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Foreword

This Technical Basis for Regulation (TBR) has been produced by the Special Mobile Group (SMG) Technical Committee of the European Telecommunications Standards Institute (ETSI). This TBR covers the requirements for GSM Telephony (speech)

This TBR contains the procedures and requirements for the approval testing of GSM terminal equipment for speech.

The requirements of other TBRs apply in addition to this TBR.

For each test, supplementary information is provided, giving a justification why this item has been selected for regulatory testing, and a reference to the relevant article of the Terminal Directive [1].

This TBR is based on the ETS 300 607-1 (GSM 11.10-1) [2].

This TBR 20 corresponds to TC-SMG TBR 20 version 4.0.0.

NOTE: This TBR for Phase 2 may be developed in stages. The first release will include, as a minimum, all of the basic Phase 2 requirements for full rate and primary band. Subsequent releases will include additional requirements.

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1 Scope

This Technical Basis for Regulation (TBR) specifies the technical requirements to be met by terminal equipment capable of connecting to a public telecommunications network. These requirements apply to terminals for Phase 2 of the public land mobile radio service, operating in the 900 MHz band with a channel separation of 200 kHz, utilising constant envelope modulation and carrying traffic channels according to the Time Division Multiple Access (TDMA) principle.

This TBR specifies the requirements for GSM Telephony (speech) for the GSM900 version of the Global System for Mobile communications (GSM).

For each test purpose and its corresponding conformance requirement, a reference is given to ETS 300 607-1 (GSM 11.10-1) [2]. The requirements apply to speech transmission.

The measurement uncertainty is handled, as described in ETS 300 607-1 (GSM 11.10-1) [2].

This TBR covers the essential requirements of the Terminal Directive 91/263/EEC [1] Article 4g. Articles 4d, 4e, and 4f are covered by TBR 19.

The Terminal Directive 91/263/EEC Articles 4a and 4b are covered by other directives, and, therefore, not by this TBR.

In this TBR, there are no Electromagnetic Compatibility technical requirements in terms of the Terminal Directive 91/263/EEC, Article 4c.

NOTE: Technical Requirements for EMC performance and testing of the equipment are covered by the relevant standards applicable to the EMC Directive 89/336/EEC, Annex A.

Terminal equipment may be subject to additional requirements in other Common Technical Regulations (CTR) depending on the equipments functionality.

ETS 300 607-1 (GSM 11.10-1) [2] constitutes the conformance test suite for GSM. The verification of the conformance requirements in this TBR is based on the tests described in this reference. The set of requirements in ETS 300 607-1 (GSM 11.10-1) [2] and the set of requirements in this TBR need not be identical.

Some requirements only apply to specific types of mobile station (e.g. data tests only apply to mobile stations with a data facility). The TBR also indicates the specific test which shall be carried out for each mobile station type.

An active accessory is covered by this TBR if it modifies the terminal performance in an aspect which affects conformance to essential requirements.

NOTE: Only active devices are subject to this TBR. Accessories may be tested with specific terminals, and either approved for use with those terminals only, or may possibly be approved for use with a wider range of terminals, depending on the nature and effect of the accessory.

2 Normative references

This TBR incorporates, by dated or undated reference, 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 revision of any of these publications apply to the requirements specified in this TBR, only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

- [1] Terminal Directive 91/263/EEC: "Council directive of 29 April 1991 on the approximation of the laws of the Member States concerning telecommunications terminal equipment, including the mutual recognition of their conformity. ("The Terminal Directive")".
- [2] ETS 300 607-1 (GSM 11.10-1 Version 4.13.0): "European digital cellular telecommunications system (phase 2); Mobile station conformity specifications".
- [3] TBR 19: "European digital cellular telecommunications system (Phase 2); Attachment requirements for Global System for Mobile communications (GSM) mobile stations; Access".
- [4] ETS 300 540 (GSM 03.50 Version 4.2.0): "European digital cellular telecommunications system (Phase 2); Transmission planning aspects of the speech service in the GSM Public Land Mobile Network (PLMN) system".
- [5] ETS 300 504 (GSM 02.06 Version 4.4.0): "European digital cellular telecommunication system (Phase 2); Types of Mobile Stations (MS)".

