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## Foreword

This European Telecommunication Standard (ETS) has been produced by the Special Mobile Group (SMG) of the European Telecommunications Standards Institute (ETSI).

This specification specifies the stage two description of the Voice Broadcast Service (VBS) within the digital cellular telecommunications system.

The contents of this specification is subject to continuing work within SMG and may change following formal SMG approval. Should SMG modify the contents of this specification, it will be resubmitted for OAP by ETSI with an identifying change of release date and an increase in version number as follows:

Version 5.x.y

where:

- 5 indicates GSM Phase 2+ Release 1996
- x the second digit is incremented for all other types of changes, i.e. technical enhancements, corrections, updates, etc.
- y the third digit is incremented when editorial only changes have been incorporated in the specification;

<b>Transposition dates</b>	
Date of adoption of this ETS:	4 December 1998
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## 1 Scope

This European Telecommunication Standard (ETS) specifies the stage 2 description of the Voice Broadcast Service (VBS) which allows the distribution of speech (or other signals which can be transmitted via the speech codec), generated by a service subscriber, into a predefined geographical area to all or a group of service subscribers located in this area.

## 2 Normative references

This specification incorporates by dated and undated references, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this specification only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

- [1] GSM 01.04 (ETR 350): "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".
- [2] GSM 02.09 (ETS 300 920): "Digital cellular telecommunications system (Phase 2+); Security aspects".
- [3] GSM 02.69 (ETS 300 926): "Digital cellular telecommunications system (Phase 2+); Voice Broadcast Service (VBS) - Stage 1".
- [4] GSM 03.20 (ETS 300 929): "Digital cellular telecommunications system (Phase 2+); Security related network functions".
- [5] GSM 03.22 (ETS 300 930): "Digital cellular telecommunications system (Phase 2+); Functions related to Mobile Station (MS) in idle mode".
- [6] GSM 03.67 (ETS 300 932): "Digital cellular telecommunications system (Phase 2+); enhanced Multi-Level Precedence and Pre-emption service (eMLPP) - Stage 2".
- [7] GSM 04.08 (ETS 300 940): "Digital cellular telecommunications system (Phase 2+); Mobile radio interface layer 3 specification".
- [8] GSM 05.08 (ETS 300 911): "Digital cellular telecommunications system (Phase 2+); Radio subsystem link control".
- [9] GSM 08.08: "Digital cellular telecommunications system (Phase 2+); Mobile-services Switching Centre - Base Station System (MSC - BSS) interface Layer 3 specification".
- [10] CCITT Recommendation E.164: "Numbering plan for the ISDN era".

### 3 Definitions and abbreviations

#### 3.1 Definitions

Definitions used in this specification are also defined in GSM 02.69.

**voice broadcast channel:** Downlink to be allocated in each cell of the group call area for a particular voice broadcast call. All mobile stations of the destination subscriber being service subscribers in one cell shall listen to the common downlink.

**group members:** Service subscribers entitled to belong to a particular group classified by a certain group identification (group ID).

**voice broadcast call member:** Any group member or dispatcher participating in an on going voice broadcast call.

**broadcast call attributes:** Group call area, dispatcher identities.

**Group Call Register (GCR):** A functionality in the network containing the broadcast call attributes.

**group call anchor MSC:** The MSC responsible for managing and maintaining a particular voice broadcast call. The group call anchor MSC is determined as the one controlling the cells of the group call area (see also group call relay MSC). For voice broadcast services where the group call area exceeds an MSC area, the group call anchor MSC is predefined in the network.

**group call relay MSC:** MSC controlling cells of a group call area which are not under control of the group call anchor MSC for those voice broadcast services where the group call area exceeds one MSC area.

**notification:** Notifications are given on common channels or dedicated channels in order to inform group members which are either in idle mode or in dedicated mode or participating in a voice group call or broadcast call on the existence of voice broadcast calls.

**Notification channel (NCH):** Common control channel on which the notifications are sent by the network (equivalent to a paging channel).

#### 3.2 Abbreviations

Abbreviations used in this specification are also listed in GSM 01.04.

