

# ETSI TS 123 041 V15.5.0 (2019-04)



**Digital cellular telecommunications system (Phase 2+) (GSM);  
Universal Mobile Telecommunications System (UMTS);  
Technical realization of Cell Broadcast Service (CBS)  
(3GPP TS 23.041 version 15.5.0 Release 15)**

*Standard Catalogue  
Full standards catalogue  
https://standards.iteh.ai/catalog/standards/sis/123-041-2019-04-4e68-a3a5-5dc40ceabe33/etsi-ts-123-041-v15-5-0-2019-04*



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Reference

RTS/TSGC-0123041vf50

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Keywords

GSM,UMTS

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# Foreword

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# 1 Scope

The present document describes the Cell Broadcast short message service (CBS) for GSM and UMTS.

For GSM it defines the primitives over the Cell Broadcast Centre - Base Station System (CBC-BSS) interface and the message formats over the Base Station System - Mobile Station (BSS-MS) interface for Teleservice 23 as specified in 3GPP TS 22.003 [2].

For UMTS it defines the interface requirements for the Cell Broadcast Centre – UMTS Radio Network System (RNS) interface and the radio interface requirements for UMTS Radio Acces Networks to support CBS as specified in 3GPP TS 22.003 [2].

The present document also describes the Public Warning System (PWS) for GSM, UMTS, E-UTRAN, and NG-RAN, see 3GPP TS 22.268 [28].

## 1.1 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] Void
- [2] 3GPP TS 22.003: "Circuit Teleservices supported by a Public Land Mobile Network (PLMN)".
- [3] 3GPP TS 23.038: "Alphabets and language-specific information".
- [4] 3GPP TS 23.040: "Technical realization of the Short Message Service (SMS)".
- [5] Void.
- [6] 3GPP TR 03.49 Version 7.0.0: "Digital cellular telecommunication system (Phase 2+); Example protocol stacks for interconnecting Cell Broadcast Centre (CBC) and Base Station Controller (BSC)".
- [7] 3GPP TS 44.012: "Short Message Service Cell Broadcast (SMS-CB) support on the mobile radio interface".
- [8] 3GPP TS 45.002: "Multiplexing and multiple access on the radio path".
- [9] Void.
- [10] 3GPP TS 48.052: "Base Station Controller - Base Transceiver Station (BSC - BTS) interface; Interface principles".
- [11] 3GPP TS 48.058: "Base Station Controller - Base Transceiver Station (BSC - BTS) interface; Layer 3 specification".
- [12] ITU-T Recommendation X.210: "Information technology - Open systems interconnection - Basic Reference Model: Conventions for the definition of OSI services".
- [13] 3GPP TS 48.008: "Mobile-services Switching Centre - Base Station System (MSC-BSS) interface; Layer 3 specification".
- [14] 3GPP TS 23.042: "Compression algorithm for text messaging services".
- [15] 3GPP TS 23.048: "Security Mechanisms for the SIM application toolkit".

- [16] 3GPP TS 25.331: "Radio Resource Control (RRC); Protocol specification".
- [17] 3GPP TS 25.401: "UTRAN Overall Description".
- [18] 3GPP TS 31.102: "Characteristics of the USIM Application".
- [19] 3GPP TS 25.324: "Broadcast/Multicast Control BMC".
- [20] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [21] 3GPP TR 25.925: "Radio Interface for Broadcast/Multicast Services".
- [22] Void.
- [23] Void.
- [24] Void.
- [25] GSMA AD.26: "Coding of Cell Broadcast Functions".
- [26] 3GPP TS 44.018: "Mobile radio interface layer 3 specification; Radio Resource Control Protocol".
- [27] 3GPP TS 44.060: "General Packet Radio Service (GPRS); Mobile Station (MS) - Base Station System (BSS) interface; Radio Link Control / Medium Access Control (RLC/MAC) protocol".
- [28] 3GPP TS 22.268: "Public Warning System (PWS) Requirements".
- [29] 3GPP TS 25.419: "UTRAN Iu-BC Interface: Service Area Broadcast Protocol (SABP)".
- [30] 3GPP TS 48.049: "Base Station Controller - Cell Broadcast Centre (BSC-CBC) Interface Specification; Cell Broadcast Service Protocol (CBSP)".
- [31] Void.
- [32] ETSI TS 102 900: "European Public Warning System (EU-ALERT) using the Cell Broadcast Service".
- [33] IETF RFC 4960: "Stream Control Transmission Protocol".
- [34] 3GPP TS 36.413: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); S1 Application Protocol (S1AP)".
- [35] 3GPP TS 29.168: "Cell Broadcast Centre interfaces with the Evolved Packet Core".
- [36] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification".
- [37] Void.
- [38] 3GPP TS 23.007: "Restoration Procedures".
- [39] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".
- [40] 3GPP TS 38.413: "NG Radio Access Network (NG-RAN); NG Application Protocol (NGAP)".
- [41] 3GPP TS 29.518: "5G System; Access and Mobility Management Services; Stage 3".
- [42] IETF RFC 7540: "Hypertext Transfer Protocol Version 2 (HTTP/2)".
- [43] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2".
- [44] 3GPP TS 38.300: "NR; NR and NG-RAN Overall Description; Stage 2".
- [45] 3GPP TS 23.527: "5G System; Restoration Procedures; Stage 2".
- [46] 3GPP TS 36.300: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access (E-UTRAN); Overall description; Stage 2".

