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ATIS Standard on -

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

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ATIS Standard on

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

Alliance for Telecommunications Industry Solutions

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Abstract

This Standard describes the use of the Evolved Packet System (EPS) 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 (CBC) message structure as used within the EPS.

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:

> M. Younge, WTSC Chair (T-Mobile US)
>
> T. Brooks, WTSC SN Chair (T-Mobile US)
>
> P. Musgrove, WTSC SN Vice Chair (AT&T)
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> P. Sanders, Technical Editor (one2many)

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

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Preface

The authority-to-individual emergency alerting capability to mobile devices was originally called Commercial Mobile Alert System (CMAS) in the first three Reports & Orders from the Federal Communications Commission (FCC). This standard was originally developed based upon the CMAS terminology and CMAS was operational in April 2012. However, in February 2013, the FCC renamed CMAS to Wireless Emergency Alert (WEA) with associated updates to the appropriate sections of Part 11 of the 47 CFR. Subsequently, the FCC has issued additional enhancements and rules for this government-to-individual emergency alerting capability to mobile devices and these are identified as modifications to WEA.

Consequently, this specification may use both the term CMAS and the term WEA. These terms should be considered as equivalent terms with WEA being the preferred term.

This ATIS specification is the WEA 3.0 standard for the WEA via Evolved Packet System (EPS) Public Warning System (PWS) and is based upon the cumulative WEA enhancements identified up through the January 2018 FCC Second Report & Order and Second Order on Reconsideration, FCC 18-4 [Ref 22]. 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 19].

1 Scope, Purpose, & Application

1.1 Scope

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

This standard is not intended to describe an overall end-to-end WEA 3.0 architecture, but includes 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 9 & 10].

> NOTE: ATIS-0700036, *Wireless Emergency Alert (WEA) 3.0 Mobile Device Behavior (MDB) Specification* [Ref 9], also supports the WEA 3.0 functionality of this Standard even though this access technology is not explicitly referenced in the WEA 3.0 MDB specification.

1.2 Purpose

The purpose of this standard is to describe the use of the EPS 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 (CBC) message structure as used within the EPS.

1.3 Application

This standard is applicable to the mapping of WEA 3.0 messages to the Warning Message Delivery service on EPS.

FCC Report and Order and Further Notice of Proposed Rulemaking (FCC 21-77) [Ref 24], re-designates WEA Presidential Alerts to include alerts from both the President and from the FEMA Administrator and renames the Presidential Alert to National Alert. Protocol encoding on the C-interface, however, still uses "Presidential".

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] Void.

[Ref 2] FCC 08-99, *Federal Communications Commission First Report and Order in the Matter of The Commercial Mobile Alert System*; April 9, 2008.[1]

[Ref 3] Void.

[Ref 4] Void.

[Ref 5] Void.

[Ref 6] INCITS 31-2009[R2014], *Codes for the Identification of Counties and Equivalent Areas of the United States, Puerto Rico, and the Insular Areas*.[2]

[Ref 7] ATIS-0700006, *Wireless Emergency Alert (WEA) 3.0 via GSM/UMTS Cell Broadcast Service Specification*.[3]

[Ref 8] ATIS-0700045, *CMSP Gateway to Cell Broadcast Center (CBC) Interface Specification*.[3]

[Ref 9] ATIS-0700036, *Wireless Emergency Alert (WEA) 3.0 Mobile Device Behavior (MDB) Specification*.[5]

[Ref 10] ATIS-0700037, *Wireless Emergency Alert (WEA) 3.0 Federal Alert Gateway to CMSP Gateway Interface Specification*.[5]

[Ref 11] 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.[2]

[Ref 12] 3GPP TS 29.168, *3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; Cell Broadcast Centre interfaces with the Evolved Packet Core; Stage 3.*[4]

[Ref 13] 3GPP TS 36.413, *3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access Network (E-UTRAN); S1 Application Protocol (S1AP)*.[6]

[Ref 14] 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*.[6]

[Ref 15] 3GPP TS 23.041, *3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; Technical realization of Cell Broadcast Service (CBS)*.[6]

[Ref 16] 3GPP TS 23.038, *3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; Alphabets and language-specific information*.[6]

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

[2] This document is available from the International Committee for Information Technology Standards (INCITS) at < https://standards.incits.org/apps/group_public/project/details.php?project_id=204 >

[3] 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/ >.

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

[Ref 17] ISO/IEC 10646:2017, *Information technology -- Universal Coded Character Set (UCS)*.[5]

[Ref 18] 3GPP TS 22.268, *3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Public Warning System (PWS) Requirements*.[6]

[Ref 19] ATIS-0700035, *Wireless Emergency Alert (WEA) 3.0 Service Description*.[3]

[Ref 20] ATIS-0700025, *Wireless Emergency Alert (WEA) 3.0 International Roaming Specification*.[3]

[Ref 21] IETF RFC 3986, *Uniform Resource Identifier (URI)*.[6]

[Ref 22] FCC 18-4, *Federal Communications Commission Second Report and Order and Second Reconsideration,* January 30, 2018.[7]

[Ref 23] ATIS-0700041, *Wireless Emergency Alert (WEA) 3.0 Device-Based Geo-Fencing*.[3]

[Ref 24] FCC 21-77, Federal Communications Commission Report and Order and Further Notice of Proposed Rulemaking in the Matter of Amendment of Part 11 of the Commission's Rules Regarding the Emergency Alert System; June 17, 2021.[8]

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 2] and from the FCC Report and Order on WEA Enhancements, FCC 16-127 [Ref 11]:

Active WEA message: A WEA message that is currently being broadcast – i.e., has not expired, has not been canceled or updated, or has not been stopped being broadcast by operator policy.

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 2].

Commercial Mobile Alert System (CMAS): The Commercial Mobile Alert System (CMAS) refers to the voluntary emergency alerting system defined in the FCC First Report and Order, FCC 08-99 [Ref 2], whereby Commercial Mobile Service Providers may elect to transmit Alert Messages to the public.

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.

County and County Equivalent: Counties are considered to be the "first-order subdivisions" of each State and statistically equivalent entity, regardless of their local designations (county, parish, borough, etc.). Thus, the following entities are considered to be equivalent to counties for legal and/or statistical purposes: The parishes of Louisiana; the boroughs and census areas of Alaska; the District of Columbia; the independent cities of Maryland, Missouri, Nevada, and Virginia; that part of Yellowstone National Park in Montana; and various entities in the possessions and associated areas. Per the International Committee for Information Technology Standards (INCITS) 31-2009 standard [Ref 6], the Federal Information Processing Standards (FIPS) codes for county and county equivalents are maintained by the American National Standards Institute (ANSI) and are publicly available at

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[5] This document is available from the International Organization for Standardization (ISO) < http://www.iso.org >.

[6] This document is available from the Internet Engineering Task Force (IETF). < http://www.ietf.org >

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

http://www.census.gov/geo/www/ansi/ansi.html. As of 30 June 2017, there were 3,235 identified county and county equivalents.

Device-Based Geo-Fencing (DBGF): The process by which a WEA capable device compares Warning Area Geometries received from a network cell broadcast message with the device's current location to determine whether the device should present the associated alert message.

State/Local WEA Test Message: End-to-end system test message initiated by state/local emergency managers and terminating with members of the public who opt in to receiving them.

Warning Area Coordinates (WAC) Information Element (IE): The parameter that contains the description of polygons and circles (i.e., the description of the Warning Area Geometries) that specifies the alert's geographic boundary, as provided by the alert originator, along with associated handling information (e.g., timer).

WEA Handset Action Message (WHAM): Message used to trigger geo-fencing procedures in the device.

3.2 Acronyms & Abbreviations

3GPP	3rd Generation Partnership Project
AMBER	America's Missing Broadcast Emergency Response
ANSI	American National Standards Institute
ATIS	Alliance for Telecommunications Industry Solutions
CBC	Cell Broadcast Center
CBE	Cell Broadcast Entity
CBEM	Cell Broadcast Entity Message
CBS	Cell Broadcast Service
CMAS	Commercial Mobile Alert System
CMSP	Commercial Mobile Service Provider
DBGF	Device-Based Geo-Fencing
EPS	Evolved Packet System
E-UTRAN	Evolved Universal Terrestrial Radio Access Network
FCC	Federal Communications Commission
FIPS	Federal Information Processing Standards
IE	Information Element
INCITS	International Committee for Information Technology Standards
LTE	Long-Term Evolution
MME	Mobility Management Entity
OMC	Operation and Maintenance Center
PWS	Public Warning System
SAME	Specific Area Message Encoding
TAI	Tracking Area Indicator
UE	User Equipment
WAC	Warning Area Coordinates
WEA	Wireless Emergency Alert
WHAM	WEA Handset Action Message

4 Requirements

This clause identifies requirements specific to the mapping of the WEA service to the PWS that are not evident in existing 3GPP specifications.

4.1 General WEA Requirements

[WEA-EPC-RQMT-0010] The EPS PWS supporting WEA shall support the technical realization as specified in 3GPP TS 23.041 [Ref 15].

[WEA-EPC-RQMT-0020] The CMSP network may begin distribution for broadcast of the English alert text of WEA Alert and WEA Update messages before beginning the distribution for broadcast of any other associated additional languages.

4.2 Cell Broadcast Center (CBC) Requirements

The general CBC requirements for the EPS are specified in 3GPP TS 23.041 [Ref 15] and 3GPP TS 29.168 [Ref 12]. The requirements for the CBC interface with the CMSP Gateway are defined in ATIS-0700045 [Ref 8].

This clause defines the CBC requirements for the support of WEA via EPS PWS.

[WEA-EPC-RQMT-0030] The CBC shall support ATIS-0700045 [Ref 8].

[WEA-EPC-RQMT-0040] The CBC shall retain the information to identify the Tracking Area, Emergency Areas, and/or Cell ID list for an Alert until the Alert is cancelled or the Alert expires.

[WEA-EPC-RQMT-0050] The CBC shall determine the set of network elements for the WEA Alert where the message is to be broadcast as defined in 3GPP TS 23.041 [Ref 15] (e.g., list of cell sites, tracking areas, emergency areas) based upon the geo-target information (e.g., geo-code, polygon, circle) provided to the CBC by the CMSP Gateway.

[WEA-EPC-RQMT-0060] A CBC shall have the capability to adjust the CMSP Gateway-requested retransmission frequency and duration depending on network conditions or operator policy.

[WEA-EPC-RQMT-0070] The CBC in conjunction with the capabilities of the Evolved Universal Terrestrial Radio Access Network (E-UTRAN) shall perform retransmissions of the WEA alert message based upon the retransmission information provided by the CMSP Gateway.

[WEA-EPC-RQMT-0080] The CBCs shall have the capability to be deployed in either an active-active or an active-standby server configuration with synchronization of transactional states between the multiple associated CBCs.