3 Abbreviations

ACK	ACKnowledgement
ARFCN	Absolute Radio Frequency Channel Number
ATR	Answer To Reset
ATT	ATTach (flag)
BA	BCCH Allocation
BC	Bearer Capability
BCCH	Broadcast Control CHannel
BER	Bit Error Ratio
BFI	Bad Frame Indication
BTS	Base Transceiver Station
CC	Call Control
CCH	Control CHannel
CCCH	Common Control CHannel
CFB	Call Forwarding mobile subscriber Busy
CFNRc	Call Forwarding MS Not Reachable
CFU	Call Forwarding Unconditional
CKSN	Ciphering Key Sequence Number
CLK	CLock
CM	Connection Management
CTR	Common Technical Regulations
DCCH	Dedicated Control CHannel
DISC	DISConnect frame
DM	Disconnect Mode (frame)
DRX	Discontinuous Reception (mechanism)
DTE	Data Terminal Equipment
DTMF	Dual Tone Multi Frequency
DTX	Discontinuous Transmission (mechanism)
EA	Address field Extension bit
EL	Length indicator field Extension bit
etu	elementary time unit
F	Final bit
FACCH	Fast Associated Control CHannel

FER	Frame Erasure Ratio
HLR	Home Location Register
HPLMN	Home PLMN
I	Information (frame)
IMEI	International Mobile station Equipment Identity
IMSI	International Mobile Subscriber Identity
L	Length indicator
LA	Location Area
LAC	Location Area Code
LAI	Location Area Identification
M	More data bit
ME	Mobile Equipment
MM	Mobility Management
MMI	Man Machine Interface
MO	Mobile Originated
MOC	Mobile Originated Call
MS	GSM Mobile Station
MT	Mobile terminated
MTC	Mobile terminated Call
N(R)	Receive sequence Number
N(S)	Send sequence Number
N(SD)	SenD sequence Number
NPI	Number Plan Identification
OACSU	Off Air Call Set Up
P	Poll bit
PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation eXtra Information for Testing
PLMN	Public Land Mobile Network
PRC	structured PRoCedures
RA	Random mode request information field
RACH	Random Access CHannel
RAND	RANDom number (authentication)
RBER	Residual Bit Error Ratio
REJ	REJect (frame)
RF	Radio Frequency
RMS	Root Mean Square (value)
RNR	Receiver Not Ready (frame)
RR	Radio Resource (management entity / connection)
RR	Receive Ready (frame) (in L2)
RST	Reset
RXLEV	Received signal LEVel
RXQUAL	Received signal QUALity
RXQUAL_FULL	Received signal QUALity assessed over the FULL set of TDMA frames within a SACCH block
RXQUAL_SUB	Received signal QUALity assessed over a SUBset of 12 TDMA frames
S	S counter
SABM	Set Asynchronous Balanced Mode (frame)
SACCH	Slow Associated Control CHannel
SAPI	Service Access Point Identifier
SDCCH	Stand-alone Dedicated Control CHannel
SIM	Subscriber Identity Module
SMS	Short Message Service
SRES	Signed RESponse (authentication)
SS	System Simulator
TA	Terminal Adapter
TCH	Traffic CHannel
TCH/FS	Full rate Traffic CHannel for Speech
TCH/HS	Half rate Traffic CHannel for Speech
TDMA	Time Division Multiple Access
TE	Terminal equipment
TI	Transaction Identifier
TMSI	Temporary Mobile Subscriber Identity

TN	Timeslot Number
TON	Type Of Number
TXPWR	Transmit PoWeR: Tx power level in the MS_TXPWR_REQUEST and MS_TXPWR_CONF parameters
U	Unnumbered (frame)
UA	Unnumbered Acknowledge (frame)
UI	Unnumbered Information (frame)
V(SD)	SenD state Variable

4 Requirements

The following table contains all requirements that are needed to meet the essential requirements as defined in the Terminal Directive [1]. A justification according to article 4 of the Terminal Directive is given by stating the relevant category (g) together with a text supporting the justification.

The entries are defined as follows:

- "ETS 300 607-1 Item" defines the item number of the conformance requirement and also the reference to ETS 300 607-1 (GSM 11.10-1) [2]. This reference is a normative reference to a subclause of ETS 300 607-1 (GSM 11.10-1) [2] containing the conformance requirement text, and references to the base standard.
- "Description" contains a short description of the requirement
- "TBR Justification" contains supplementary information to explain the justification of the requirement according to article 4 of the Terminal Directive [1].
- "TD Cat" defines the category according to article 4 of the Terminal Directive [1].
- "Test Cat" defines whether the requirement is covered by a "special test situation" (e.g. a manufacturer's declaration of some form). An "X" indicates a special test situation, whilst, a blank entry indicates conformity is by the test referred to by this TBR.