For the purpose of this specification, the following abbreviations apply:

eMLPP	enhanced Multi-Level Precedence and Pre-emption
GCR:	Group Call Register
NCH:	Notification Channel
VBS:	Voice Broadcast Service
VGCS:	Voice Group Call Service

## 4 Main concepts

### 4.1 Group definition

Service subscribers can become group members on a PLMN wide basis to one or more groups pre-defined in the network by a corresponding group identification (group ID). The membership enables them to receive voice broadcast calls associated with that group ID. In addition, certain group members are entitled by their subscription to initiate voice broadcast calls. Certain dispatchers connected to external networks also require the capability to initiate or receive voice broadcast calls.

In addition to subscriber details in the HLR, it is necessary for the mobile station to be aware of its group membership by storing details on the SIM. This is required because it shall respond to notification messages which include only the group ID (i.e. no IMSI or TMSI details).

Having become a group member, each service subscriber can set to active state or deactive state the group ID or any one out of his several group IDs on the SIM. In active state the subscriber can initiate voice broadcast calls to that group ID. When in deactive state the subscriber can not make voice broadcast calls to the group and the mobile station ignores any notification for that group ID.

### 4.2 Broadcast process

#### 4.2.1 Broadcast call initiation

##### 4.2.1.1 Normal operation with successful outcome

A group call area can be restricted to a single MSC area or can exceed one MSC area (implementation option).

A voice broadcast call shall be initiated by a calling subscriber by a related MMI action for the service selection and the group ID dialled.

The MSC in which the voice broadcast call is initiated obtains (by requesting the Group Call Register (GCR, see clause 5) the group call attributes.

This GCR interrogation after call initiation also determines whether the MSC shall act as anchor- or as relay MSC. If the MSC is not the anchor-MSC then the call will be "forwarded" from the relay to the respective anchor-MSC (information also delivered by GCR) and further "call-establishment" is done by the anchor-MSC as described in the following.

When a calling subscriber initiates a voice broadcast call, one voice broadcast channel shall be established in each cell of the group call area and notifications for that call shall be sent in each of these cells. As an alternative, voice broadcast channels may only be established in cells in reaction to responses received from mobile stations on the notifications. At the same time standard connections to dispatchers in the mobile network or in an external network shall be established.

The calling subscriber shall have an dedicated standard uplink/downlink. All mobile stations of the listening service subscribers in one cell shall only listen to the same common downlink (voice broadcast channel).

Only one voice broadcast channel shall be established in each cell for any given voice broadcast call, although there may be a number of simultaneous voice broadcast calls within the same cell.

Service subscribers shall be notified on the voice broadcast call in each cell. These voice broadcast call notification messages shall be broadcast on the notification channel (NCH).

The notification messages use the group ID rather than individual TMSIs/IMSI. Additionally, a group call area identity (group call area ID) shall be included in order to enable a resolution in the case of overlapping group call areas. A service subscriber's mobile station needs to be able to recognize notification messages for those group IDs subscribed to and presently activated.

The network may also send messages on appropriate voice broadcast channel FACCHs, in order to notify voice broadcast call members who may participate in other voice broadcast calls. In addition , also paging

information messages for standard calls may be sent in order to inform voice broadcast call members on actually paged point-to-point calls.

Further the network may provide notification on the voice group call to service subscribers who have subscribed to the paged group ID and which are in dedicated mode.

The process of broadcasting messages on NCHs is to be carried out throughout the call in order to provide the "late entry" facility whereby group members entering the area can join the call.

On receiving notification of a voice broadcast call a voice broadcast call member's mobile station shall adjust to the nominated channel to receive the broadcast call if this channel was received in the notification message and receive the information on the downlink. Whilst receiving, the mobile station shall not transmit on the uplink SACCH. This group receive mode is different to the normal idle mode or dedicated mode. If no channel description was provided in the notification message, the mobile station shall establish a dedicated connection in order to respond to the notification. The network may then provide the mobile station with a channel description for the voice broadcast call.

As a further mobile station option, the mobile station may read its paging subchannel in the current cell while in group receive mode or in group transmit mode in order to receive paging messages for mobile terminated calls.

#### 4.2.1.2 Exceptional procedures

Completion of links into congested cells where pre-emption did not occur is required.

