ATIS-0700043

Wireless Emergency Alert (WEA) 3.0 via 5G Public Warning System Specification

As a leading technology and solutions development organization, the Alliance for Telecommunications Industry Solutions (ATIS) brings together the top global ICT companies to advance the industry's most pressing business priorities. ATIS' nearly 200 member companies are currently working to address the All-IP transition, 5G, network functions virtualization, big data analytics, cloud services, device solutions, emergency services, M2M, cyber security, network evolution, quality of service, billing support, operations, and much more. These priorities follow a fast-track development lifecycle — from design and innovation through standards, specifications, requirements, business use cases, software toolkits, open source solutions, and interoperability testing.

ATIS is accredited by the American National Standards Institute (ANSI). The organization is the North American Organizational Partner for the 3rd Generation Partnership Project (3GPP), a founding Partner of the oneM2M global initiative, a member of the International Telecommunication Union (ITU), as well as a member of the Inter-American Telecommunication Commission (CITEL). For more information, visit www.atis.org.

Notice of Disclaimer & Limitation of Liability

The information provided in this document is directed solely to professionals who have the appropriate degree of experience to understand and interpret its contents in accordance with generally accepted engineering or other professional standards and applicable regulations. No recommendation as to products or vendors is made or should be implied.

NO REPRESENTATION OR WARRANTY IS MADE THAT THE INFORMATION IS TECHNICALLY ACCURATE OR SUFFICIENT OR CONFORMS TO ANY STATUTE, GOVERNMENTAL RULE OR REGULATION, AND FURTHER, NO REPRESENTATION OR WARRANTY IS MADE OFMERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OR AGAINST INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS. ATIS SHALL NOT BE LIABLE, BEYOND THE AMOUNT OF ANY SUM RECEIVED IN PAYMENT BY ATIS FOR THIS DOCUMENT, AND IN NO EVENT SHALL ATIS BE LIABLE FOR LOST PROFITS OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES. ATIS EXPRESSLY ADVISES THAT ANY AND ALL USE OF OR RELIANCE UPON THE INFORMATION PROVIDED IN THIS DOCUMENT IS AT THE RISK OF THE USER.

NOTE - The user's attention is called to the possibility that compliance with this standard may require use of an invention covered by patent rights. By publication of this standard, no position is taken with respect to whether use of an invention covered by patent rights will be required, and if any such use is required no position is taken regarding the validity of this claim or any patent rights in connection therewith. Please refer to [http://www.atis.org/legal/patentinfo.asp] to determine if any statement has been filed by a patent holder indicating a willingness to grant a license either without compensation or on reasonable and non-discriminatory terms and conditions to applicants desiring to obtain a license.

ATIS-0700043

ATIS Standard on

Wireless Emergency Alert (WEA) 3.0 via 5G Public Warning System Specification

Alliance for Telecommunications Industry Solutions

Approved June 26, 2020

Abstract

This Standard describes the use of the 5G System (5GS) Public Warning System (PWS) for the broadcast of Wireless Emergency Alert (WEA) 3.0 messages and includes the mapping of WEA 3.0 application level messages to the Cell Broadcast Center Function (CBCF) message structure as used within the 5GS.

.

Foreword

The Alliance for Telecommunication Industry Solutions (ATIS) serves the public through improved understanding between carriers, customers, and manufacturers. The Wireless Technologies and Systems Committee (WTSC) develops and recommends standards and technical reports related to wireless and/or mobile services and systems, including service descriptions and wireless technologies. WTSC develops and recommends positions on related subjects under consideration in other North American, regional, and international standards bodies.

The mandatory requirements are designated by the word shall and recommendations by the word should. Where both a mandatory requirement and a recommendation are specified for the same criterion, the recommendation represents a goal currently identifiable as having distinct compatibility or performance advantages. The word may denotes an optional capability that could augment the standard. The standard is fully functional without the incorporation of this optional capability.

Suggestions for improvement of this document are welcome. They should be sent to the Alliance for Telecommunications Industry Solutions, WTSC 1200 G Street NW, Suite 500, Washington, DC 20005.

