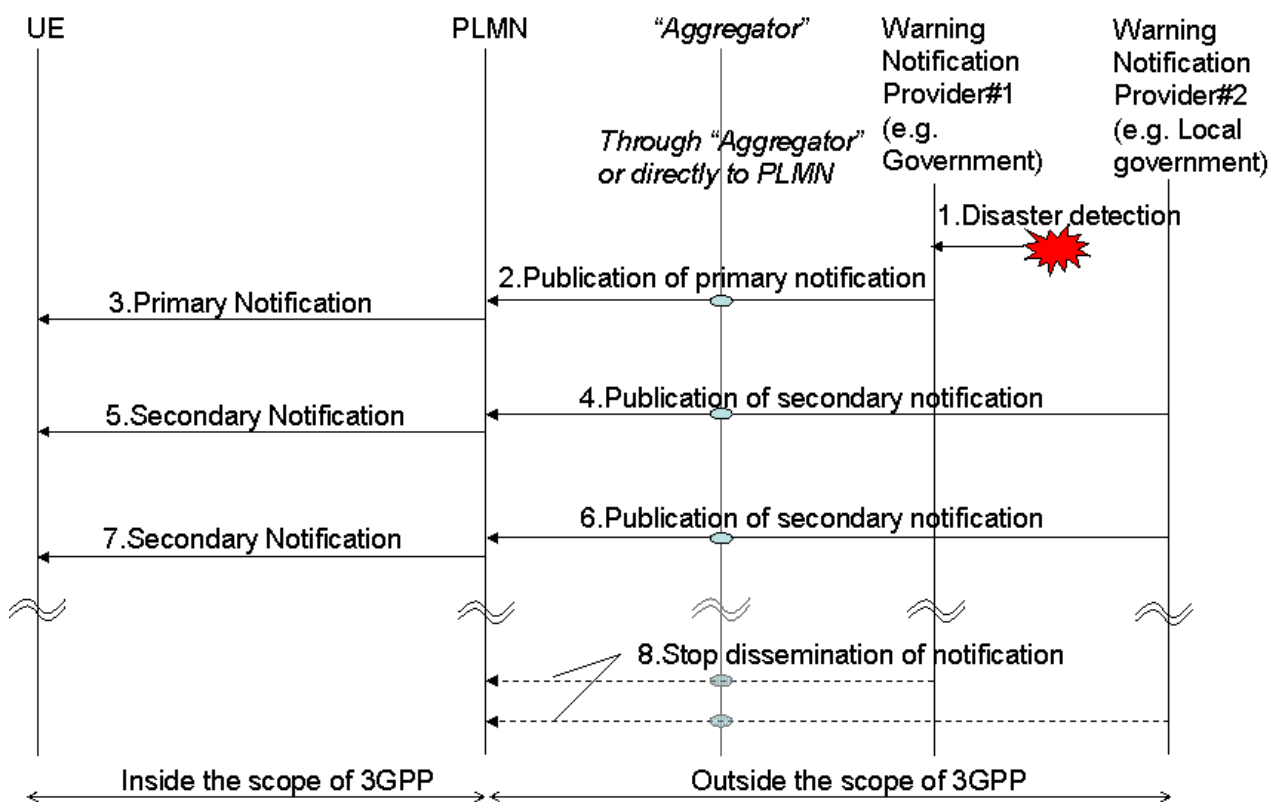
A generic ETWS architecture is depicted in Figure 1. Only ETWS (i.e. the components inside the dashed box in Figure 1) is in the scope of 3GPP specification. The ETWS consists of the PLMN that is capable to deliver Warning Notification and the UEs that are capable to receive Warning Notification.

A Warning Notification Provider is able to send Warning Notification to the users in Notification Area by activating ETWS.

Warning Notification is classified into two types depending on the purpose and urgency of the notification.

The first type of Notification is called Primary Notification. This type of notification delivers the most important information of the threat that is approaching to users (e.g. the imminent occurrence of Earthquake or Tsunami). The notification shall be delivered to the users as soon as possible.

The second type of Notification is called Secondary Notification. This type of notification delivers additional information, such as instructions on what to do / where to get help as long as the emergency lasts.



**Figure.2 Typical notification procedure**

Figure.2 shows the typical notification procedure of Earthquake and Tsunami Warning Service.

- (1) The occurrence of a disaster is detected by a Warning Notification Provider.
- (2) The Warning Notification Provider publishes a Primary Notification to PLMN. The Warning Notification Provider is able to specify the Notification Area where the Warning Notification is expected to be distributed. The content of the Primary Notification only includes the most urgent information related to the disaster.
- (3) The Primary Notification is delivered to users in the Notification Area specified by the Warning Notification Provider. The UE which detects the delivery of the Primary Notification alerts the user e.g. by sound and vibration. Alerted user is expected to start evacuation.
- (4) The Warning Notification Provider may publish a Secondary Notification to PLMN. The Warning Notification Provider is able to specify the Notification Area where the Warning Notification is expected to be distributed. The

content of the Secondary Notification may include additional information, such as instructions on what to do / where to get help as long as the emergency lasts.

