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Digital cellular telecommunications system (Phase 2+) (GSM); In-band control of remote transcoders and rate adaptors for full rate traffic channels (GSM 08.60 version 7.2.1 Release 1998)

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European Standard (Telecommunications series)

**Digital cellular telecommunications system (Phase 2+);
In-band control of remote transcoders and rate adaptors
for full rate traffic channels
(GSM 08.60 version 7.2.1 Release 1998)**

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KeywordsDigital cellular telecommunications system,
Global System for Mobile communications (GSM)**ETSI**650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Special Mobile Group (SMG).

The present document specifies the inband control of remote transcoders and rate adaptors for Full Rate speech, Enhanced Full Rate speech, Adaptive Multi-Rate speech and full rate data within the Digital cellular telecommunications system (Phase 2+).

The specification from which the present document has been derived was originally based on CEPT documentation, hence the presentation of the present document may not be entirely in accordance with the ETSI/PNE Rules.

The contents of the present document is subject to continuing work within SMG and may change following formal SMG approval. Should SMG modify the contents of the present document it will be re-released with an identifying change of release date and an increase in version number as follows:

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- 7 indicates Release 1998 of GSM Phase 2+.
- x the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- y the third digit is incremented when editorial only changes have been incorporated in the specification.

National transposition dates

Date of adoption of this EN:	12 May 2000
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Date of latest publication of new National Standard or endorsement of this EN (dop/e):	29 February 2001
Date of withdrawal of any conflicting National Standard (dow):	29 February 2001

1 Scope

When 64 kbit/s traffic channels are used on the Abis interface, the speech shall be coded according to CCITT Recommendation G.711 and the data rate adaptation shall be as specified in GSM 04.21 and GSM 08.20.

In the case where 16 kbit/s traffic channels are used for full rate speech, enhanced full rate speech, Adaptive Multi-Rate speech or full rate data service, then the present document shall apply for frame structure and for control of remote transcoders and additional rate adaptors.

For Adaptive Multi-Rate speech the present document specifies the 16 kBit/s submultiplexing, both for the full and the half rate traffic channels (TCH/AFS and TCH/AHS). The specification for 8 kBit/s submultiplexing is given in GSM 08.61, both for the full and the half rate traffic channels (TCH/AFS and TCH/AHS).

The use and general aspects of the Abis interface are given in GSM 08.51.

NOTE: The present document should be considered together with the GSM 06 series of specifications, GSM 04.21 (Rate Adaptation on the MS-BSS Interface) and GSM 08.20 (Rate Adaptation on the BS/MS Interface).

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.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.
- For this Release 1998 document, references to GSM documents are for Release 1998 versions (version 7.x.y).

- [1] GSM 01.04: "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".
- [2] GSM 04.06: "Digital cellular telecommunications system (Phase 2+); Mobile Station - Base Station System (MS - BSS) interface; Data Link (DL) layer specification".
- [3] GSM 04.21: "Digital cellular telecommunications system (Phase 2+); Rate adaption on the Mobile Station - Base Station System (MS - BSS) interface".
- [4] GSM 06.01: "Digital cellular telecommunications system (Phase 2+); Full rate speech; Processing functions".
- [5] GSM 06.10: "Digital cellular telecommunications system (Phase 2+); Full rate speech; Transcoding".
- [6] GSM 06.11: "Digital cellular telecommunications system (Phase 2+); Full rate speech; Substitution and muting of lost frames for full rate speech channels".
- [7] GSM 06.12: "Digital cellular telecommunications system (Phase 2+); Full rate speech; Comfort noise aspect for full rate speech traffic channels".
- [8] GSM 06.31: "Digital cellular telecommunications system (Phase 2+); Full rate speech; Discontinuous Transmission (DTX) for full rate speech traffic channels".
- [9] GSM 06.32: "Digital cellular telecommunications system (Phase 2+); Voice Activity Detector (VAD)".