At the time of consensus on this document, WTSC, which was responsible for its development, had the following leadership:

D. Zelmer, WTSC Chair (AT&T)

M. Younge, WTSC Vice Chair (T-Mobile)

P. Musgrove, WTSC SN Chair (AT&T)

G. Schumacher, WTSC SN Vice Chair (Sprint)

P. Sanders, Technical Editor (one2many)

The WTSC Systems & Networks (SN) Subcommittee was responsible for the development of this document.

Table of Contents

Table of Figures

Table of Tables

ATIS Standard on –

Wireless Emergency Alert (WEA) 3.0 via 5GS Public Warning System Specification

Preface

This ATIS specification is the WEA 3.0 standard for the WEA via 5G System (5GS) Public Warning System (PWS) and is based upon the cumulative WEA enhancements identified up through the January 2018 Federal Communications Commission (FCC) Second Report & Order and Second Order on Reconsideration, FCC 18-4 [Ref 14]. The use of the term WEA in this specification refers to WEA 3.0, unless otherwise specifically indicated.

The regulatory background is described in detail in the Service Description in ATIS-0700035 [Ref 2].

1   Scope, Purpose, & Application

1.1 Scope

The scope of this standard is the support of WEA 3.0 via the 5GS PWS. This standard covers the mapping of WEA 3.0 messages onto the 3rd Generation Partnership Project (3GPP)-defined PWS message structure within the 5GS.

This standard is not intended to describe an overall end-to-end WEA 3.0 architecture and may include clarifications that may be lacking in existing 3GPP specifications.

The WEA 3.0 interface with the Federal network and the mobile device behavior upon reception of a WEA 3.0 alert are specified in separate standards [Ref 3 & Ref 4].

1.2 Purpose

The purpose of this standard is to describe the use of the 5GS PWS for the delivery of WEA 3.0 messages. The standard includes the mapping of WEA 3.0 application level messages to the Cell Broadcast Center Function (CBCF) message structure as used within the 5GS.

This standard identifies the differences between WEA in Long-Term Evolution (LTE) as specified in ATIS-0700010.v003 [Ref 1] and WEA in the 5GS.

1.3 Application

This standard is applicable to the mapping of WEA 3.0 messages to the warning message delivery service on 5GS.

2   Normative References

The following standards contain provisions which, through reference in this text, constitute provisions of this ATIS Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this ATIS Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

[Ref 1] ATIS-0700010.v003, *Wireless Emergency Alert (WEA) 3.0 via EPS Public Warning System Specification*. [1]

[Ref 2] ATIS-0700035, *Wireless Emergency Alert (WEA) 3.0 Service Description*. [1]

[Ref 3] ATIS-0700036.v002, *Wireless Emergency Alert (WEA) 3.0 Mobile Device Behavior (MDB) Specification*.[1]

[Ref 4] ATIS-0700037.v002, *Wireless Emergency Alert (WEA) 3.0 Federal Alert Gateway to CMSP Gateway Interface Specification*.[1]

[Ref 5] 3GPP TS 38.473, *3rd Generation Partnership Project; Technical Specification Group Radio Access Network; F1 application protocol (F1AP)*.[2]

[Ref 6] 3GPP TS 22.268, *3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Public Warning System (PWS) Requirements*.[2]

[Ref 7] 3GPP TS 23.041, *3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; Technical realization of Cell Broadcast Service (CBS)*.[2]

[Ref 8] 3GPP TS 29.518, *3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; 5G System; Access and Mobility Management Services; Stage 3*.[2]

[Ref 9] 3GPP TS 36.331, *3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA) Radio Resource Control (RRC); Protocol specification*.[2]

[Ref 10] 3GPP TS 38.413, *3rd Generation Partnership Project; Technical Specification Group Radio Access Network; NG-RAN; NG Application Protocol (NGAP)*.[2]

[Ref 11] 3GPP TS 38.331, *3rd Generation Partnership Project; Technical Specification Group Radio Access Network; NR Radio Resource Control (RRC) protocol specification*.[2]

[Ref 12] FCC 08-99, *Federal Communications Commission First Report and Order in the Matter of The Commercial Mobile Alert System*; April 9, 2008.[3]