[WEA-EPC-RQMT-0090] It shall not be treated or reported as an error condition or as an invalid WEA alert message if none of the cell sites serviced by the CBC are within the alert area of the WEA alert message.

[WEA-EPC-RQMT-0100] The CBC shall manage the generation of the Serial Number for an alert message and the Serial Number shall be unique for a given Message ID per 3GPP TS 23.041 [Ref 15].

[WEA-EPC-RQMT-0110] The CBC shall accept Cell Broadcast Service (CBS) messages which contain the CBS Message IDs assigned to WEA only if that CBS message has been received from an authorized CMSP Gateway.

> NOTE: The method for the CBC to authorize the CMSP Gateway and any associated error handling is beyond the scope of this Standard.

[WEA-EPC-RQMT-0120] The CBC shall send the appropriate indication to the downstream nodes to support the broadcast of multiple WEA Alert messages concurrently.

[WEA-EPC-RQMT-0130] The CBC shall send only the long 360-character maximum text messages to the downstream nodes for the purpose of broadcasting over E-UTRAN.

[WEA-EPC-RQMT-0140] The CBC shall assign the same Serial Number for the broadcasting of the long (360 characters maximum) message as it assigns for broadcasting the linked short (90 characters maximum) message.

[WEA-EPC-RQMT-0141] The CBC shall include the Serial Number it has assigned to a New WEA Alert message in the Ack message towards the CMSP Gateway when the New WEA Alert message includes Warning Area Coordinates.

4.3 CMSP Gateway Requirements

The requirements for the CMSP Gateway interface with the Federal Alert Gateway are defined in ATIS-0700037 [Ref 10]. The requirements for the CMSP Gateway with the CBC are defined in ATIS-0700045 [Ref 8].

This clause defines the CMSP Gateway requirements for the support of Cell Broadcast for WEA Alerts.

[WEA-EPC-RQMT-0150] The CMSP Gateway shall appear as a CBE in the Cell Broadcast Service network architecture, and shall support the CMSP Gateway to CBC interface defined in ATIS-0700045 [Ref 8].

[WEA-EPC-RQMT-0160] The CMSP Gateway shall provide the CBC with the geo-target information (e.g., geo-code, polygon, circle) linked to the specified alert. As such, the CMSP Gateway is not required to know the cell sites supported by the CBCs.

[WEA-EPC-RQMT-0170] The CMSP Gateway shall have the capability to send each WEA alert message to all or some of the CBCs served by the CMSP Gateway.

[WEA-EPC-RQMT-0180] The CMSP Gateway shall be responsible for determining the frequency and duration of the retransmissions of WEA alert messages. The CMSP Gateway calculation of the WEA alert message frequency and duration will be based upon CMSP policies and upon the expiration date and time of the WEA alert message. The CMSP Gateway will provide the retransmission information to the CBC.

[WEA-EPC-RQMT-0190] The CMSP Gateway shall use the same frequency of retransmissions for the English and for the Spanish language messages.

[WEA-EPC-RQMT-0200] The CMSP Gateways shall have the capability to be deployed in either an active-active or an active-standby server configuration with synchronization of transactional state between the multiple associated CMSP Gateways.

[WEA-EPC-RQMT-0210] The CMSP Gateway shall generate the Message ID based on the Special Handling, Urgency, Severity, Certainty, and Text Language parameters received from the Federal Alert Gateway. The CMSP Gateway links the generated Message ID to the alert message received from the Federal Alert Gateway.

[WEA-EPC-RQMT-0220] When an alert update request is received from the Federal Alert Gateway, the CMSP Gateway shall send requests to cancel the old English, and the linked old Spanish message, if present, followed by requests to broadcast the new English message, and the new Spanish message, if Spanish message text was provided.

[WEA-EPC-RQMT-0230] Instead of sending FIPS geocode values to the CBC, the CMSP Gateway shall only send Specific Area Message Encoding (SAME) geocode values to the CBC [Ref 10].

[WEA-EPC-RQMT-0240] If the CMSP Gateway receives both the CMAC_cmas_geocode element and the CMAC_cap_geocode element with a SAME geocode value, the CMSP Gateway shall only send the SAME geocode value to the CBC.

[WEA-EPC-RQMT-0250] If the CMSP Gateway receives only the CMAC_cmas_geocode element, the CMSP Gateway shall convert the FIPS value of the CMAC_cmas_geocode to a SAME geocode value by appending a leading zero to the FIPS value and shall send only the generated SAME geocode value to the CBC.

[WEA-EPC-RQMT-0260] The CMSP Gateway shall maintain the correlation of the English alert message with the equivalent Spanish alert message.

[WEA-EPC-RQMT-0270] When a new alert message is received the CMSP Gateway shall send requests to the CBC to broadcast the new English message and the new Spanish message, if Spanish message text was provided.

[WEA-EPC-RQMT-0280] The CMSP Gateway shall send requests to the CBC for long 360-character max text messages for broadcasting on E-UTRAN.

[WEA-EPC-RQMT-0290] Upon the reception of a cancel alert message, the CMSP Gateway shall cancel the English alert message and shall also cancel the equivalent Spanish message, if present.

[WEA-EPC-RQMT-0300] It is not an error condition for an updated English alert message to not have an equivalent updated Spanish alert message when the original English alert message had a linked Spanish alert message.

[WEA-EPC-RQMT-0310] It is not an error condition for an updated English alert message to have an equivalent updated Spanish alert message when the original English alert message did not have an equivalent Spanish alert message.

[WEA-EPC-RQMT-0320] When the new WEA message requires DBGF, the CMSP Gateway shall generate the WHAM (as defined in ATIS-0700041 [Ref 23]) according to operator policy.

NOTE: The WHAM does not carry the WAC IE.

[WEA-EPC-RQMT-0330] If polygon or circle elements are present, the CMSP Gateway shall use these to generate the Warning Area Coordinates IE unless the DBGF Bypass is included in the CMAC_note field.

[WEA-EPC-RQMT-0340] When an Update to an alert that required DBGF is received, the CMSP GW shall first cancel the broadcast of WHAM for the alert. with the DBGF. In the case WHAM broadcast has expired or been broadcast only once, the aforementioned cancellation is not required.

[WEA-EPC-RQMT-0341] The WHAM message content shall include the Message Identifier of the New WEA Alert message(s) and the Serial Number the CBC has assigned to the message(s).

4.3.1 Message Coding

The WEA alert messages that are received from the Federal Alert Gateway are UTF-8 encoded (per ATIS-0700037 [Ref 10]).

[WEA-EPC-RQMT-0342] The CMSP shall transmit the English and Spanish messages in the default GSM 7-bit alphabet to the mobile device.

[WEA-EPC-RQMT-0350] UTF-8 characters that are not contained in the default GSM 7-bit alphabet may be represented by their closest approximation in the GSM 7-bit alphabet. The algorithm for the mapping of the characters in UTF-8 to characters in the GSM 7-bit alphabet is vendor implementation specific and is beyond the scope of this Standard, with the exception of the subset of Spanish characters to be mapped as indicated in the table below. In addition, the Spanish characters "¿" (inverted question mark) and "¡" (inverted exclamation point) shall be deleted (not conveyed further).

Table 4.1: Spanish Character Mapping

From	To
á	a
Á	A
í	i
Í	I
ó	o
Ó	O
ú	u
Ú	U

4.3.2 URL Coding

If the Alert Originators include URLs with characters which are not supported by the GSM 7-bit alphabet, these unsupported characters will be removed or replaced which could result in the URLs in the broadcast alert messages not being valid.

[WEA-EPC-RQMT-0360] To avoid this situation, the Alert Originators should not use the characters "{", "}", "|", "\", "^", "~", "[", "]", and "`" in their embedded URLs. See IETF RFC 3986 [Ref 21] regarding unsafe characters.

4.4 UE Requirements

This clause provides the User Equipment (UE) requirements for the support of WEA via EPS PWS. The requirements for the UE behavior upon the receipt of the WEA alert message are defined in ATIS-0700036 [Ref 9].

[WEA-EPC-RQMT-0370] The UE shall be able to receive the PWS related messages via EPS as specified in 3GPP TS 36.331 [Ref 14].

4.5 CBC to MME Requirements

This clause defines the requirements for the interface between the CBC and the Mobility Management Entity (MME).

[WEA-EPC-RQMT-0380] CBCs shall be able to interface to all MMEs deployed in the CMSP network.

[WEA-EPC-RQMT-0390] The CBC to MME interface shall follow the existing primitives in the 3GPP TS 29.168 [Ref 12] specification.

NOTE: This includes setting the Concurrent Warning Message Indicator Information Element within the WRITE REPLACE WARNING REQUEST message appropriately to support the broadcast of multiple concurrent WEA Alert messages.

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 WEA Reference Point "D" maps to the interface between the CMSP Gateway and the CBC (see ATIS-0700045 [Ref 8]).

The WEA Reference Point "E" maps to Long-Term Evolution (LTE)-Uu (3GPP TS 23.041 [Ref 15] and 3GPP TS 36.331 [Ref 14]).

Interface SBc is defined in 3GPP TS 23.041 [Ref 15] and 3GPP TS 29.168 [Ref 12].

Interface S1-MME is defined in 3GPP TS 23.041 [Ref 15] and 3GPP TS 36.413 [Ref 13].