(5) The Secondary Notification is delivered to users in the Notification Area specified by the Warning Notification Provider. The UE which detects the delivery of the Secondary Notification alerts the users e.g. by specified buzzer and vibration. Alerted users are able to recognize additional information.

(6) The Warning Notification Provider may be able to publish multiple Secondary Notifications to PLMN. The Warning Notification Provider is able to specify the Notification Area where the Warning Notification is expected to be distributed. The content of the Secondary Notification may include additional information, such as instructions on what to do / where to get help as long as the emergency lasts.

(7) The Secondary Notification is delivered to users to the Notification Area specified by the Warning Notification Provider. The UE which detects the delivery of the Secondary Notification alerts the users e.g. by specified buzzer and vibration. Alerted users are able to recognize additional information.

(8) The Warning Notification Provider may request dissemination of notification to the PLMN to stop.

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## 5 General Requirements

### 5.1 Background

Warning Notifications are expected to be delivered to the users while satisfying the following requirements.

- Quick Warning Notification delivery after the occurrence of Earthquake or Tsunami.

Earthquake and Tsunami propagate very fast. The duration time between the actual occurrence of the disaster and its arrival is very short. The order of the duration time is around seconds or minutes at most. Therefore the Warning Notifications shall be delivered quickly to the users in the emergency impacted area so that they could take any actions to escape from danger.

- Accurate Warning Notification delivery.

Warning Notification delivery urges the users to take the actions such as evacuation. Therefore, the Warning Notification shall be delivered to the users accurately in the Notification Area and the content of Warning Notification should be understandable for many types of users (i.e. impaired persons, foreigners).

### 5.2 High level general requirements for Warning Notification delivery

The following list gives the high level general requirements for Warning Notification delivery:

- Warning Notification shall be delivered to the Notification Area specified by the Warning Notification Provider.
- Publication of Warning Notification can be limited to the Notification Area where the Warning Notification is expected to be distributed.
- Warning Notifications shall be delivered to the UEs in idle-mode.

### 5.3 Duration of delivery time

Duration of the delivery time for PLMN operators is the time from the receipt of the Warning Notification by the PLMN operator, i.e. the edge of the 3GPP network, to the time that the Warning Notification is successfully delivered to the UEs.

Provisioning of delivery of Primary and Secondary Notification may be required.



- Primary Notification shall be delivered within 4 seconds to the UE in the Notification Area where the Warning Notification is expected to be distributed even under congestion situation.
- Secondary Notification is delivered to the users in the Notification Area where the Warning Notification is expected to be distributed even under congestion situation.

Note: UEs that are out of coverage or switched off are not considered in the requirements.

Note: Secondary Notification may not always be generated as it depends on the Warning Notification Provider's policy.

Note: Primary Notification may not always be generated (i.e. the warning may start with a Secondary Notification).

## 5.4 Granularity of the distribution

Requirements from the perspective of the granularity of the distribution are the following.

- Based on the geographical information indicated by the Warning Notification Provider, it shall be possible for the PLMN operators to select the Notification Areas based on their network configuration of the area coverage such as distribution of cells, Node Bs, RNCs, etc.
- The geographical Area, e.g. prefecture, county, etc. shall be possible to be designated statically or dynamically by Warning Notification Provider. It is FFS how Warning Notification Provider and Network operators designates the geographical area.

## 5.5 Information element and volume

The following are the requirements from the perspective of information element and amount of data.

Both Primary and Secondary Notification shall

- support at least 2 types of emergency events, which are Earthquake and Tsunami
- be able to indicate the preferred UE behaviours when receiving Warning Notification, (e.g. whether to display text in the foreground, whether to ring a buzzer, whether to vibrate)
- be distinguishable from notifications generated for the purpose of testing, training and other notification services.
- be sent in an optimized type and amount of data, for example, a text with a certain length, by considering the delivery platforms for ETWS

Primary Notification shall

- convey data which is small enough to be sent quickly on the network.
- convey small amount of data to indicate the imminent occurrence of Earthquake and Tsunami, etc.

Secondary Notification may

- convey a large amount of data in order to deliver text, audio to instruct what to do / where to get help, graphical data such as a map indicating the route from present position to evacuation site, time table of food distribution.

Note: The amount of data to be sent within a Primary Notification would be a few bytes to achieve quick information delivery.

## 5.6 Priority

Requirements from the perspective of priority are as follows.

- Primary Notification has higher priority than Secondary Notification.

- Notifications shall be able to be sequenced by the PLMN according to priority of notification in case that Primary Notification and Secondary Notification should exist at the same time in PLMN.