[Ref 13] FCC 16-127, *Federal Communications Commission Report and Order and Further Notice of Proposed Rulemaking in the Matter of Wireless Emergency Alerts Amendments to Part 11 of the Commission's Rules Regarding the Emergency Alert System*; September 29, 2016.[3]

[Ref 14] FCC 18-4, *Federal Communications Commission (FCC) Second Report & Order and Second Order on Reconsideration.*[3]

3   Definitions, Acronyms, & Abbreviations

For a list of common communications terms and definitions, please visit the *ATIS Telecom Glossary*, which is located at < https://glossary.atis.org/ >.

3.1 Definitions

The following definitions are taken from the FCC First Report and Order for the Commercial Mobile Alert System, FCC 08-99 [Ref 12] and from the FCC Report and Order on WEA Enhancements, FCC 16-127 [Ref 13]:

Alert Message: An Alert Message is a message that is intended to provide the recipient information regarding an emergency, and that meets the requirements for transmission by a Commercial Mobile Service Provider as defined in the FCC First Report and Order for the Commercial Mobile Alert System, FCC 08-99 [Ref 12].

---

[1] This document is currently awaiting publication by the Alliance for Telecommunications Industry Solutions (ATIS), 1200 G Street N.W., Suite 500, Washington, DC 20005. < https://www.atis.org/ >.

[2] This document is available from the 3rd Generation Partnership Project (3GPP) < http://www.3gpp.org/ >.

[3] This document is available from the Federal Communications Commission. < http://www.fcc.gov/ >

Commercial Mobile Service Provider (CMSP): A Commercial Mobile Service Provider (CMSP) is an FCC licensee providing commercial mobile service as defined in section 332 (d)(1) of the Communications Act of 1934 (47 U.S.C. 332(d)(1)). Section 332(d)(1) defines the term *commercial mobile service* as any mobile service (as defined in 47 U.S.C. 153) that is provided for profit and makes interconnected service available (a) to the public or (b) to such classes of eligible users as to be effectively available to a substantial portion of the public, as specified by regulation by the Federal Communications Commission.

3.2 Acronyms & Abbreviations

3GPP	3rd Generation Partnership Project
5GC	5G Core
5GS	5G System
AMF	Access and Mobility Function
ATIS	Alliance for Telecommunications Industry Solutions
CBC	Cell Broadcast Center
CBCF	Cell Broadcast Center Function
CBE	Cell Broadcast Entity
CBEM	Cell Broadcast Entity Message
CMAC	Commercial Mobile Alert C-interface
CMSP	Commercial Mobile Service Provider
EPC	Evolved Packet Core
EPS	Evolved Packet System
E-UTRAN	Evolved Universal Terrestrial Radio Access Network
FCC	Federal Communications Commission
LTE	Long-Term Evolution
NG-RAN	Next Generation – Radio Access Network
NR	New Radio
PWS	Public Warning System
RAT	Radio Access Technology
UE	User Equipment
WEA	Wireless Emergency Alert

4   Requirements

4.1 General WEA Requirements

[WEA-5GC-RQMT-0010] The 5GS PWS supporting WEA shall support the technical realization as specified in 3GPP TS 23.041 [Ref 7].

4.2 Cell Broadcast Center Function (CBCF) Requirements

The general CBCF requirements for the 5GS are specified in 3GPP TS 23.041 [Ref 7] and 3GPP TS 29.518 [Ref 8].

The requirements for the support of WEA by the CBCF in the 5G Core (5GC) are identical to the requirements for the support of WEA by the Cell Broadcast Center (CBC) in the Evolved Packet Core (EPC) as specified in ATIS-0700010.v003 [Ref 1] with the only difference that the 5GC supports WEA broadcast in the Next Generation – Radio Access Network (NG-RAN), where the CBC in the EPC supports broadcast in Evolved Universal Terrestrial Radio Access Network (E-UTRAN).

The NG-RAN supports broadcast via gNodeBs by the New Radio (NR) access network and broadcast via ng-eNodeBs by the E-UTRAN. The access network needs to broadcast the WEA message indicated in the CBEM_network parameter (see Table 7.1).