The Warning System architecture for support of WEA is as follows:
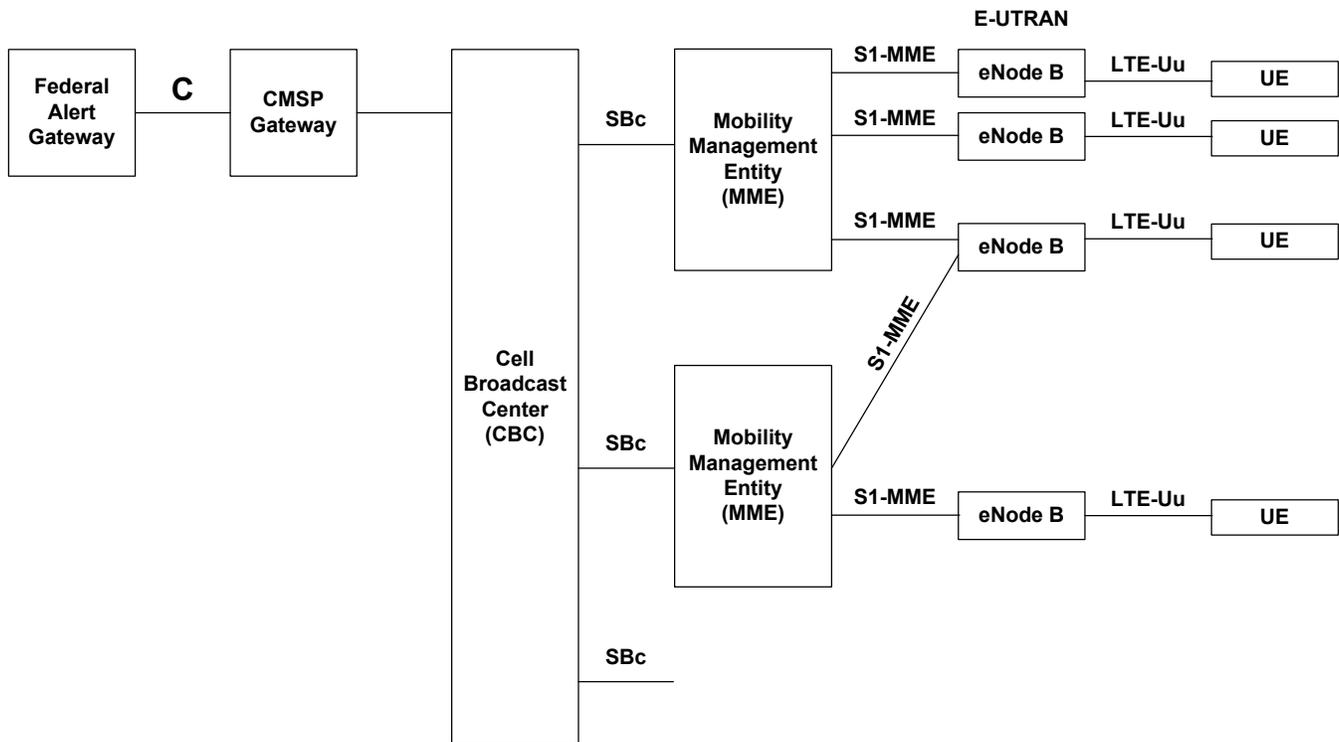
Figure 5.1: Warning System Architecture for WEA

5.1 CBC to MME Interface

For the interface between the CBC and the MME, 3GPP has defined a mandatory protocol in 3GPP TS 29.168 [Ref 12].

5.2 CMSP Gateway to CBC Interface

The interface between the CMSP Gateway and the CBC is defined in ATIS-0700045 [Ref 8].

6 WEA Call Flows

This clause provides call flows for the WEA functionality as applicable to EPS. These call flows assume that Warning Message Delivery procedures as defined in the 3GPP TS 23.041 [Ref 15] are used within the CMSP infrastructure for EPS.

Within the 3GPP specifications, WEA is considered to be a part of PWS, and therefore, this document also refers the Warning Message Delivery procedures for EPS as "EPS Public Warning System" or "EPS PWS".

The EPS Public Warning System is depicted in the following figure.
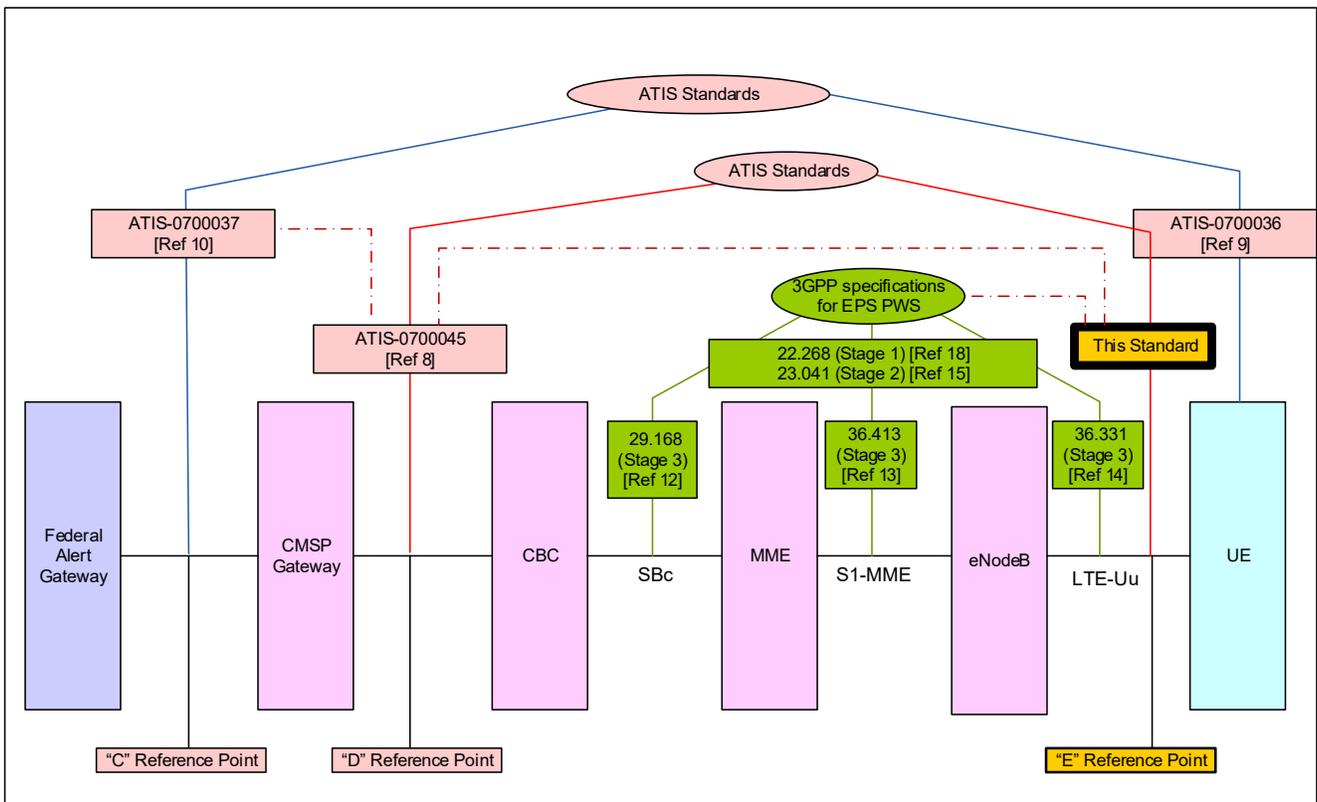
Figure 6.1: WEA Reference Diagram for EPS Public Warning System

The dotted lines in Figure 6.1, *WEA Reference Diagram for EPS Public Warning System*, show dependencies among standards and specifications.

Figure 6.1, *WEA Reference Diagram for EPS Public Warning System*, provides the references to other Standards necessary to support the end-to-end transmission of WEA alert messages. The CMSP Gateway is a CBE and its interface to the CBC is specified in ATIS-0700045 [Ref 8]. The interface between the Federal Alert Gateway and the CMSP Gateway is specified in ATIS-0700037 [Ref 10]. The mobile device behavior for processing the WEA alert messages is defined in ATIS-0700036 [Ref 9].

The WEA uses the EPS Public Warning System functionality as defined in 3GPP TS 22.268 [Ref 18], 3GPP TS 23.041 [Ref 15] and the other related 3GPP Standards (3GPP TS 29.168 [Ref 12], 3GPP TS 36.413 [Ref 13], and 3GPP TS 36.331 [Ref 14]) referenced in Figure 6.1, WEA *Reference Diagram for EPS Public Warning System*.

The following WEA call flows are defined in this clause:

- New WEA alert message call flow.

- Cancelled WEA alert message call flow.

- Updated WEA alert message call flow.

- Invalid WEA alert message call flow.

- Transmission Control related message call flows.

6.1 New WEA Alert Message Call Flow

The following is the call flow for a new WEA Alert Message:

Figure 6.2: New WEA Alert Message Call Flow

1. A valid WEA Alert Message is received in accordance with ATIS-0700037 [Ref 10].

2. The CMSP Gateway constructs the English language WEA Alert Message for CBS and, if Spanish text is received from the Federal Alert Gateway, the Spanish language WEA Alert Message for CBS.

    NOTE: The generation of the 90-character maximum English language message and the 90-character maximum Spanish language message is specified in ATIS-0700006 [Ref 7].

Steps 3 through 8 are repeated for the English language WEA message and for the Spanish language WEA message. All of the resulting WEA Alert Messages for CBS are linked to the WEA Alert Message received in Step 1 by the CMSP Gateway.

3. The CMSP Gateway sends the WEA Alert Message to the CBC as defined in ATIS-0700045 [Ref 8].

4. The CBC validates the received WEA Alert Message.

5. The CBC sends an acknowledgement to the CMSP Gateway for the WEA Alert Message as defined in ATIS-0700045 [Ref 8].

> NOTE: The CBC includes the Serial Number it has assigned to the WEA Alert Message in the acknowledgement.

6. The CBC performs geo-targeting to calculate the associated set of cell sites for the received WEA Alert Message.

> NOTE: If the geo-targeting indicates that no cell sites serviced by this CBC are within the indicated WEA alert area, no further processing of this new WEA alert message is required for the CBC.

7. The WEA Alert Message is transmitted via EPS Warning Message Delivery procedure for WEA (i.e., EPS Public Warning System) in accordance with 3GPP TS 23.041 [Ref 15].

8. The mobile device behavior for the transmitted WEA Alert Message is in accordance with ATIS-0700036 [Ref 9].

The following steps are applicable for any active WEA message that requires DBGF.

9. The CMSP Gateway starts the Recheck timer for the Geo-fencing Recheck Period according to operator policy.

10. After the Recheck timer has timed out, the CMSP Gateway shall generate the WHAM as defined in ATIS-0700041 [Ref 23] according to operator policy.

> NOTE: The CMSP Gateway includes the Message Identifier it has assigned to the WEA Alert Message and the Serial Number it has received from the CBC for this WEA Alert Message in the message content of the WHAM.

11. The CBC validates the received WHAM.

12. The CBC sends an acknowledgement to the CMSP Gateway for the WHAM as defined in ATIS-0700045 [Ref 8].

13. The WHAM is transmitted via EPS Warning Message Delivery procedure in accordance with 3GPP TS 23.041 [Ref 15] to an area which is the union of the warning areas of the referenced WEA message(s).

14. The mobile device behavior for the transmitted WHAM is in accordance with ATIS-0700036 [Ref 9].

Unless the associated WEA messages are cancelled or expired, Steps 9 to 14 may be repeated each Geo-fencing Recheck Period based on operator policy.