If the cell in which the calling service subscriber is located is reset, the voice broadcast call shall be released.

On receiving details of a voice broadcast call the user may choose to move to the notified call or the mobile station may automatically move to the notified call if the new call is of higher priority than the existing call and automatic acceptance applies for this priority level.

#### 4.2.2 On-going broadcast calls [SIST ETS 300 934 E5:2003](https://standards.iteh.ai/catalog/standards/sist/938428e2-884a-401f-a018-17215e6861/sist-300-934-e5-2003)

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##### 4.2.2.1 Normal operation with successful outcome [SIST ETS 300 934 E5:2003](https://standards.iteh.ai/catalog/standards/sist/938428e2-884a-401f-a018-17215e6861/sist-300-934-e5-2003)

Within each voice broadcast call only the voice of the calling subscriber shall be transmitted on the voice broadcast downlink channel.

Mobile stations in group receive mode use the group receive mode procedure (see GSM 03.22) to "camp-on" in a new cell to be able to listen to the voice broadcast channel. The mobile station may find the voice broadcast channel details of a new cell on the related NCH.

A network may decide not to establish voice broadcast channels in all cells. Instead, notifications containing no channel description may be provided. If a mobile station moves to such a cell, it must respond to the notification in order to receive the voice broadcast call. The network may then establish a voice broadcast channel and inform the mobile station on the channel position.

NOTE: Concerning security aspects, whilst authentication and membership checking of mobile call originators can be carried out, it is not possible to authenticate service subscribers in group receive mode if they have not before established a dedicated connection to responded to a notification. No equivalent of a group "TMSI" is provided to protect the "identity" of established voice broadcast calls.

#### 4.2.2.2 Exceptional procedures

If a mobile station in group receive mode indicates a failure due to radio link time-out, the mobile station shall behave as specified in GSM 05.08 and go back to idle mode, possibly in another cell, as determined by the cell re-selection algorithm. If a notification is received for the same cell, the mobile station shall try to reconnect.

#### 4.2.3 Leaving of a broadcast call without termination

A destination subscriber being service subscriber can leave the voice broadcast call at any point by "deselecting" it via an MMI function. Having deselected the call the mobile station returns to idle mode and "ignores" any further notification messages related to that call.

NOTE: If a service subscriber does not wish to participate in calls to a particular group ID for long periods of time, the group ID shall be switched to deactive state by the subscriber.

The service subscriber shall have the capability to reselect the voice broadcast call. The mobile station shall not ignore notification messages to that call any more.

The dispatcher shall be able to leave a voice broadcast call without terminating it.

#### 4.2.4 Broadcast call termination

A voice broadcast call can be terminated by the calling subscriber or an entitled dispatcher.

The call must not be maintained if the calling subscriber leaves the group call area (e.g. if he moves into an MSC area where a group call area is no part of).

#### 4.2.5 Acknowledgements

The acknowledgement is an application option.

For voice broadcast calls which are identified by an acknowledgement flag mobile stations which have acknowledgement facilities have to return an acknowledgement message with a predefined content in a predefined manner.

The acknowledgement shall be sent using an appropriate data service, to a predefined address or with a predefined short code stored on the SIM card. The network may apply geographical routing to a predefined acknowledgement service centre.

#### 4.2.6 Transactions between the mobile station and the network

Mobile stations which are in broadcast receive mode shall not perform any transactions with the network while adjusted to the voice broadcast channel. They shall leave the group receive mode and act in a standard way to perform any transaction if necessary and return to the voice broadcast call afterwards.

## 5 General architecture

### 5.1 Group Call Register (GCR)

The general architecture of GSM is maintained. In addition, a network function is required which is used for registration of the broadcast call attributes, the Group Call Register (GCR).

The GCR function is mainly a database function, holding information about voice broadcast calls.

NOTE 1: The GCR implementation is not specified. It may be realized e.g. as a new network node, in a PABX directly attached to an MSC, inside an MSC or as an HLR. The interface between the GCR function and other functions is not specified in the GSM technical specifications. As a consequence, the functional split between MSC and GCR as developed in this specification is only indicative, and other functional splits can be implemented.