Table 1: Requirements and Justifications

ETS 300 607-1 Item	DESCRIPTION	TBR JUSTIFICATION	TD Cat	Test Cat
14.4.3	Co channel rejection - TCH/HS (SID frames)	Non compliance in this area may impair speech quality.	g	
30.1	Sending sensitivity / frequency response	If this requirement is not met, the MS will not be able to produce a reasonable speech intelligibility	g	
30.2	Sending loudness rating	If this requirement is not met, the MS will not be able to produce a reasonable speech intelligibility	g	
30.3	Receiving sensitivity / frequency response	If this requirement is not met, the MS will not be able to produce a reasonable speech intelligibility	g	
30.4	Receiving loudness rating	If this requirement is not met, the MS will not be able to produce a reasonable speech intelligibility	g	
30.5.1	Side Tone Masking Rating (STMR)	If this requirement is not met, the MS will not be able to produce a reasonable speech intelligibility	g	
30.5.2	Listener Side Tone Rating (LSTR)	If this requirement is not met, the MS will not be able to produce a reasonable speech intelligibility	g	X
30.6.1	Telephone acoustic coupling loss (TAL) - Echo loss (EL)	If this requirement is not met, the MS will not be able to produce a reasonable speech intelligibility	g	
30.6.2	Telephone acoustic coupling loss (TAL) - Stability margin	If this requirement is not met, the MS will not be able to produce a reasonable speech intelligibility	g	
30.7.1	Distortion - Sending	If this requirement is not met, the MS will not be able to produce a reasonable speech intelligibility	g	
32.1	Testing of speech transcoding functions / Full Rate Downlink speech transcoding	If this requirement is not met, the output speech quality will be degraded so that interworking via the public network is not guaranteed.	g	X
32.2	Full Rate Downlink receiver DTX functions	Failure in this area will affect the intelligibility of the telephony signal.	g	
32.3	Full Rate Uplink speech transcoding	If this requirement is not met, the coding of the speech information will be incorrect so that interworking via the public network is not guaranteed.	g	
32.4	Full Rate Uplink transmitter DTX functions	DTX functions are mandatory for implementation in all GSM mobile stations. If a mobile station fails to perform the required functions, annoying effects like speech clipping, modulation of the background noise or even cutting the transmission on the radio path could take place and interworking via the public network is not guaranteed.	g	

Table 1: Requirements and Justifications (continued)

ETS 300 607-1 Item	DESCRIPTION	TBR JUSTIFICATION	TD Cat	Test Cat
32.5.4	Full Rate Speech channel transmission delay - Downlink processing delay	If the delay requirement for GSM mobile stations is not met, the overall circuit delay experienced by users will be unacceptable causing conversational difficulties. Interworking via the public network is not guaranteed.	g	X
32.5.5	Full Rate General test of transparency of MMI inputs - Downlink coding delay	If the delay requirement for GSM mobile stations is not met, the overall circuit delay experienced by users will be unacceptable causing conversational difficulties. Interworking via the public network is not guaranteed.	g	X
32.5.6	Full Rate General test of transparency of MMI inputs - Uplink processing delay	If the delay requirement for GSM mobile stations is not met, the overall circuit delay experienced by users will be unacceptable causing conversational difficulties. Interworking via the public network is not guaranteed.	g	X
32.5.7	Full Rate General test of transparency of MMI inputs - Uplink coding delay	If the delay requirement for GSM mobile stations is not met, the overall circuit delay experienced by users will be unacceptable causing conversational difficulties. Interworking via the public network is not guaranteed.	g	X
32.6	Testing of speech transcoding functions / Half Rate Downlink speech transcoding	If this requirement is not met, the output speech quality will be degraded so that interworking via the public network is not guaranteed.	g	X
32.7	Half Rate Downlink receiver DTX functions	Failure in this area will affect the intelligibility of the telephony signal.	g	
32.8	Half Rate Uplink speech transcoding	If this requirement is not met, the coding of the speech information will be incorrect so that interworking via the public network is not guaranteed.	g	
32.9	Half Rate Uplink transmitter DTX functions	DTX functions are mandatory for implementation in all GSM mobile stations. If a mobile station fails to perform the required functions, annoying effects like speech clipping, modulation of the background noise or even cutting the transmission on the radio path could take place and interworking via the public network is not guaranteed.	g	

Table 1: Requirements and Justifications (concluded)