6.2 Cancelled WEA Alert Message Call Flow

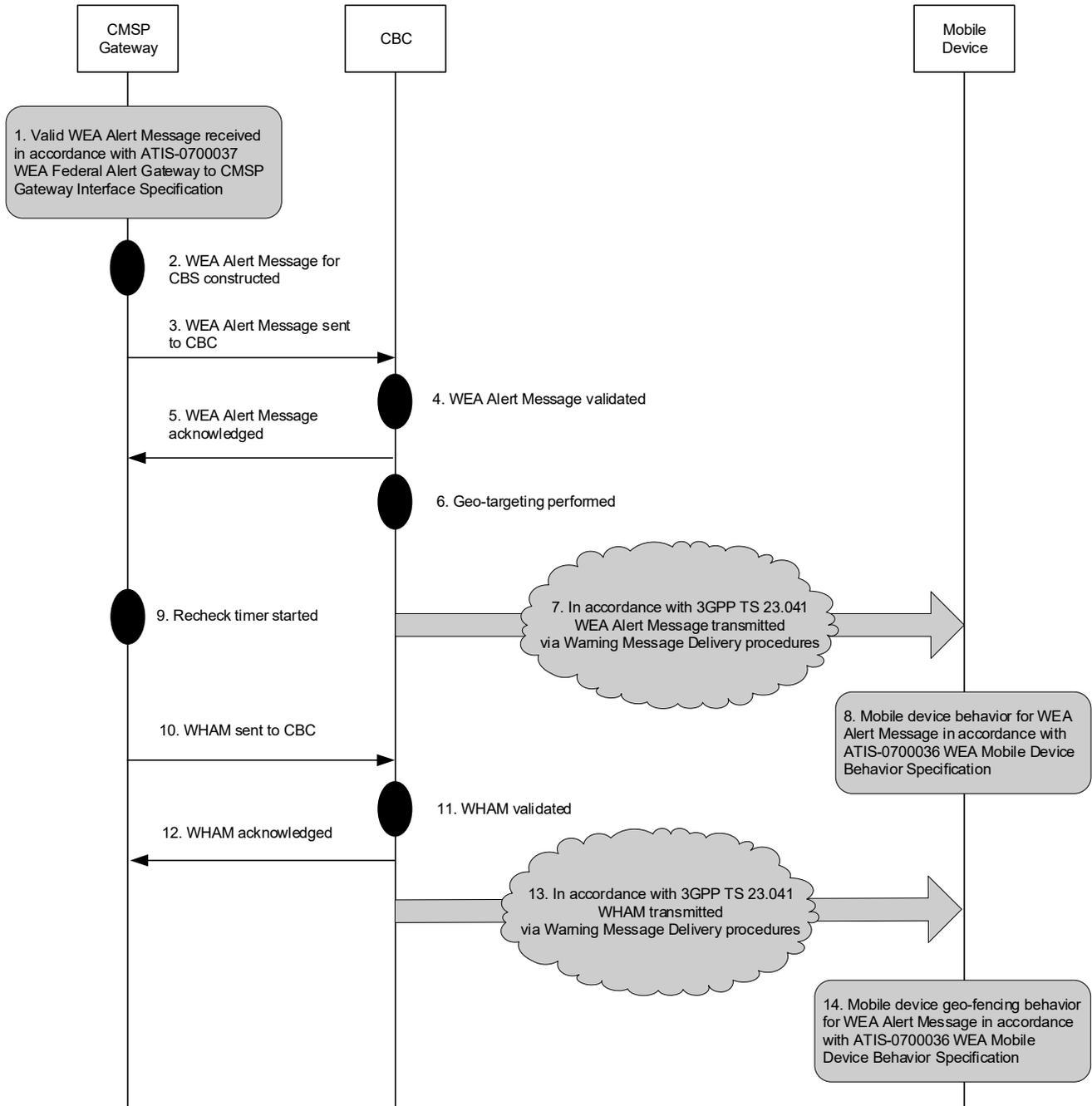The following is the call flow for a cancelled WEA Alert Message:
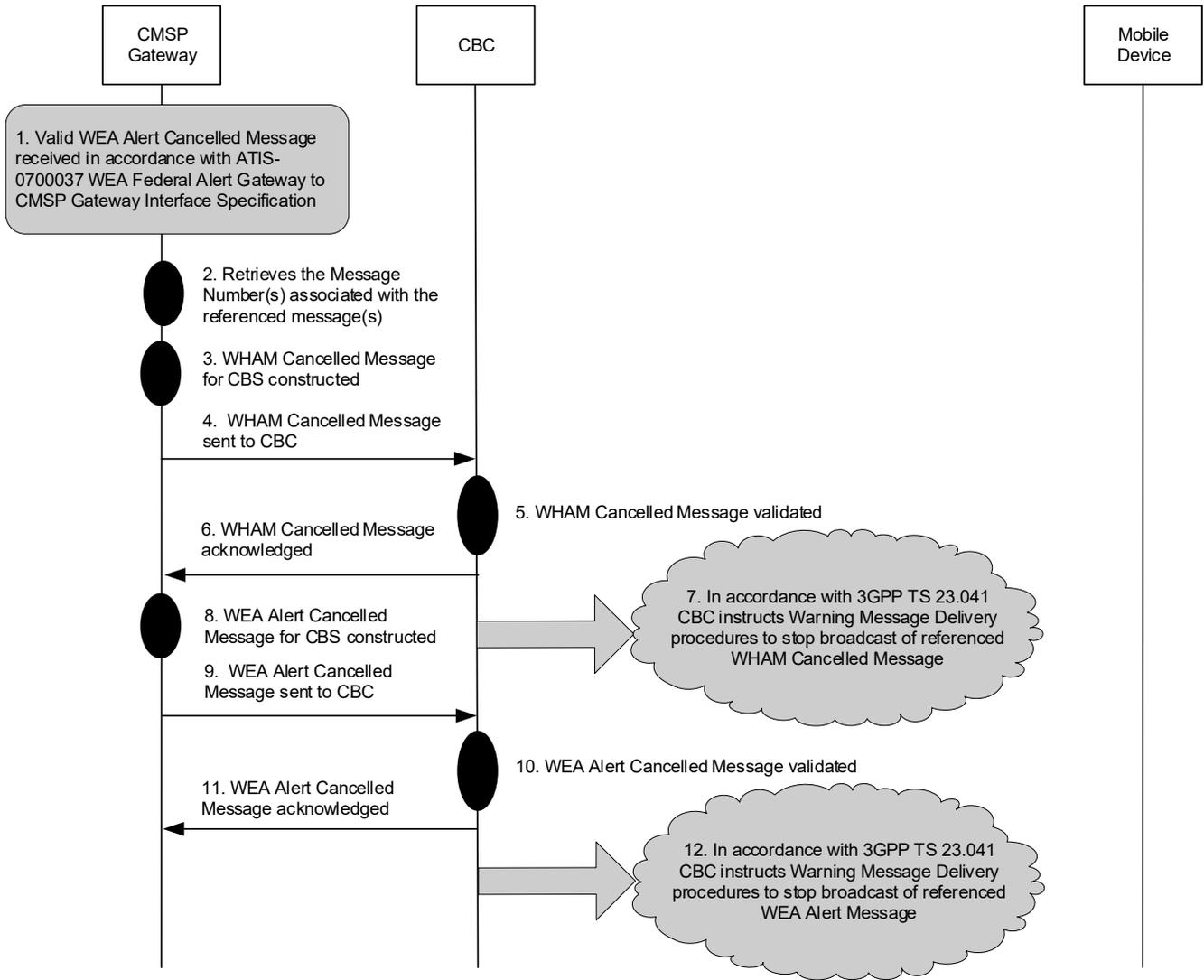
Figure 6.3: Cancelled WEA Alert Message Call Flow

1. A valid WEA Alert Cancelled Message is received in accordance with ATIS-0700037 [Ref 10].

2. The CMSP Gateway retrieves the Message Numbers linked to the referenced messages that have to be cancelled for English language and Spanish language, if Spanish text was provided, and for any associated WHAM.

Steps 3 – 7 are applicable if WHAM broadcast is ongoing that is associated with any WEA messages as determined in Step 2.

3. The CMSP Gateway constructs the WHAM Cancelled Message for CBS.

4. The CMSP Gateway sends the WHAM Cancelled Message to the CBC as defined in ATIS-0700045 [Ref 8].

5. The CBC validates the received WHAM Cancelled Message.

6. The CBC sends an acknowledgement to the CMSP Gateway for the WHAM Cancelled Message as defined in ATIS-0700045 [Ref 8].

7. In accordance with 3GPP TS 23.041 [Ref 15], EPS Warning Message Delivery procedure for CMAS (i.e., EPS Public Warning System) is instructed to stop the broadcast of the WHAM referenced in the received WHAM Cancelled Message for CBS.

8. The CMSP Gateway constructs the WEA Alert Cancelled Message for CBS for the English language message and for the Spanish language message, if a linked Spanish message broadcast is ongoing.

Steps 9 through 12 are repeated for the English language WEA message and for the Spanish language WEA message, if Spanish language WEA message is being broadcast.

9. The CMSP Gateway sends the WEA Alert Cancelled Message to the CBC as defined in ATIS-0700045 [Ref 8].

10. The CBC validates the received WEA Alert Cancelled Message.

11. The CBC sends an acknowledgement to the CMSP Gateway for the WEA Cancellation Alert Message as defined in ATIS-0700045 [Ref 8].

12. In accordance with 3GPP TS 23.041 [Ref 15], EPS Warning Message Delivery procedure for CMAS (i.e., EPS Public Warning System) is instructed to stop the broadcast of the WEA Alert Message referenced in the received WEA Alert cancelled Message for CBS.

6.3 Updated WEA Alert Message Call Flow

When the CMSP Gateway receives an Updated WEA message from the Federal Alert Gateway, it shall send a request to the CBC to cancel the associated ongoing broadcast, followed by a request to broadcast the updated WEA message as per CMSP Gateway requirement [WEA-EPC-RQMT-0220] in Clause 4.3.

The call flow for an updated WEA message consists of the call flow for a cancelled WEA message (see Clause 6.2), followed by the call flow for a new WEA message (see Clause 6.1).