> NOTE: During a transition period the access network of the CMSP may support broadcast over E-UTRAN via eNodeBs and via ng-eNodeBs. Broadcast via eNodeBs is supported by the EPC (see ATIS-0700010.v003 [Ref 1]) and broadcast via ng-eNodeBs is supported by the 5GC as specified in the present standard.

4.3 CMSP Gateway Requirements

The requirements for the CMSP Gateway interface with the Federal Alert Gateway are defined in ATIS-0700037.v002 [Ref 4].

The requirements for the CMSP Gateway for the support of WEA in the 5GS are identical to the requirements for the CMSP Gateway for the support of WEA in the EPC as specified in ATIS-0700010.v003 [Ref 1] with the only difference that the 5GC supports WEA broadcast in the NG-RAN, where the EPC supports broadcast in E-UTRAN.

4.4 UE Requirements

This clause provides the User Equipment (UE) requirements for the support of WEA via 5GS PWS. The requirements for the UE behavior upon the receipt of the WEA alert message are defined in ATIS-0700036.v002 [Ref 3].

> [WEA-5GC-RQMT-0100] The NR capable UE shall be able to receive the PWS related messages via the NR access network as specified in 3GPP TS 38.331 [Ref 11].
>
> [WEA-5GC-RQMT-0110] The E-UTRAN capable UE shall be able to receive the PWS related messages via the E-UTRAN as specified in 3GPP TS 36.331 [Ref 9].

4.5 CBCF to AMF Requirements

This clause defines the requirements for the interface between the CBCF and the Access and Mobility Function (AMF).

> [WEA-5GC-RQMT-0200] CBCFs shall be able to interface to all AMFs deployed in the CMSP network.
>
> [WEA-5GC-RQMT-0210] The CBCF to AMF interface shall follow the primitives in the 3GPP TS 29.518 [Ref 8] specification.

4.6 Lawful Interception Requirements

There are no lawful interception requirements for WEA, as all WEA messages are generated by the government and are disseminated to the public. WEA messages are not specific to a target or subject of an interception. No new or existing network Intercept Access Points are expected to intercept WEA messages.

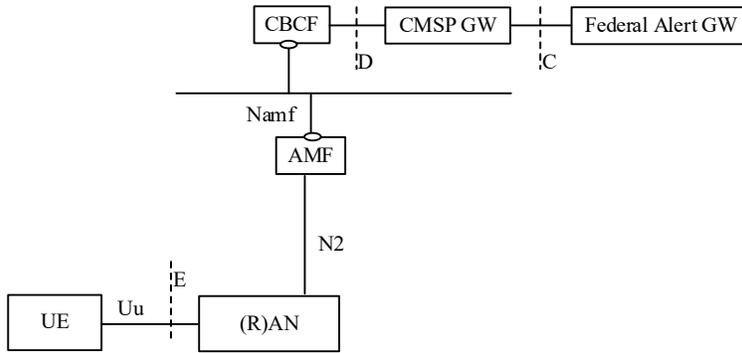# 5 Functional Architecture and Interfaces

The 5GS Warning System Architecture for WEA is shown in Figure 5.1.

The WEA Reference Point "C" maps to the interface between the Federal Alert Gateway and the CMSP Gateway.