[47] ATIS-0700041: "WEA 3.0: Device-Based Geo-Fencing".

## 1.2 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [20] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [20].

|      |                          |
|------|--------------------------|
| 5GS  | 5G System                |
| 5GCN | 5G Core Network          |
| EPC  | Evolved Packet Core      |
| NR   | New Radio                |
| WEA  | Wireless Emergency Alert |

## 1.3 Definitions

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

For the purposes of the present document, the following terms and definitions given in 3GPP TS 23.501 [39] apply:

**5G System**  
**NG-RAN**

For the purposes of the present document, the following terms and definitions given in 3GPP TS 38.300 [44] apply:

**gNB**  
**NG-RAN node**  
**ng-eNB**

## 2 General description

The CBS service is analogous to the Teletex service offered on television, in that like Teletex, it permits a number of unacknowledged general CBS messages to be broadcast to all receivers within a particular region. CBS messages are broadcast to defined geographical areas known as cell broadcast areas. These areas may comprise of one or more cells, or may comprise the entire PLMN. Individual CBS messages will be assigned their own geographical coverage areas by mutual agreement between the information provider and the PLMN operator. CBS messages may originate from a number of Cell Broadcast Entities (CBEs), which are connected to the Cell Broadcast Centre. CBS messages are then sent from the CBC to the cells, in accordance with the CBS's coverage requirements.

A CBS page comprises of 82 octets, which, using the default character set, equates to 93 characters. Other Data Coding Schemes may also be used, as described in 3GPP TS 23.038 [3]. Up to 15 of these pages may be concatenated to form a CBS message. Each page of such CBS message will have the same message identifier (indicating the source of the message), and the same serial number. Using this information, the MS/UE is able to identify and ignore re-broadcasts of already received messages.

CBS messages are broadcast cyclically by the cell at a frequency and for a duration agreed with the information provider. The frequency at which CBS messages are repeatedly transmitted will be dependent on the information that they contain; for example, it is likely that dynamic information such as road traffic information, will require more frequent transmission than weather information. The repetition period will also be affected by the desire for CBS messages to be received by high speed mobiles which rapidly traverse cells. Reception of CBS messages for an MS/UE is not a requirement if it is connected in the CS domain. It should be possible for an MS/UE to receive messages if it is connected in the PS domain and no data is currently transmitted.

|                          |              |          |                     |
|--------------------------|--------------|----------|---------------------|
| CS-Domain                | CS-Connected | CS-Idle  | CS-Idle             |
| PS-Domain                | -            | PS-Idle  | PS-Connected        |
| Reception of CBS Message | Not possible | Possible | Depends on RRC mode |

NOTE: In case the UE is in CS-Idle and PS-Connected Mode it depends on the Radio Resource Control State whether reception of CBS messages is possible. The relevant states are described in 3GPP TS 25.331 [16].

GSM only [CBS messages may be broadcast on two different cell broadcast channels, which are characterized by different QoS. A MS is always able to read the basic channel (see 3GPP TS 45.002 [8]). The reading of the extended channel may collide with other tasks of the MS. Therefore the probability of receiving a CBS message on the extended channel is smaller than on the basic channel. The reading of the extended channel for MSs is optional. The scheduling on the channels will be done independently].

To permit mobiles to selectively display only those CBS messages required by the MS/UE user, CBS messages are assigned a message class which categorises the type of information that they contain and the language (Data Coding Scheme) in which the CBS message has been compiled. Through the use of appropriate MMI, the user is then able to ignore message types that he does not wish to receive, e.g. advertising information or messages in an unfamiliar language.

A network may be able to remotely activate mobile terminals in order to enable them to receive CBS messages, according to regulatory requirements (see 3GPP TS 25.331 [16]).

PWS provides a service that allows the network to distribute warning messages on behalf of public authority. PWS enables the distribution of ETWS, CMAS (aka WEA), KPAS and EU-Alert warning messages in GSM, UMTS, E-UTRAN, and NG-RAN.

Some of the PWS warning message distribution mechanisms are access technology specific, but some CBS procedures and related message structures are common for GSM and UMTS, and some CBS procedures and related message structures are common for E-UTRAN and NG-RAN.

## 3 Network Architecture

### 3.0 General

The chosen network architectures differ for GSM, UMTS, EPS, and 5GS. In subclause 3.1 the GSM network architecture is described, in subclause 3.2 the UMTS network architecture, in subclause 3.3 the EPS network architecture, and in subclause 3.4 the 5GS network architecture.

### 3.1 GSM Network Architecture

The basic network structure of CBS is depicted by figure 1.