ETS 300 607-1 Item	DESCRIPTION	TBR JUSTIFICATION	TD Cat	Test Cat
32.9.4	Half Rate Speech channel transmission delay - Downlink processing delay	If the delay requirement for GSM mobile stations is not met, the overall circuit delay experienced by users will be unacceptable causing conversational difficulties. Interworking via the public network is not guaranteed.	g	X
32.9.5	Half Rate General test of transparency of MMI inputs - Downlink coding delay	If the delay requirement for GSM mobile stations is not met, the overall circuit delay experienced by users will be unacceptable causing conversational difficulties. Interworking via the public network is not guaranteed.	g	X
32.9.6	Half Rate General test of transparency of MMI inputs - Uplink processing delay	If the delay requirement for GSM mobile stations is not met, the overall circuit delay experienced by users will be unacceptable causing conversational difficulties. Interworking via the public network is not guaranteed.	g	X
32.9.7	Half Rate General test of transparency of MMI inputs - Uplink coding delay	If the delay requirement for GSM mobile stations is not met, the overall circuit delay experienced by users will be unacceptable causing conversational difficulties. Interworking via the public network is not guaranteed.	g	X
32.10.4	Half rate speech channel transmission delay / downlink processing delay	If the delay requirement for GSM mobile stations is not met, the overall circuit delay experienced by users will be unacceptable causing conversational difficulties. Interworking via the public network is not guaranteed.	g	X
32.10.5	Half rate speech channel transmission delay / downlink coding delay	If the delay requirement for GSM mobile stations is not met, the overall circuit delay experienced by users will be unacceptable causing conversational difficulties. Interworking via the public network is not guaranteed.	g	X
32.10.6	Half rate speech channel transmission delay / uplink processing delay	If the delay requirement for GSM mobile stations is not met, the overall circuit delay experienced by users will be unacceptable causing conversational difficulties. Interworking via the public network is not guaranteed.	g	X
32.10.7	Half rate speech channel transmission delay / uplink coding delay	If the delay requirement for GSM mobile stations is not met, the overall circuit delay experienced by users will be unacceptable causing conversational difficulties. Interworking via the public network is not guaranteed.	g	X

Annex A (normative): The TBR Requirement Table (TBR-RT)

A.1 Introduction to the TBR-RT

This TBR-RT provides a summary of all the requirements of this TBR. It shows the status of each TBR-Requirement (TBR-R), whether it is essential to implement in all circumstances, or whether the requirement is dependant on the manufacturer having chosen to support a particular optional service or functionality. In particular it enables the TBR-Rs associated with a particular optional service or functionality to be grouped and identified.

The static requirements proforma provides the means to capture the choices which the manufacturer has made in implementing the equipment.

The dynamic requirements proforma indicates the choices for which conformance is claimed for.

When completed in respect of a particular equipment the tables provide a means to undertake the static assessment of conformity with the TBR, and to select the appropriate test cases to be used in dynamically testing the equipment.

References to items

For each possible item answer (answer in the support column) within the static requirements tables there exists a unique reference, used, for example, in the conditional expressions. It is defined as the table identifier, followed by a solidus character "/", followed by the item number in the table. If there is more than one support column in a table, the columns shall be discriminated by letters (a, b, etc.), respectively.

EXAMPLE 1: A.5/4 is the reference to the answer of item 4 in table A.5.

EXAMPLE 2: A.6/3b is the reference to the second answer (i.e. in the second support column) of item 3 in table A.6.

Prerequisite line

A prerequisite line takes the form: Prerequisite: <predicate>.

A prerequisite line after a clause or table title indicates that the whole clause or the whole table is not required to be completed if the predicate is FALSE.

A.2 Format of the tables

The entries of the static requirement tables are defined as follows:

- In the "Item" column a local entry number for the requirement in the TBR-RT is given.
- In the "Description" column a short non-exhaustive description of the requirement is found.
- The "Ref." column references the corresponding clause of base standard or ETS 300 607-1 (GSM 11.10-1) [2].
- In the "Status" column the status of the entry, as further detailed in the following clause, is indicated.
- The "Support" column is blank in the proforma, and shall be completed by the manufacturer in respect of each particular requirement to indicate the choices, which have been made in the implementation.
- The "Mnemonic" assigns a symbolic name to the static requirement.

The entries of the dynamic requirement tables are defined as follows:

- "ETS 300 607-1 Item" defines the item number of the conformance requirement and also the reference to ETS 300 607-1 (GSM 11.10-1) [2]. This reference is a normative reference to a section of ETS 300 607-1 (GSM 11.10-1) [2] containing the conformance requirement text, and references to the base standard.
- In the "Description" column a short non-exhaustive description of the requirement is found.
- The "TD Cat" column the class of essential requirements is indicated. Essential requirements are classified according to article 4 of the EC Council Directive, 91/263/EEC. The only valid entry in this TBR-RT is g, corresponding to respectively "interworking of terminal equipment via the public telecommunication network".
- In the "Status" column the status of the entry, as further detailed in the following clause, is indicated.
- The "Support" column is blank in the proforma, and shall be completed by the manufacturer in respect of each particular requirement to indicate the choices, for which conformance is claimed for.