6.4 Invalid WEA Alert Message Call Flow

The following is the call flow for an invalid WEA Alert Message:
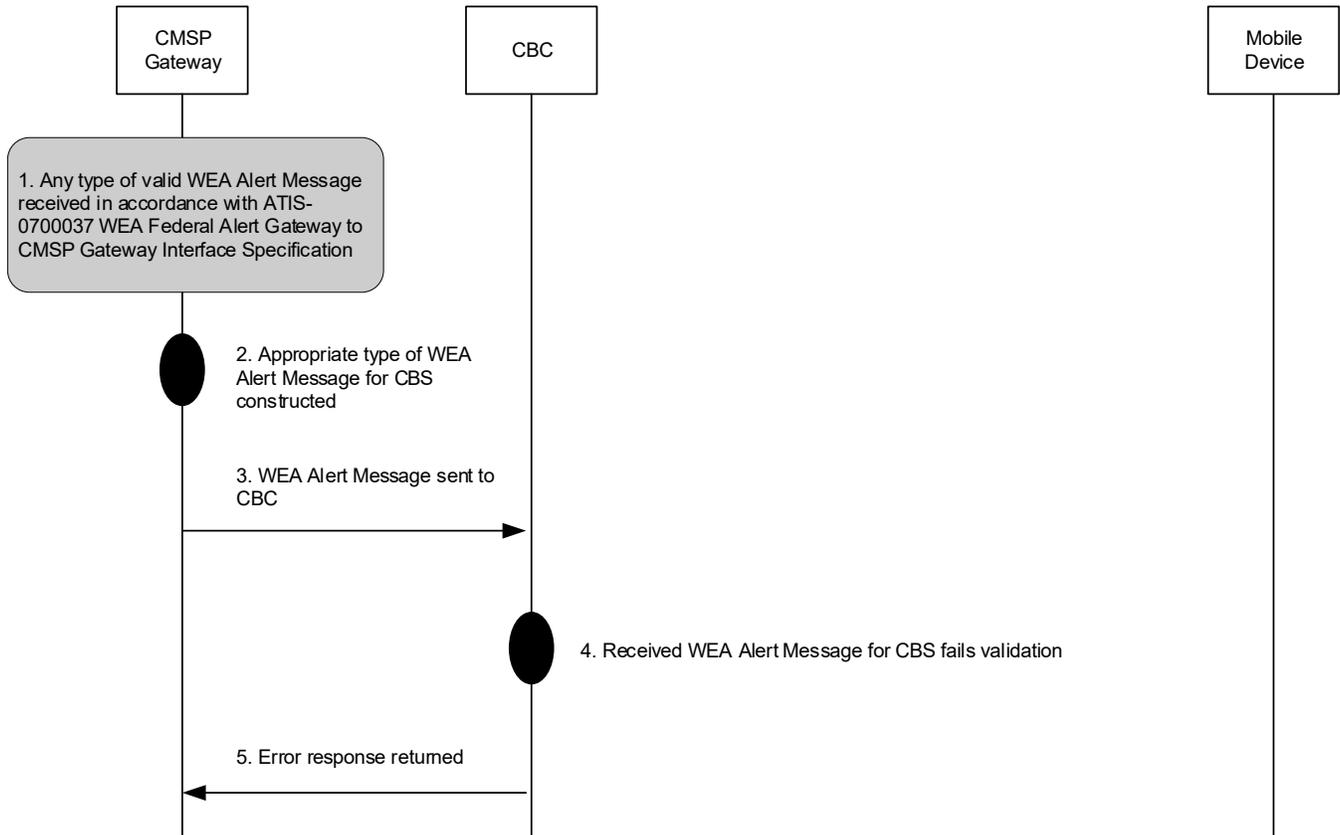
Figure 6.4: Invalid WEA Alert Message Call Flow

1. Any type of valid WEA Alert Message is received in accordance with ATIS-0700037, *Wireless Emergency Alert (WEA) 3.0 Federal Alert Gateway to CMSP Gateway Interface Specification* [Ref 10].
2. The CMSP Gateway constructs the appropriate type of WEA Alert Message for CBS.
3. The CMSP Gateway sends the constructed WEA Alert Message to the CBC as defined in ATIS-0700045 [Ref 8].
4. The CBC validates the received WEA Alert Message and the received message fails validation.
5. The CBC returns an error response to the CMSP Gateway as defined in ATIS-0700045 [Ref 8].

The CMSP GW shall not generate a WHAM upon reception of an error response for an invalid WEA Alert message.

6.5 Transmission Control Message Call Flows

The CBC may request message traffic from the CBE be ceased or resumed based upon internal error processing or due to a maintenance condition on the CBC. This clause provides the following transmission control call flows:

- Cease transmissions call flow.
- Resume transmissions call flow.

The relationship and interaction of Transmission Control Messages on the CBE to CBC interface with the Transmission Control Messages on the Reference Point "C" Interface of ATIS-0700037, *Wireless Emergency Alert (WEA) 3.0 Federal Alert Gateway to CMSP Gateway Interface Specification* [Ref 10] is beyond the scope of this Standard.

6.5.1 Cease Transmissions Call Flow

The CBC may request message traffic from the CBE be ceased based upon internal error processing or due to a maintenance condition on the CBC.

The following figure with its descriptions of the associated call flow steps defines the call flow for a Transmission Control - Cease Message sent from the CBC to the CMSP Gateway over the CBE to CBC Interface:
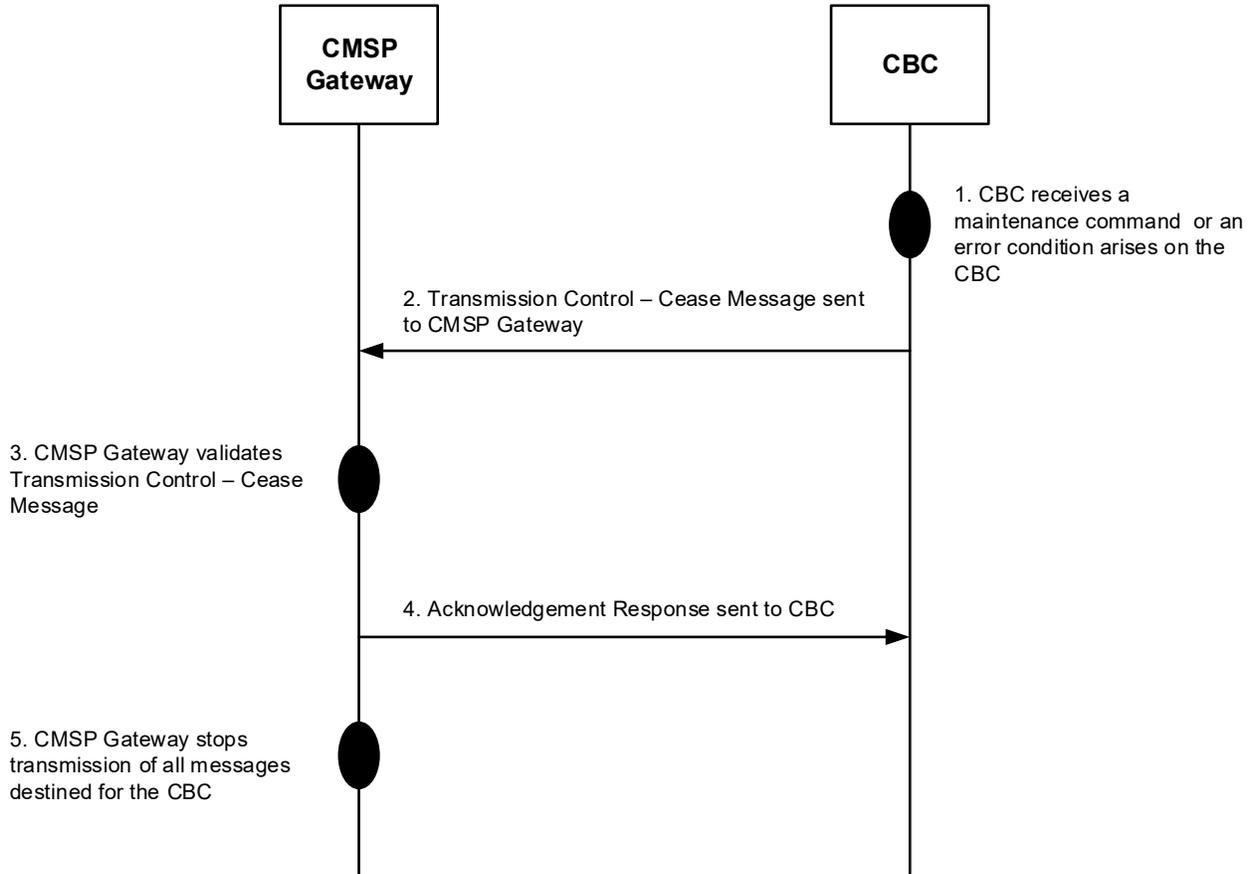
Figure 6.5: Cease Transmissions Call Flow

1. The CBC receives a maintenance command to request the CMSP Gateway to stop transmissions of all messages destined for the CBC or an error condition arises, which prevents the CBC from processing any further messages from the CMSP Gateway.

2. The CBC sends the Transmission Control - Cease Message to the CMSP Gateway via the CBE to CBC Interface.

3. The CMSP Gateway validates the received Transmission Control – Cease Message from the CBC.

4. The CMSP Gateway sends an Acknowledge Response back to the CBC.

    NOTE: The CBC may ignore the acknowledgement response.

5. The CMSP Gateway stops transmissions of all messages destined for the CBC.

6.5.2 Resume Transmissions Call Flow

Once the maintenance or error condition that triggered the stopping of message transmission over the CBE to CBC Interface is cleared, the CBC informs the CMSP Gateway that transmission of messages may resume. The following figure with its descriptions of the associated call flow steps defines the call flow for a Transmission Control – Resume Message sent from the CBC to the CMSP Gateway over the CBE to CBC Interface:
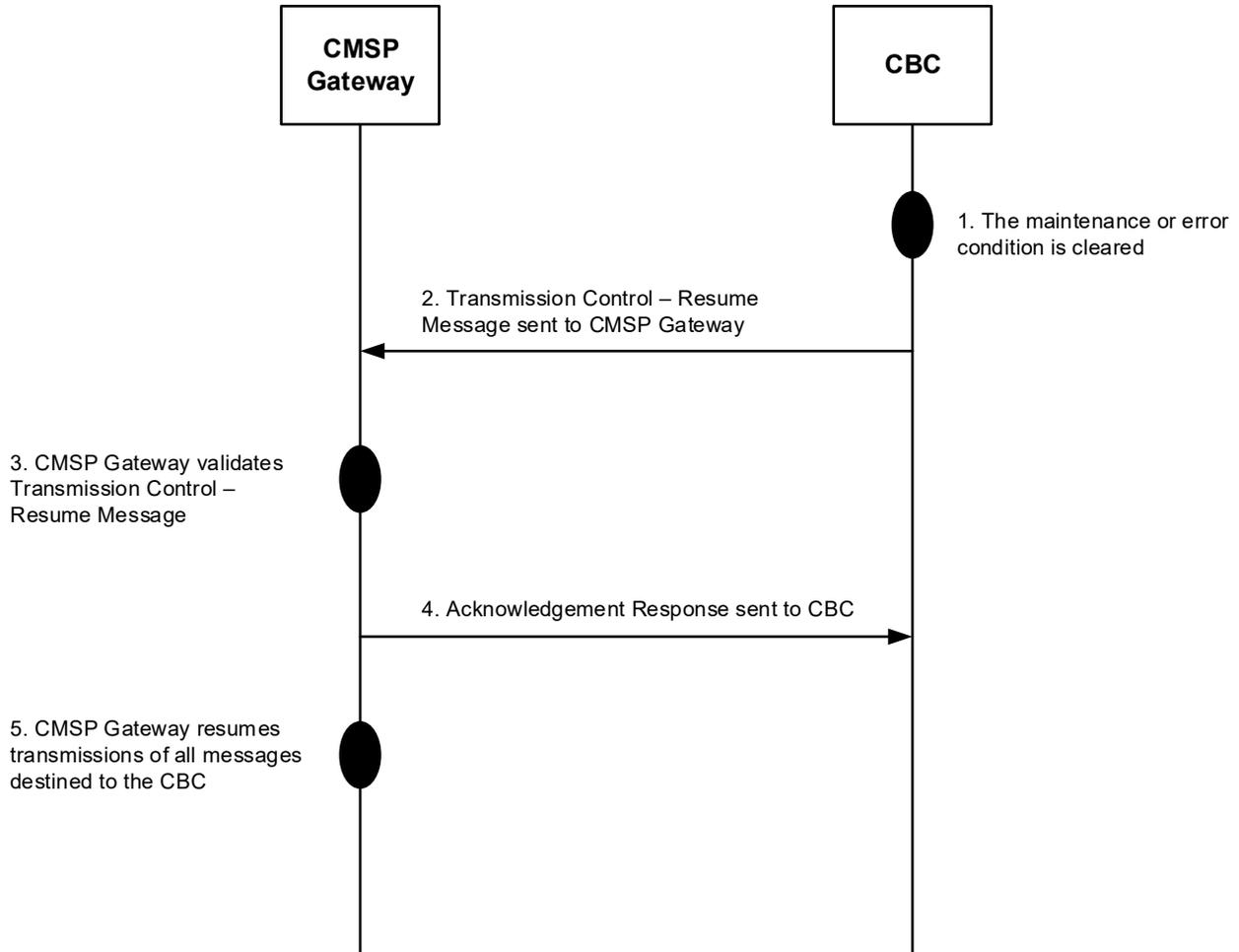
Figure 6.6: Resume Transmissions Call Flow