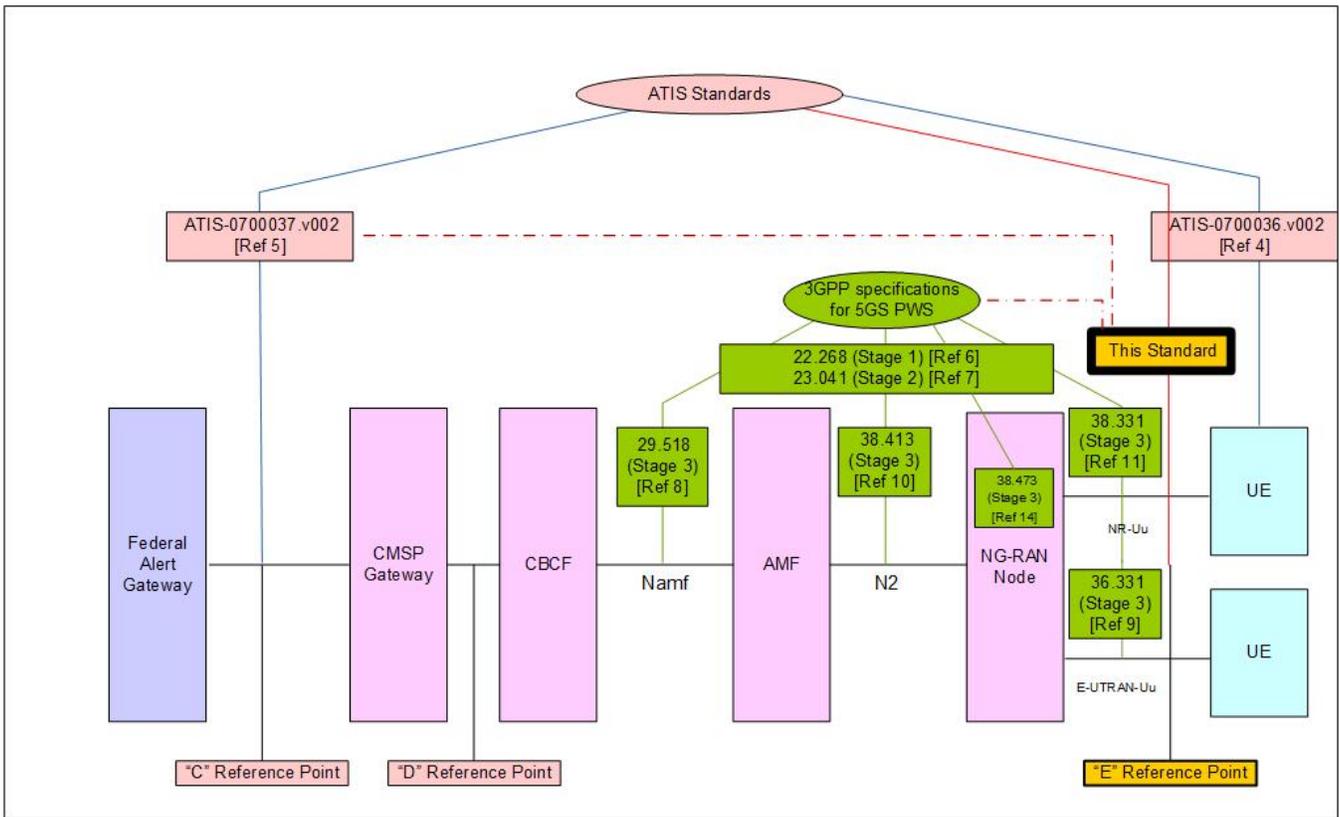The WEA Reference Point "D" maps to the interface between the CMSP Gateway and the CBCF.

The WEA Reference Point "E" maps to New Radio (NR-Uu) interface and to the E-UTRAN-Uu interface.

Figure 5.1: 5GS Warning System Architecture for WEA

The 5GS Public Warning System and its associated ATIS and 3GPP standards, are depicted in the following figure.

Figure 5.2: WEA Reference Diagram for 5GS Public Warning System

The dotted lines in Figure 5.2 show dependencies among standards and specifications.

Figure 5.2 provides the references to other Standards necessary to support the end-to-end transmission of WEA alert messages. The interface between the Federal Alert Gateway and the CMSP Gateway is specified in ATIS-0700037.v002 [Ref 4]. The mobile device behavior for processing the WEA alert messages is defined in ATIS-0700036.v002 [Ref 3].

The WEA uses the 5GS Public Warning System functionality as defined in 3GPP TS 22.268 [Ref 6], 3GPP TS 23.041 [Ref 7] and the other related 3GPP Standards (3GPP TS 29.518 [Ref 8], 3GPP TS 38.413 [Ref 10], 3GPP TS 38.331 [Ref 11], 3GPP TS 36.331 [Ref 9], and 3GPP TS 38.473 [Ref 5]) referenced in Figure 5.2.