## 5.7 Support of Warning Notification Providers

PLMN operators shall be able to support the following functionalities through interaction with Warning Notification Providers.

- Activation of Warning Notification delivery
- Cancellation of Warning Notification delivery

A cancellation is a command to the ETWS to stop dissemination of a specific Warning Notification.

## 5.8 UE Requirements

### 5.8.1 User Interface

UE behaviour shall follow the request provided by the Warning Notification Provider.

It shall be possible for users to configure the behaviour of a UE with regard to ETWS alerting and should allow at least volume adjustment.

Note: different regulatory requirements might exist with regards to pre-emption of ongoing calls.

The audible / visual indication shall be able to be suppressed by users' manual operation (e.g. by pushing keys) and subsequently re-enable it.

It shall be possible to configure the UE such that it is possible to automatically suppress duplicate notifications received later and subsequently re-enable it.

A duplicate is a repetition of a previous notification as determined by a parameter such as a message ID.

### 5.8.2 Support of non-ETWS capable UEs

Support of non-ETWS capable UEs is subject to regulatory requirements and/or operator's policy.

### 5.8.3 Battery Life of the UE

Battery life of the UE shall not be significantly reduced by the introduction of ETWS.

### 5.8.4 Enabling and disabling of Warning Notifications

It shall be able for users to "opt-out" of some or all of the Warning Notifications provided by the ETWS. The user shall be able to select UE options via the User Interface to disable, or later re-enable, the UE behaviour in response to some or all Warning Notifications

An ETWS-UE in limited service state shall be able to receive and display Warning Notifications.

Note: The ability to disable some of the Warning Notifications may be subject to regulatory requirements.

Note: If the UE is enabled for ETWS in the HPLMN then it should remain enabled for ETWS when roaming, likewise when the roamer returns to the HPLMN then ETWS should be returned to the original state, subject to the regulatory requirements and operator policy.

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## 6 Security

Security requirements are as follows:

ETWS shall only broadcast Warning Notifications that come from an authenticated authorized source.

NOTE 1: This requirement is subject to regulatory policies.

NOTE 2: The authentication and authorization of the source are outside the scope of 3GPP Specifications.

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## 7 Subscription and Charging

Requirements from the perspective of subscription and charging are as follows.

- It shall be possible to provide Earthquake and Tsunami Warning service without charging the user.
- It shall be possible for the PLMN operators to bill the Warning Notification Provider.

Note: Some regulators may require unregistered UEs to receive Warning Notifications.

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## 8 Roaming

ETWS shall be able to deliver Warning Notifications to roaming users with ETWS capable UEs.

Under no circumstances, will the network translate, or in any other way, change the content of the Warning Notification.

Upon receiving Primary Notification which includes small amount of data to indicate the imminent occurrence of an Earthquake and/or Tsunami, the UE shall display the Warning Notification in a way that is easy to understand by the user, such as an icon or picture.

Note: It is expected that that the Warning Notification Provider will send the Warning Notification in the languages in common use in the specific area or in such a way that the Warning Notification can reasonably be understood.

## Annex A (informative): Change history

TSG SA#	SA Doc.	SA1 Doc	Spec	CR	R ev	Rel	Cat	Subject/Comment	Old	New	Work Item
SA1#38		S1-071690	22.168	-		Rel-8		First skeleton	-	0.0.0	ETWS
SA1#38		S1-071810	22.168	-		Rel-8		V1.0.0	0.0.0	1.0.0	ETWS
SA1#38		S1-071790	22.168	-		Rel-8		Editorial change	1.0.0	1.0.1	ETWS
SA1#38		S1-071873	22.168	-		Rel-8		Approved with editorial change	1.0.1	1.1.0	ETWS
SA1#39		S1-080188	22.168	-		Rel-8		Clean-up before submission to TSG SA for approval	1.1.0	1.2.1	ETWS
SA#39		-	22.168	-		Rel-8		Raised to v.2.0.0 by MCC for approval at SA#39 (same technical content as previous version in 1.2.1)	1.2.1	2.0.0	
SA#39	SP-080185	-	22.168	-		Rel-8		Raised to v.8.0.0 by MCC following SA#39 approval	2.0.0	8.0.0	
SP-40	SP-080300	S1-080773	22.168	0001	4	Rel-8	C	CR to TS 22.168 (ETWS) on high level general requirements	8.0.0	8.1.0	ETWS
SP-40	SP-080300	S1-080758	22.168	0002	3	Rel-8	C	CR to TS 22.168 (ETWS) on security requirements	8.0.0	8.1.0	ETWS
SP-55	SP-120172	S1-120342r	22.168	0005	4	Rel-8	F	Security requirement correction	8.1.0	8.2.0	ETWS
SP-58	SP-120864	S1-124502	22.168	0006	1	Rel-8	F	clarification on enabling ETWS messages in limited service state	8.2.0	8.3.0	TEI8