1. The maintenance or error condition that triggered the stop of message transmission over the CBE to CBC Interface is cleared.
2. The CBC sends the Transmission Control – Resume Message to the CMSP Gateway via the CBE to CBC Interface.
3. The CMSP Gateway validates the received Transmission Control – Resume Message from the CBC.
4. The CMSP Gateway sends an Acknowledge Response back to the CBC.
5. The CSMP Gateway may resume transmission of messages destined to the CBC.

7 Warning Message Delivery for WEA Application

This clause describes the use of Cell Broadcast Center Warning Message Delivery to support the WEA alert messages and WHAM as follows:

- Description of the mapping of the WEA message structure to the Cell Broadcast Center message structure.
- Description of the Warning message parameters which have specific application to the WEA alert messages.

7.1 WEA Interfaces

As indicated in Clause 5, *Functional Architecture and Interfaces*, 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 EPS architecture can be thought of as corresponding to the eNode-B to mobile device interface for the delivery of WEA messages via the Message Delivery Service (the LTE-Uu in Figure 5.1, *Warning System Architecture for* WEA).

The interface between the CMSP Gateway and the CBC is referred to as Reference Point "D". The data elements that are sent between the CMSP Gateway and the CBC over Reference Point "D" are CBE message elements and are referred to as Cell Broadcast Entity Message (CBEM) elements. This interface is specified in ATIS-0700045 [Ref 8].

The following diagram illustrates how the CMSP infrastructure delivers WEA alert messages to the mobile devices through the Warning Message Delivery service:
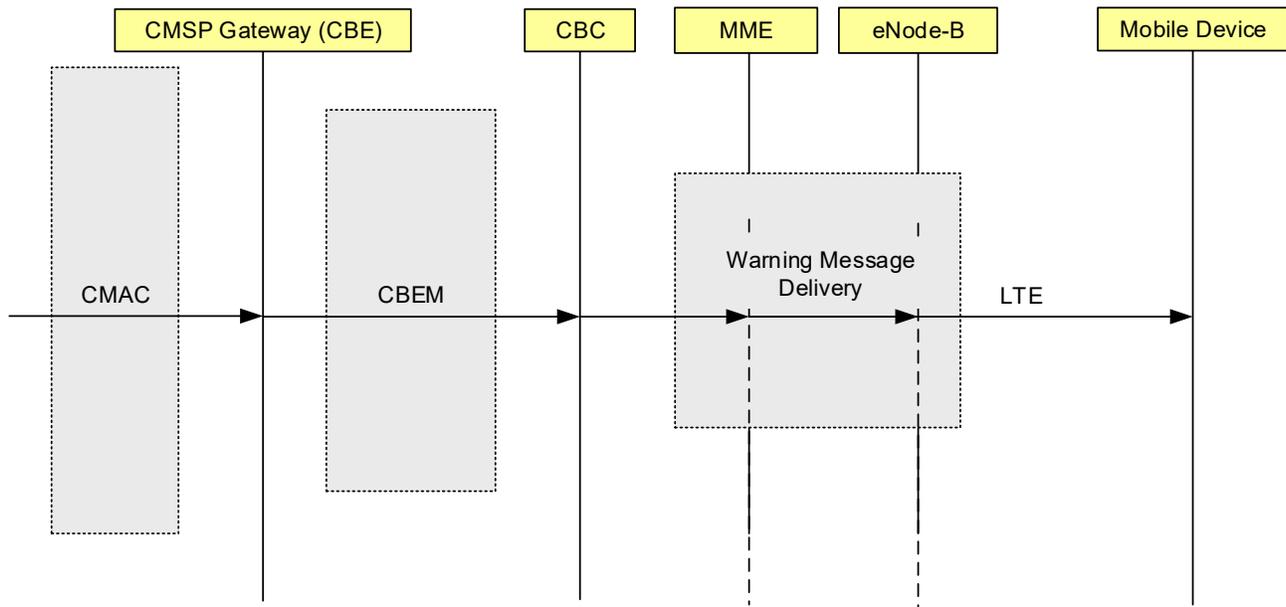
Figure 7.1: WEA Message Relationship

Within the WEA functional architecture, the CMSP Gateway converts the CMAC messages received over Reference Point "C" from the Federal Alert Gateway, per ATIS-0700037, *Wireless Emergency Alert (WEA) 3.0 Federal Alert Gateway to CMSP Gateway Interface Specification* [Ref 10], to the CBEM messages before sending the alert message to the CBC, per ATIS-0700045, [Ref 8]. 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 EPS Warning Message Delivery service; this mapping is described in this Standard. This Standard also illustrates the mapping of the CBEM elements and the CBC 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 15] and 3GPP TS 36.331 [Ref 14]. This standard utilizes these messages to broadcast WEA alert messages. The following sub-clauses provide an overview of the Warning message structures for the EPS. This standard specifies how the parameters of the Warning Message Delivery WRITE-REPLACE and STOP primitives are populated based upon the CBEM elements. The Warning messages associated with the EPS air interface are described in the relevant 3GPP specifications.

The following general requirements apply to Warning Message Delivery:

[WEA-EPC-RQMT-0400] The long 360-character maximum message shall be broadcast on LTE networks.

[WEA-EPC-RQMT-0410] The short 90-character maximum message shall be broadcast on pre-LTE networks.

[WEA-EPC-RQMT-0420] The WHAM shall be broadcast on LTE networks.

7.3 Overview of WEA Element Mapping

The following table illustrates which CMAC elements are used to derive CBEM elements, Warning message elements, and ultimately delivered to the mobile device. Note that only a subset of CMAC elements are delivered to the mobile device, while some CMAC elements are used only by the network entities supporting the WEA and/or Warning Message Delivery service. The clauses that follow describe in detail the element mapping from the CMAC to CBEM and CBEM to Warning messages.

Table 7.1: Element Mapping from CMAC to CBEM to Mobile Device

CMAC Element	Mapped to CBEM?	Mapped to Warning Message?	Delivered to Mobile Device?
CMAC_area_description	No	No	No
CMAC_cap_alert_uri	No	No	No
CMAC_cap_identifier	No	No	No
CMAC_cap_sent_date_time	No	No	No
CMAC_category	No	No	No
CMAC_certainty	Yes (see Note 1)	Yes (see Note 1)	Yes (see Note 1)
CMAC_circle	Yes	Yes	Yes (see Note 5)
CMAC_cmas_geocode	Yes	Yes	No
CMAC_Digital_Signature	No	No	No
CMAC_expires_date_time	Yes (see Note 2)	Yes (see Note 2)	No
CMAC_gnis	No	No	No
CMAC_message_number	Yes	Yes	No
CMAC_message_type	Yes	Yes	No
CMAC_note	No (see Note 5)	No	No
CMAC_polygon	Yes	Yes	Yes (see Note 5)
CMAC_protocol_version	No	No	No
CMAC_referenced_message_cap_identifier	No	No	No
CMAC_referenced_message_number	Yes	Yes	No
CMAC_response_code	No	No	No
CMAC_response_type	No	No	No
CMAC_sender	No	No	No
CMAC_sender_name	No	No	No
CMAC_sending_gateway_id	No	No	No
CMAC_sent_date_time	No	No	No
CMAC_severity	Yes (see Note 1)	Yes (see Note 1)	Yes (see Note 1)
CMAC_special_handling	Yes (see Note 1)	Yes (see Note 1)	Yes (see Note 1)
CMAC_status	No	No	No
CMAC_short_text_alert_message	Yes	Yes	Yes
CMAC_short_text_alert_message_length	No	Yes (see Note 3)	Yes (see Note 3)
CMAC_long_text_alert_message	Yes	Yes	Yes
CMAC_long_text_alert_message_length	Yes	Yes (see Note 3)	Yes (see Note 3)

CMAC Element	Mapped to CBEM?	Mapped to Warning Message?	Delivered to Mobile Device?
CMAC_text_language	Yes	Yes (see Note 1, Note 4)	Yes (see Note 4)
CMAC_urgency	Yes (see Note 1)	Yes (see Note 1)	Yes (see Note 1)

NOTE 1: The CMAC_special_handling element and the CMAC_severity, CMAC_certainty and CMAC_urgency elements and CMAC_text_language element are used to derive the Message Identifier element. See Clause 7.5.2, *Message Identifier*.

NOTE 2: The CMAC_expires_date_time element is used to derive the number of broadcasts requested. See Clause 7.5.7, *Number of Broadcasts Requested*.

NOTE 3: The message length is calculated by the CBC and is used by the CBC to determine the values of Information Length in each CB Page of CB Data of the Warning Message Contents parameter. See Clause 7.5.9, *Warning Message Contents*.

NOTE 4: The text language is contained in the WRITE-REPLACE WARNING REQUEST Data Coding Scheme parameter. See Clause 7.5.8, *Data Coding Scheme*.

NOTE 5: The CMAC_polygon and CMAC_circle elements are delivered to the mobile device as specified in ATIS-0700041, *Wireless Emergency Alert (WEA) 3.0 Device-Based Geo-Fencing* [Ref 23], unless DBGF-bypass is requested in the CMAC_note element.