6 WEA Call Flows

The call flows for WEA functionality as applicable to 5GS are identical to the call flows as specified for the WEA functionality that is applicable to the Evolved Packet System (EPS) as specified in ATIS-0700010.v003 [Ref 1] with the applicable standards as depicted in Figure 5.2.

7 Warning Message Delivery for WEA Application

7.1 WEA Interfaces

As indicated in clause 5, the interface between the CMSP infrastructure and the mobile devices is referred to as Reference Point "E" in the WEA functional architecture. Reference point "E" is a logical abstract interface (i.e., it is not a physical interface), and in the 5GS architecture can be thought of as corresponding to the RAN Node to mobile device interface for the delivery of WEA messages via the Message Delivery Service (the NR-Uu and E-UTRAN-Uu in Figure 5.1).

The interface between the CMSP Gateway and the CBCF is referred to as Reference Point "D". The data elements that are sent between the CMSP Gateway and the CBCF over Reference Point "D" are Cell Broadcast Entity (CBE) message elements and are referred to as Cell Broadcast Entity Message (CBEM) elements.

The following diagram illustrates how the CMSP infrastructure delivers WEA alert messages to the mobile devices through the Warning Message Delivery service:
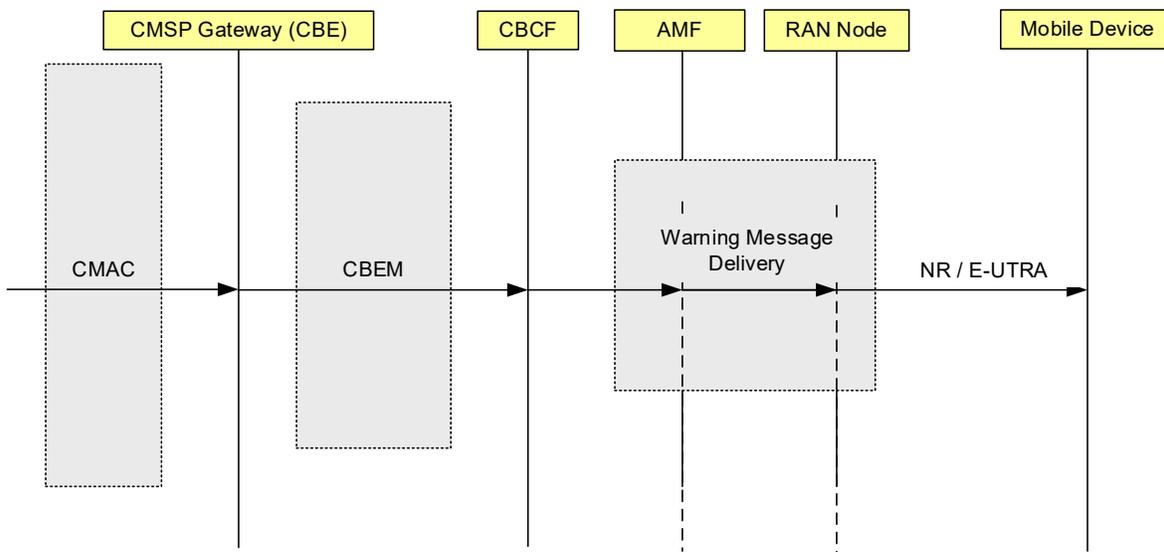

Figure 7.1: WEA Message Relationship

Within the WEA functional architecture, the CMSP Gateway converts the Commercial Mobile Alert C-interface (CMAC) messages received over Reference Point "C" from the Federal Alert Gateway, per ATIS-0700037.v002 [Ref 4], to the CBEM messages before sending the alert message to the CBCF, per ATIS-0700010.v003 [Ref 2]. The mapping of CMAC elements to CBEM elements is governed by the WEA data that is to be delivered to the mobile devices via the 5GS Warning Message Delivery service; this mapping is described in this Standard. This Standard also illustrates the mapping of the CBEM elements and the CBCF message elements.