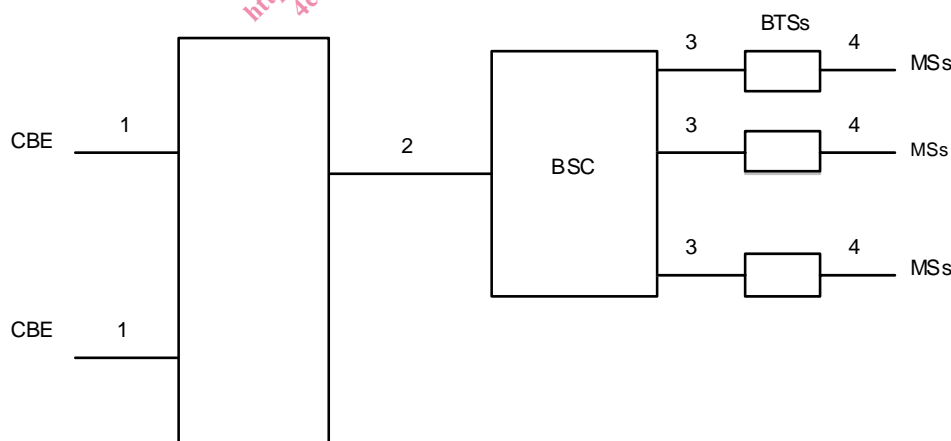


Figure 1

- message transfer on link 1 is outside the scope of 3GPP specifications;
- message transfer on link 2 is described in subclause 9.1;
- message transfer on link 3 is described in 3GPP TS 48.058 [11];

- message transfer on link 4 is described in 3GPP TS 44.012 [7] and the timing of messages transferred on link 4 is described in 3GPP TS 45.002 [8].

## 3.2 UMTS Network Architecture

The basic network structure of CBS is depicted by figure 2.

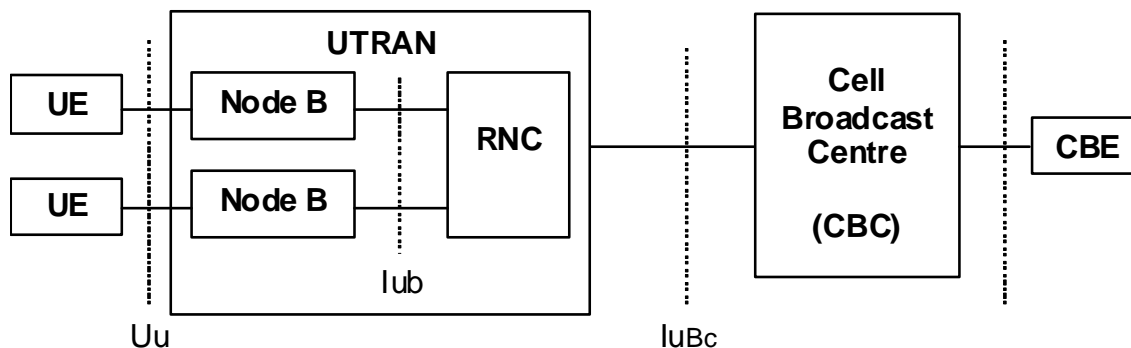


Figure 2

The basic network structure replaces the GSM BSS with the UTRAN containing the RNC and the Node B. The cell broadcast centre (CBC) is part of the core network and connected to a routing node e.g. a 3G SGSN via the Bc reference point. Thus the CBC can reach every RNC via the user plane of the Iu interface. On the logical interface between the CBC and the RNC protocol is described in 3GPP TS 25.419 [29]. The other UTRAN related interfaces are described in the according UTRAN specifications based on the 3GPP TR 25.925 [21]. Based on this architecture and the current requirements for cell broadcast the core network elements like MSC, VLR, HLR etc are not involved for the service delivery.

The CBE and the interface between CBE and CBC are out of scope of 3GPP specifications.

## 3.3 EPS Network Architecture

The basic network structure of PWS architecture in E-UTRAN is depicted by figure 3.3-1.

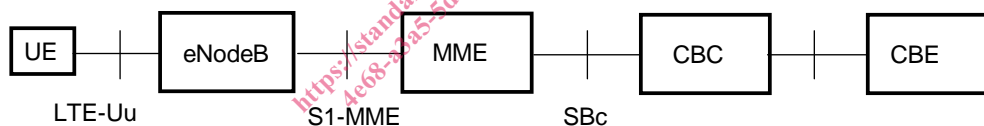


Figure 3.3-1: PWS architecture

The cell broadcast centre (CBC) is part of the core network and connected to the MME via the SBc reference point. The interface between the CBC and the MME is described in 3GPP TS 29.168 [35] and the interface between the MME and the eNodeB is described in 3GPP TS 36.413 [34].

The CBE and the interface between CBE and CBC are out of scope of 3GPP specifications.

## 3.4 5GS Network Architecture

Figures 3.4-1, 3.4-2 and 3.4-3 depict the basic network structure of 5GS PWS architecture.

Figure 3.4-1 depicts the 5GS PWS system architecture, using service-based interfaces between CBCF and AMF, showing how the network functions interact with each other. This option is further described in clauses 4 to 8. The service-based interfaces are further described in clause 9A.