7.4 Mapping of CBEM Elements from CMAC Elements

The following table illustrates how the CBEM elements defined in ATIS-0700045, [Ref 8] are derived from the CMAC elements of Federal Alert Gateway-to-CMSP Gateway interface:

Table 7.2: Mapping of CBEM Elements from CMAC Elements

CBEM Element	CMAC Element
CBEM_protocol_version	N/A specific to the CMSP Gateway to CBC interface

CBEM_message_number	Generated by the CMSP Gateway using the following:
	    CMAC_message_number
	    CMAC_cap_identifier

CBEM_referenced_message_number	Generated by the CMSP Gateway using the following:
	    CMAC_referenced_message_number
	    CMAC_referenced_message_cap_identifier

CBEM_sender_id	N/A specific to the CMSP Gateway to CBC interface
CBEM_message_type	N/A specific to the CMSP Gateway to CBC interface, but the CMSP Gateway may use the CMAC_message_type to generate this element
CBEM_response_code	N/A specific to the CMSP Gateway to CBC interface
CBEM_response_description	N/A specific to the CMSP Gateway to CBC interface

CBEM_CBS_message_id	Generated by the CMSP Gateway using the following:
	    CMAC_special_handling
	    CMAC_severity
	    CMAC_urgency
	    CMAC_certainty
	    CMAC_text_language

CBEM_CBS_message_serial_number	Generated by the CBC upon receiving a New WEA Alert message and returned to the CMSP Gateway in an Ack message.
CBEM_data_coding_scheme	Set to "GSM_7_Bit_Coding"

CBEM Element	CMAC Element
CBEM_language	Generated by the CMSP Gateway using the following: CMAC_text_language

CBEM_CBS_broadcast_text	Generated by the CMSP Gateway using the following:
	    CMAC_long_text_alert_message_length
	    CMAC_long_text_alert_message

CBEM_repetition_period	N/A generated by the CMSP Gateway
CBEM_number_of_broadcasts_requested	Generated by the CMSP Gateway using the following: CMAC_expires_date_time

CBEM_geocode_type	Generated by the CMSP Gateway using the following:
	    CMAC_cmas_geocode
	    CMAC_cap_geocode
	    mutual agreements between CMSP Gateway and CBC

CBEM_ geocode	Generated by the CMSP Gateway based upon the value of the
	    CBEM_geocode_type element and the following:
	    CMAC_cmas_geocode
	    CMAC_cap_geocode
	    mutual agreements between CMSP Gateway and CBC

CBEM_polygon	CMAC_polygon
CBEM_circle	CMAC_circle

7.5 Mapping of WEA Message and WHAM to WRITE-REPLACE WARNING REQUEST Indication

This clause describes the usage of the following EPS Warning Message Delivery service WRITE-REPLACE WARNING REQUEST Message parameters for the support of WEA alert message and for the WHAM.

The following informative table illustrates how the above indicated WRITE-REPLACE WARNING REQUEST Message parameters may be derived from the CBEM elements:

Table 7.3: Mapping CBEM Elements to WRITE-REPLACE WARNING REQUEST Parameters (Informative)

WRITE-REPLACE WARNING REQUEST Parameter	CBEM Element	Description
Message Type	Generated by the CBC	Identifies the message type
Message Identifier	CBEM_CBS_message_id	This identifies the source type of the WEA message or the WHAM.
Serial Number	Generated by CBC and correlated to CBEM_message_number	This identifies a new WEA message or a new WHAM.
List of TAIs	CBEM_geocode_type CBEM_geocode CBEM_polygon CBEM_circle	CBC derives the Tracking Area Identities (TAIs) for the WEA message from the geo-targeting information received from the CMSP Gateway. The List of TAIs for the WHAM is identical to the List of TAIs of the associated WEA message. NOTE: Multiple occurrences of geocodes or multiple occurrences of polygons/circles, if present, map to the same List of TAIs.

WRITE-REPLACE WARNING REQUEST Parameter	CBEM Element	Description
Warning Area List	CBEM_geocode_type CBEM_geocode CBEM_polygon CBEM_circle	CBC derives the Warning Area for the WEA message from the geo-targeting information received from the CMSP Gateway. The Warning Area List for the WHAM is identical to the Warning Area List of the associated WEA message. NOTE: Multiple occurrences of geocodes or multiple occurrences of polygons/circles, if present, map to the same Warning Area List.
Repetition Period E-UTRAN	CBEM_repetition_period	This indicates the repetition period used to broadcast the WEA alert message and the WHAM for repetition periods up to 4096 seconds. The Repetition Period for the WEA message may be different from the Repetition Period for the WHAM.
Extended Repetition Period	CBEM_repetition_period	This indicates the repetition period used to broadcast the WEA alert message and the WHAM for repetition periods exceeding 4096 seconds. The maximum value of the repetition period is $2^{17}-1$ seconds.
Number of Broadcasts Requested	CBEM_number_of_broadcasts_requested	This indicates the number times the WEA alert message and WHAM is repeated. The Number of Broadcasts Requested for the WEA message may be different from the Number of Broadcasts Requested for the WHAM.
Data Coding Scheme	CBEM_language	Identifies the language and coding used in the WEA alert message; currently, 7-bit coding is used. The DCS value for the WHAM is specified in section 7.5.8.
Warning Message Contents E-UTRAN	CBEM_CBS_broadcast_text	This identifies the actual contents of the WEA alert message. In the case of WHAM the Message Identifier and Serial Number of the referenced WEA message(s) are included.
OMC ID	No mapping from any CBEM element	CMSP specific parameter
Concurrent Warning Message Indicator	No mapping from any CBEM element	This indicates that the new WEA message needs to be broadcast concurrently with other ongoing broadcast of WEA messages.
Warning Area Coordinates	CBEM_warning_area_coordinates	This indicates the alert area coordinates of a WEA alert message. The Warning Area Coordinates IE is included when it is generated by the CMSP Gateway. Warning Area Coordinates IE is not sent in a WHAM message.
Send Write-Replace-Warning Indication	No mapping from any CBEM element	This flag is included in the Write-Replace Warning Request if the CBC requests to receive the Broadcast Completed Area List.

WRITE-REPLACE WARNING REQUEST Parameter	CBEM Element	Description
Global eNB ID	No mapping from any CBEM element	Included when the Write-Replace-Warning Request is sent only to a specific eNodeB. In that case the List of TAIs is not included.
Warning Type	No mapping from any CBEM element	ETWS specific parameter; not applicable to WEA
Warning Security Information	No mapping from any CBEM element	ETWS specific parameter; not applicable to WEA
List of NG-RAN TAIs		Not applicable to EPS
Warning Area List NG-RAN		Not applicable to EPS
Warning Message Content NG-RAN		Not applicable to EPS
Repetition Period NG-RAN		Not applicable to EPS
Global RAN Node ID		Not applicable to EPS
RAT Selector NG-RAN		Not applicable to EPS
Test Flag	No mapping from any CBEM element	CMSP specific parameter

7.5.1 Message Type

The Message Type uniquely identifies the message being sent. It is mandatory for all messages.

7.5.2 Message Identifier

Per 3GPP TS 23.041 [Ref 15], which generically describes the CBS, the Message Identifier parameter identifies the source/type of a Warning message and is passed transparently from the CBC to the mobile device. For example, "Federal Alert Gateway" (= source), "Presidential"[8] (= type) corresponds to one value for WEA. A number of WEA messages may originate from the same source (Federal Alert Gateway) and/or be of the same type. These will be distinguished by the Serial Number. The Message Identifier is coded in binary.

> [WEA-EPC-RQMT-0430] The mobile device shall attempt to receive the WEA messages which have Message Identifiers that are in a "search list" as defined in 3GPP TS 23.041 [Ref 15]. A mobile device shall by default have the Message Identifiers for WEA messages in its search list. This "search list" shall contain the WEA Message Identifiers stored in the memory of the mobile device in a "list of Warning messages to be received".

The "search list" may be used to manage the subscriber "opt out" capabilities. For example, Presidential is always included in the "search list"; Extreme Alert messages, Severe Alert messages, and America's Missing Broadcast Emergency Response (AMBER) Alerts are included in the "search list" by default but may be removed by the subscriber if they choose not to receive these categories of alerts.

The following subclauses define the Message Identifiers assignments for the both the English and additional language (e.g., Spanish) WEA Alert messages for GSM, UMTS, and LTE networks, in accordance with the Message ID range allocation in 3GPP TS 23.041 [Ref 15]:

7.5.2.1 Relationship of Message Identifier with Message Language

This clause defines the relationship of the Message Identifier with the message language.

1. The language of the alert message will only be identified by the Data Coding Scheme element (see Clause 7.5.8).

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[8] WEA Presidential Alerts have been renamed to National Alert. However, protocol encoding on the C-interface still uses the term "Presidential".

2. Per 3GPP TS 23.041 [Ref 15], there are no restrictions, no mandates, and no requirements on the assignment of any alert message language supported by 3GPP TS 23.038 [Ref 16] to any WEA associated Message Identifier.

3. Compliance with 3GPP TS 23.041 [Ref 15] for Message Identifiers and for Data Coding Scheme for message languages is required for compliance with the FCC regulations on the availability of WEA alerts while roaming as defined in the *FCC First Report and Order for the Commercial Mobile Alert System*, FCC 08-99 [Ref 2].

4. Per 3GPP TS 23.041 [Ref 15], the CMSPs use the Message Identifiers listed in Clause 7.5.2.2 when the WEA messages are required to be received by the mobile device independently of the user's preferred WEA language configuration settings [Ref 9].

5. Per 3GPP TS 23.041 [Ref 15], the CMSPs use the Message Identifiers listed in Clause 7.5.2.3 when the WEA messages can be optionally received by the mobile device based on the user's preferred WEA language configuration settings [Ref 9].

7.5.2.2 Message Identifier Assignments for English Language WEA Alert Messages

- The set of Message Identifier assignments as defined in this clause for English Language WEA alert messages does not imply that English is the exclusive message language for this set of Message Identifiers.

   a. In the US, English alerts use this set of Message Identifiers.
   b. Canada uses both English and French for this set of Message Identifiers.
   c. European nations also use this set of Message Identifiers for non-English alert messages (see [Ref 20]).

[WEA-EPC-RQMT-0440] The English language National Alert message identifier shall be designated as MsgID1 and shall have the decimal value of 4370.

[WEA-EPC-RQMT-0450] The English language Imminent Threat message identifiers shall be designated as shown in the following table:

Table 7.4: Message Identifiers for English Language WEA Imminent Threat Alerts

WEA Message Class	Message Identifier	Message Identify Value (decimal)	Severity	Urgency	Certainty
English Language Extreme Alerts	MsgID2	4371	Extreme	Immediate	Observed
	MsgID3	4372	Extreme	Immediate	Likely
English Language Severe Alerts	MsgID4	4373	Extreme	Expected	Observed
	MsgID5	4374	Extreme	Expected	Likely
	MsgID6	4375	Severe	Immediate	Observed
	MsgID7	4376	Severe	Immediate	Likely
	MsgID8	4377	Severe	Expected	Observed
	MsgID9	4378	Severe	Expected	Likely

[WEA-EPC-RQMT-0460] The English language Child Abduction Emergency message identifier shall be designated as MsgID10 and shall have the decimal value of 4379.