7.2 Warning Message Delivery Service & WEA

The Warning messages delivered over the air interface are specified in 3GPP TS 23.041 [Ref 7], 3GPP TS 36.331 [Ref 9] and 3GPP TS 38.331 [Ref 11]. This standard utilizes these messages to broadcast WEA alert messages. The following sub-clauses provide an overview of the Warning message structures for the 5GS. This standard specifies how the parameters of the Warning Message Delivery WRITE-REPLACE-WARNING-

REQUEST-NG-RAN and STOP-WARNING-REQUEST-NG-RAN primitives are populated based upon the CBEM elements. The Warning messages associated with the air interface are described in the relevant 3GPP specifications.

The following general requirements apply to Warning Message Delivery:

[WEA-5GC-RQMT-0300] The long 360-character maximum message shall be broadcast on 5GS networks.

7.3 Overview of WEA Element Mapping

The mapping of CMAC elements to CBEM elements, to Warning message elements, and ultimately to delivery to the mobile device is identical to the mapping in the EPS as specified in ATIS-0700010.v003 [Ref 1].

7.4 Mapping of WEA Message to WRITE-REPLACE-WARNING- REQUEST- NG-RAN Message

The usage of the 5GS Warning Message Delivery service WRITE-REPLACE-WARNING-REQUEST-NG-RAN message parameters for the support of WEA alert message in 5GS is identical to the usage in EPS as defined in ATIS-0700010.v003 [Ref 1] with the exception that WRITE-REPLACE WARNING-REQUEST-NG-RAN messages are delivered by the CBCF via the AMF for broadcasting by NG-RAN nodes and with the addition as shown in Table 7.1.

Table 7.1: Mapping CBEM Elements to WRITE-REPLACE-WARNING-REQUEST-NG-RAN Parameters

WRITE-REPLACE WARNING-REQUEST-NG-RAN Parameter	CBEM Element	Description
Radio Access Technology (RAT) Selector NG-RAN	CBEM_network	CBEM_network is generated by the CMSP Gateway and shall have one of the following values for broadcasting on E-UTRAN or NR access networks via the 5GC: "LTE" "5G" CBEM_network value "LTE" maps to RAT Selector NG-RAN value "E-UTRA" and CBEM_network value "5G" maps to RAT Selector NG-RAN value "NR".

NOTE: Parameter names in the WRITE-REPLACE-WARNING-REQUEST apply to E-UTRAN and some parameters names have "E-UTRAN" as part of their name. Equivalent parameters in the WRITE-REPLACE-WARNING-REQUEST-NG-RAN have "NG-RAN" as part of their name. These elements have different formats, but their usage in E-UTRAN and in NG-RAN are identical.

7.5 Mapping of WEA Message to STOP-WARNING-REQUEST-NG-RAN Message

A STOP-WARNING-REQUEST-NG-RAN Message is used during WEA Cancel procedures. The usage of the 5GS Warning Message Delivery service STOP-WARNING-REQUEST-NG-RAN message parameters for the support of WEA alert message in 5GS is identical to the usage in EPS as defined in ATIS-0700010.v003 [Ref 1] with the exception that STOP-WARNING-REQUEST-NG-RAN messages are delivered by the CBCF via the AMF to cancel broadcast by NG-RAN nodes and with the addition as shown in Table 7.2.

Table 7.2: Mapping of CBEM Elements to STOP WARNING REQUEST NG-RAN Message Parameters

STOP WARNING-REQUEST-NG-RAN Message Parameter	CBEM Element	Description
RAT Selector NG-RAN	CBEM_network	CBEM_network is generated by the CMSP Gateway and shall have one of the following values for broadcasting on E-UTRAN or NR access networks via the 5GC: "LTE" "5G" CBEM_network value "LTE" maps to RAT Selector NG-RAN value "E-UTRA" and CBEM_network value "5G" maps to RAT Selector NG-RAN value "NR".

NOTE: Parameter names in the STOP-WARNING-REQUEST apply to E-UTRAN and some parameters names have "E-UTRAN" as part of their name. Equivalent parameters in the STOP-WARNING-REQUEST-NG-RAN have "NG-RAN" as part of their name. These elements have different formats, but their usage in E-UTRAN and in NG-RAN are identical.