The GCR data for a specific voice broadcast call is set at the creation of the broadcast call attributes, and can be subsequently modified. No support for these functions is specified in the GSM technical specifications.

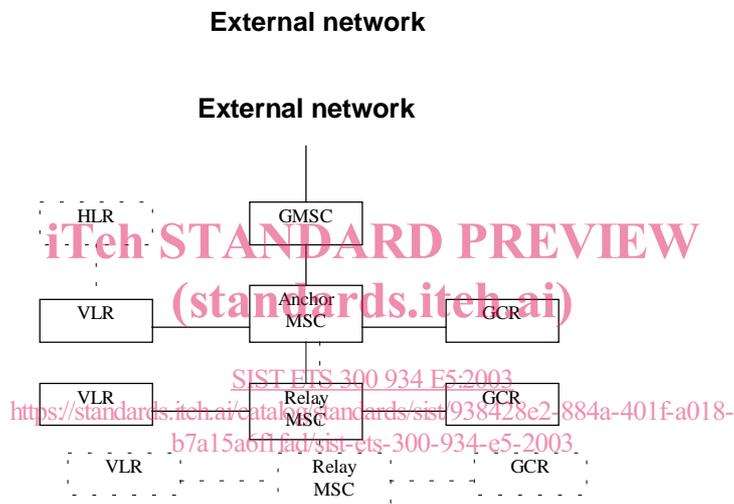


Figure 1: Functional architecture with a Group Call Register

The signalling between the entities shown in figure 1, for the two cases of service subscriber and dispatcher originated calls, shall be as defined in the following.

**Service subscriber originated:** The MSC containing the cell within which this voice broadcast call is initiated shall perform subscription checking against VLR records. It shall then consult its GCR to determine the broadcast call attributes related to its MSC area and whether it is the group call anchor MSC for that voice broadcast call. If it is not, the GCR shall provide with the broadcast call reference and the routing information identifying the group call anchor MSC to the originating MSC. The originating MSC shall then route the voice broadcast call to the anchor MSC. If the originating MSC is the group call anchor MSC, along with the broadcast call attributes, the GCR shall provide information on all group call relay MSCs to be involved.

The group call anchor MSC shall set up links to all group call relay MSCs. Each MSC involved in a voice broadcast call obtains its proper broadcast call attributes from the GCR related to the MSC.

**Dispatcher originated:** In the case of dispatchers calling from an external network, the call request, in the form of an ISDN number, shall be received at a GMSC. The number shall be analysed and the call shall be directly routed to the group call anchor MSC by the GMSC based on the called identity without requesting an HLR. The group call anchor MSC shall interrogate the GCR and obtain the broadcast call attributes. If an identical voice broadcast call is currently in progress, the dispatcher shall be connected to this call and no new call shall be initiated. When interrogating the GCR, the identity of the dispatcher is

compared with the list of dispatchers which are allowed to initiate the call. If the dispatcher is not in the list, or an identity is not provided, the network shall reject the call.

NOTE 2: Optionally dispatchers may also be user of the GSM network in which the VBS service is provided or may directly be connected to a PABX containing the GCR. Dispatcher which are registered for a certain voice broadcast call and which have also a subscription for VBS with the same group ID as the voice broadcast call for which they are dispatcher shall deactivate this group ID when they are located in the corresponding group call area in order to avoid conflicts between paging for the dispatcher and notifications for the group ID.

## 5.2 Voice broadcast call responsibility

The MSC responsible for the voice broadcast call is the one nominated within the GCR or the one to which the call is routed from the GMSC in the case of a dispatcher originated call. This MSC is termed the group call anchor MSC.

If the group call area extends beyond one MSC area then any MSCs controlling cells in the area outside of the group call anchor MSC are referred to as group call relay MSCs.

## 6 Compatibility issues

VBS can not be used with standard Phase 1 or Phase 2 mobile stations. A dedicated mobile station with VBS capability is required.

A mobile station with VBS capability shall also provide the complete functionality in order to allow the use of Phase 2 services.

Standard Phase 1 and Phase 2 mobile stations in a network shall not be impacted by the presence of VBS services in that network due to VBS signalling, also if the mobile station is operated with a SIM of a VBS service subscriber.

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