[WEA-EPC-RQMT-0470] The English language Required Monthly Test message identifier shall be designated as MsgID11 and shall have the decimal value of 4380.

[WEA-EPC-RQMT-0480] The English language Exercise message identifier shall be designated as MsgID12 and shall have the decimal value of 4381.

> NOTE: The usage of English language Exercise and the associated message identifier value of 4381 are for further study.

[WEA-EPC-RQMT-0490] The English language CMSP-defined message identifier shall be designated as MsgID13 and shall have the decimal value of 4382.

[WEA-EPC-RQMT-0500] The English language Public Safety message shall be designated as MsgID14 and shall have the decimal value of 4396.

[WEA-EPC-RQMT-0510] The English language State/Local WEA Test message shall be designated as MsgID15 and shall have the decimal value of 4398.

[WEA-EPC-RQMT-0520] Table 7.4 shall be used to derive the Message Id value for the English WEA alert messages if the Special Handling element is not received within the CMAC message from the Federal Alert Gateway.

7.5.2.3 Message Identifier Assignments for Additional Language WEA Alert Messages

[WEA-EPC-RQMT-0530] The language for the Additional Language WEA Alert messages (e.g., Spanish) shall be indicated with the Data Coding Scheme (see Clause 7.5.8).

- The set of Message Identifier assignments as defined in this clause for additional language WEA alert messages does not imply that English cannot be utilized for this set of Message Identifiers.
    a. In the US, non-English alerts, including Spanish, use this set of Message Identifiers.

[WEA-EPC-RQMT-0540] The Additional Language National Alert message identifier shall be designated as MsgID16 and shall have the decimal value of 4383.

[WEA-EPC-RQMT-0550] The Additional Language Imminent Threat message identifiers shall be designated as shown in the following table:

Table 7.5: Message Identifiers for Additional Language WEA Imminent Threat Alerts

WEA Message Class	Message Identifier	Message Identify Value (decimal)	Severity	Urgency	Certainty
Additional Language Extreme Alerts	MsgID17	4384	Extreme	Immediate	Observed
	MsgID18	4385	Extreme	Immediate	Likely
Additional Language Severe Alerts	MsgID19	4386	Extreme	Expected	Observed
	MsgID20	4387	Extreme	Expected	Likely
	MsgID21	4388	Severe	Immediate	Observed
	MsgID22	4389	Severe	Immediate	Likely
	MsgID23	4390	Severe	Expected	Observed
	MsgID14	4391	Severe	Expected	Likely

[WEA-EPC-RQMT-0560] The Additional Language Child Abduction Emergency message identifier shall be designated as MsgID25 and shall have the decimal value of 4392.

[WEA-EPC-RQMT-0570] The Additional Language Required Monthly Test message identifier shall be designated as MsgID26 and shall have the decimal value of 4393.

[WEA-EPC-RQMT-0580] The Additional Language Exercise message identifier shall be designated as MsgID27 and shall have the decimal value of 4394.

> NOTE: The usage of the Additional Language Exercise and the associated message identifier value of 4394 are for further study.

[WEA-EPC-RQMT-0590] The Additional Language CMSP-defined message identifier shall be designated as MsgID28 and shall have the decimal value of 4395.

[WEA-EPC-RQMT-0600] The Additional Language Public Safety message shall be designated as MsgID29 and shall have the decimal value of 4397.

[WEA-EPC-RQMT-0610] The Additional Language State/Local WEA Test message shall be designated

as MsgID30 and shall have the decimal value of 4399.

[WEA-EPC-RQMT-0620] Table 7.5 shall be used to derive the Message Id value for the Additional Language WEA Alert messages if the Special Handling element is not received within the CMAC message from the Federal Alert Gateway.

7.5.2.4 Message Identifier Assignments for WEA Alert messages

[WEA-EPC-RQMT-0630] For a single WEA Alert message, the same Message Identifier shall be used for both the short 90-character maximum WEA Alert message and for the long 360-character maximum WEA Alert message.

For example, if the WEA Alert message to be broadcast is a Child Abduction Emergency message, then the associated WEA Message IDs assignments would be as follows:

- A decimal value of 4379 would be used for as the assigned Message ID for the English language 90-character maximum WEA alert message broadcast on GSM/UMTS.
- A decimal value of 4379 would be used for as the assigned Message ID for the English language 360-character maximum WEA alert message broadcast on LTE.
- A decimal value of 4392 would be used for as the assigned Message ID for the Additional language 90-character maximum WEA alert message broadcast on GSM/UMTS, if the Spanish alert text was provided by the Alert Originator.
- A decimal value of 4392 would be used for as the assigned Message ID for the Additional language 360-character maximum WEA alert message broadcast on LTE, if the Spanish alert text was provided by the Alert Originator.

7.5.2.5 Message Identifier Assignment for WHAM

A decimal value of 4400 is the assigned Message ID for the WHAM (see 3GPP TS 23.041 [Ref 15]).

7.5.3 Serial Number

The Serial Number identifies a particular message from the source and type indicated by the Message Identifier and is altered every time a new message with a given Message Identifier is to be delivered.

7.5.4 List of Tracking Area IDs

The MME uses the List of Tracking Area IDs to determine which eNodeBs belong to the Tracking Area.

[WEA-EPC-RQMT-0630] If no Tracking Area ID is present, the MME shall forward the message towards all connected eNodeBs.

7.5.5 Warning Area List

The Warning Area List indicates the areas where the Warning message needs to be broadcast. This list contains one of the following:

- Cell ID List
- Tracking Area ID List
- Emergency Area List

The Warning Area List is used by the eNodeB in determining to which cells the WEA alert message shall be broadcast. An eNodeB belongs to one or more Emergency Areas, serves a number of Cells, and belongs to one or more Tracking Areas.

7.5.6 Repetition Period

The Repetition Period E-UTRAN and the Extended Repetition Period fields are used by the CBC to instruct the MMEs the repetition rate of the Warning message and the WHAM. Refer to 3GPP TS 36.413 [Ref 13] to understand the usage of these fields in EPS.

The Repetition Period E-UTRAN is used for repetition periods up to 4096 seconds and the Extended Repetition Period is used for repetition periods up to 2^{17}-1 seconds. If the Extended Repetition Period field is present the Repetition Period E-UTRAN field is ignored.

The repetition period fields are set by CMSP policies.

7.5.7 Number of Broadcasts Requested

This field indicates the number of times a Warning message is to be repeated. Refer to 3GPP TS 36.413 [Ref 13] to understand the usage of this field in EPS.

7.5.8 Data Coding Scheme

[WEA-EPC-RQMT-0640] The language and character set for the WEA alert message shall be specified by the Cell Broadcast Data Coding Scheme parameter as specified in 3GPP TS 23.041 [Ref 15]. The encoding of the Data Coding Scheme parameter is defined in 3GPP TS 23.038 [Ref 16].

[WEA-EPC-RQMT-0650] The Data Coding Scheme for the WHAM shall be set to 69 (uncompressed 8-bit data, no message class meaning).

7.5.9 Warning Message Contents

The Warning Message Contents parameter will contain the WEA Displayable Text which is the actual alert message that will be displayed on the mobile device.

[WEA-EPC-RQMT-0660] The Warning Message Delivery service shall support the text profile for WEA messages. The text profile specifies the maximum WEA Displayable Text to be 360 characters for an English or Spanish language WEA alert message encoded with GSM 7-bit encoding [Ref 16] which is provided by the CMSP Gateway.

The WEA Displayable Text on the C interface is provided in UTF-8 format [Ref 17] which is capable of supporting text in English and other languages. It is the responsibility of the CBC to translate to the GSM 7-bit encoding for English and Spanish, or other appropriate coding schemes for other languages.

Optionally, a CMSP may choose to provide additional displayable information beyond the 360-character CMAM. The maximum length of the message is 1230 octets, or 1395 GSM 7-bit encoded characters. Note that in this case the length of the Warning Message Contents parameter will be 1246 octets (1230 octets Displayable Text plus 16 octets header (see 3GPP TS 23.041 [Ref 15]).

The content for the WHAM is specified in ATIS-0700041, *Wireless Emergency Alert (WEA) 3.0 Device-Based Geo-Fencing* [Ref 23]*.*

7.5.10 OMC ID

[WEA-EPC-RQMT-0670] The OMC ID is an optional field which indicates the identity of an Operation and Maintenance Centre to which Trace records shall be sent. The use of this field is operator specific.

7.5.11 Concurrent Warning Message Indicator

The Concurrent Warning Message Indicator parameter indicates to the eNodeB that the received Warning message is a new message to be scheduled for concurrent broadcast with any of the other ongoing broadcast of Warning messages.

7.5.12 Warning Area Coordinates

The Warning Area Coordinates parameter contains alert area coordinates which are used for DBGF as specified in ATIS-0700041, *Wireless Emergency Alert (WEA) 3.0 Device-Based Geo-Fencing* [Ref 23].

7.6 Mapping of WEA Message and WHAM to STOP WARNING REQUEST Message

A STOP WARNING REQUEST Message is used during WEA Cancel and WHAM Cancel procedures (see Clause 6.2, *Cancelled WEA Alert Message Call Flow*). The following informative table illustrates how the STOP WARNING REQUEST Message parameters may be derived from the CBEM elements:

Table 7.6: Mapping of CBEM Elements to STOP WARNING REQUEST Message Parameters (Informative)

STOP WARNING REQUEST Message Parameter	CBEM Element	Description
Message Type	Generated by the CBC	Identifies the message type (Stop warning).
Message Identifier	CBEM_CBS_message_id	This identifies the source type of the WEA message or WHAM.
Serial Number	Generated by CBC and correlated to CBEM_referenced_message_number	This identifies a WEA message or WHAM to be canceled
List of TAIs	not applicable	CBC uses stored geo-targeting information of the active broadcast to be cancelled.
Warning Area List	not applicable	CBC uses stored geo-targeting information of the active broadcast to be cancelled.
OMC ID		CMSP-specific parameter.
Send Stop Warning Indication	No mapping from any CBEM element	This flag is included in the Stop Warning Request if the CBC requests to receive the Broadcast Cancelled Area List.
Stop-All Indicator		CMSP-specific parameter.
List of NG-RAN TAIs		Not applicable to EPS
Warning Area List NG-RAN		Not applicable to EPS
RAT Selector NG-RAN		Not applicable to EPS