A.3 References to ETS 300 607-1 (GSM 11.10-1)

The reference number in column "ETS 300 607-1 Item" references subclauses in ETS 300 607-1 (GSM 11.10-1) [2].

A.4 Notations used in the TBR-RT

A.4.1 Status Notations

The "STATUS" column shows the status of the entries as follows:

M	Mandatory, shall be implemented under all circumstances;
O	Optional, may be provided, but if provided shall be implemented in accordance with the requirements;
O.<n>	This status is used for mutually exclusive or selectable options among a set, in cases where it is mandatory to implement one or more options among a set. The integer <n> refers to a unique group of options within the TBR-RT. A footnote under the table in which it is used states explicitly what the requirement is for each numbered group.
C<n>	Conditional number <n>. Reference is made to a Boolean expression under the table with predicates of support answers, which will resolve to either "M", "X", "N", or "O.<n>" for a specific implementation. In all cases "ELSE Not Applicable" is implied, if an ELSE expression is omitted.
N/A	Not applicable.
X	Excluded or Prohibited.

A.4.2 Support Answer Notations

The "support" column is reserved for completion in respect of a particular implementation. Entries may be:

Yes (or Y or y)	Indicating that the implementation claims to fully implement the TBR-R in accordance with the specification. The entry of a "Yes" against an "X" status entry means the equipment does not conform to the TBR.
No (or N or n)	Indicating that the implementation does not claim full support of the TBR-R in accordance with the specification. The entry "No" against an "M" status entry means the equipment does not conform to the TBR.

A.5 The TBR Requirement Tables

A.5.1 Static Requirements, TBR-RT A

Table A.1: Static Requirements

Item	Description	Ref.	Status	Support	Mnemonic
1	Speech Half Rate	GSM 02.06	O		AddInfo_HalfRateSpeech
2	Handset MS supporting speech	GSM 03.50 3	O		AddInfo_SpeechHandset

A.5.2 Dynamic Requirements, TBR-RT B

Table A.2: Dynamic Requirements

ETS 300 607-1 Item	DESCRIPTION	TD Cat	Status	Supported
14.4.3	Co channel rejection - TCH/HS (SID frames)	g	C1	
30.1	Sending sensitivity / frequency response	g	C2	
30.2	Sending loudness rating	g	C2	
30.3	Receiving sensitivity / frequency response	g	C2	
30.4	Receiving loudness rating	g	C2	
30.5.1	Side Tone Masking Rating (STMR)	g	C2	
30.5.2	Listener Side Tone Rating (LSTR)	g	C2	
30.6.1	Telephone acoustic coupling loss (TAL) - Echo loss (EL)	g	C2	
30.6.2	Telephone acoustic coupling loss (TAL) - Stability margin	g	M	
30.7.1	Distortion - Sending	g	C2	
32.1	Testing of speech transcoding functions / Full rate Downlink speech transcoding	g	M	
32.2	Full rate Downlink receiver DTX functions	g	M	
32.3	Full rate Uplink speech transcoding	g	M	
32.4	Full rate Uplink transmitter DTX functions	g	M	
32.5.4	Full rate Speech channel transmission delay - Downlink processing delay	g	M	
32.5.5	Full rate General test of transparency of MMI inputs - Downlink coding delay	g	M	
32.5.6	Full rate General test of transparency of MMI inputs - Uplink processing delay	g	M	
32.5.7	Full rate General test of transparency of MMI inputs - Uplink coding delay	g	M	
32.6	Testing of speech transcoding functions / Half rate Downlink speech transcoding	g	C1	
32.7	Half rate Downlink receiver DTX functions	g	C1	
32.8	Half rate Uplink speech transcoding	g	C1	
32.9	Half rate Uplink transmitter DTX functions	g	C1	
32.10.4	Half rate Speech channel transmission delay - Downlink processing delay	g	C1	
32.10.5	Half rate General test of transparency of MMI inputs - Downlink coding delay	g	C1	
32.10.6	Half rate General test of transparency of MMI inputs - Uplink processing delay	g	C1	
32.10.7	Half rate General test of transparency of MMI inputs - Uplink coding delay	g	C1	
C1	IF A.1/1 THEN M ELSE N/A	-- AddInfo_HalfRateSpeech		
C2	IF A.1/2 THEN M ELSE N/A	-- AddInfo_SpeechHandset		

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