- [10] GSM 08.20: "Digital cellular telecommunications system (Phase 2+); Rate adaption on the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface".
- [11] GSM 08.51: "Digital cellular telecommunications system (Phase 2+); Base Station Controller - Base Transceiver Station (BSC - BTS) interface; General aspects".
- [12] GSM 08.54: "Digital cellular telecommunications system (Phase 2+); Base Station Controller - Base Transceiver Station (BSC - BTS) interface; Layer 1 structure of physical circuits".
- [13] GSM 08.58: "Digital cellular telecommunications system (Phase 2+); Base Station Controller - Base Transceiver Station (BSC - BTS) interface; Layer 3 specification".
- [14] GSM 12.21: "Digital cellular telecommunications system (Phase 2+); Network Management (NM) procedures and message on the A-bis interface".
- [15] CCITT Recommendation G.711: "Pulse code modulation (PCM) of voice frequencies".
- [16] CCITT Recommendation I.460: "Multiplexing, rate adaption and support of existing interfaces".
- [17] CCITT Recommendation V.110: "Support of data terminal equipments (DTEs) with V-Series interfaces by an integrated services digital network".
- [18] GSM 06.51: "Digital cellular telecommunications system (Phase 2+); Enhanced Full rate speech processing functions".
- [19] GSM 06.60: "Digital cellular telecommunications system (Phase 2+); Enhanced Full rate speech transcoding".
- [20] GSM 06.61: "Digital cellular telecommunications system (Phase 2+); Substitution and muting of lost frames for Enhanced Full rate speech channels".
- [21] GSM 06.62: "Digital cellular telecommunications system (Phase 2+); Comfort noise aspect for Enhanced Full rate speech traffic channels".
- [22] GSM 06.81: "Digital cellular telecommunications system (Phase 2+); Discontinuous Transmission (DTX) for Enhanced Full rate speech traffic channel".
- [23] GSM 06.82: "Digital cellular telecommunications system (Phase 2+); Voice Activity Detection (VAD)".
- [24] GSM 06.71: "Digital cellular telecommunications system; Adaptive Multi-Rate speech processing functions, General Description".
- [25] GSM 06.90: "Digital cellular telecommunications system; Adaptive Multi-Rate speech transcoding".
- [26] GSM 06.91: "Digital cellular telecommunications system; Substitution and muting of lost frames for Adaptive Multi-Rate speech traffic channels".
- [27] GSM 06.92: "Digital cellular telecommunications system; Comfort noise aspect for Adaptive Multi-Rate speech traffic channels".
- [28] GSM 06.93: "Digital cellular telecommunications system; Discontinuous Transmission (DTX) for Adaptive Multi-Rate speech traffic channels".
- [29] GSM 06.94: "Digital cellular telecommunications system; Voice Activity Detection (VAD) for Adaptive Multi-Rate speech traffic channels".
- [30] GSM 05.09: "Digital cellular telecommunications system; Link Adaptation".
- [31] GSM 08.61: "Digital cellular telecommunications system; Inband control of remote transcoders and rate adaptors for half rate traffic channels".
- [32] GSM 08.62: "Digital cellular telecommunications system; Inband Tandem Free Operation (TFO) of Speech Codecs".

1.2 Abbreviations

Abbreviations used in the present document are listed in GSM 01.04. Additionally:

AMR	Adaptive Multi-Rate
CMC	Codec_Mode_Command
CMI	Codec_Mode_Indication
CMR	Codec_Mode_Request
Onset	Speech Onset Frame Classification
PAB	Phase Alignment Bit
PAC	Phase Alignment Command
RATSCCH	Robust AMR Traffic Synchronised Control CHannel
RIF	Request or Indication Flag
TAC	Time Alignment Command
TAE	Time Alignment Extension
TFO	Tandem Free Operation
TFOE	TFO Enable
UFE	Uplink Frame Error

2 General Approach

When the transcoders/rate adaptors are positioned remote to the BTS, the information between the Channel Codec Unit (CCU) and the remote Transcoder/Rate Adaptor Unit (TRAU) is transferred in frames with a fixed length of 320 bits (20 ms). In the present document, these frames are denoted "TRAU frames". Within these frames, both the speech/data and the TRAU associated control signals are transferred.

The Abis interface should be the same if the transcoder is positioned 1) at the MSC site of the BSS or if it is positioned 2) at the BSC site of the BSS. In case 1), the BSC should be considered as transparent for 16 kbit/s channels.

In case of 4,8 and 9,6 kbit/s channel coding when data is adapted to the 320 bit frames, a conversion function is required in addition to the conversion/rate adaption specified in GSM 08.20. This function constitutes the RAA. In case of 14,5 kbit/s channel coding, no RAA rate adaption is required because V.110 framing is not used.

The TRAU is considered a part of the BSC, and the signalling between the BSC and the TRAU (e.g. detection of call release, handover and transfer of O&M information) may be performed by using BSC internal signals. The signalling between the CCU and the TRAU, using TRAU frames as specified in the present document, is mandatory when the Abis interface is applied.

NOTE: If standard 64 kbit/s switching is used in the BSC, multiplexing according to CCITT Recommendation I.460 should apply at both sides of the switch.

In figure 2.1, a possible configuration of the TRAU and the CCU is shown.

The functions inside the TRAU are:

- "Remote Transcoder and Rate Adaptor Control Function" (RTRACF);
- "Remote Speech Handler Function" (RSHF);
- The RAA function in case of 4,8 and 9,6 kbit/s channel coding;
- The RAA' function in case of 14,5 kbit/s channel coding;
- The RA2 function;
- The transcoder function.
- Optionally the TFO functions (see GSM 08.62).

The functions inside the CCU are:

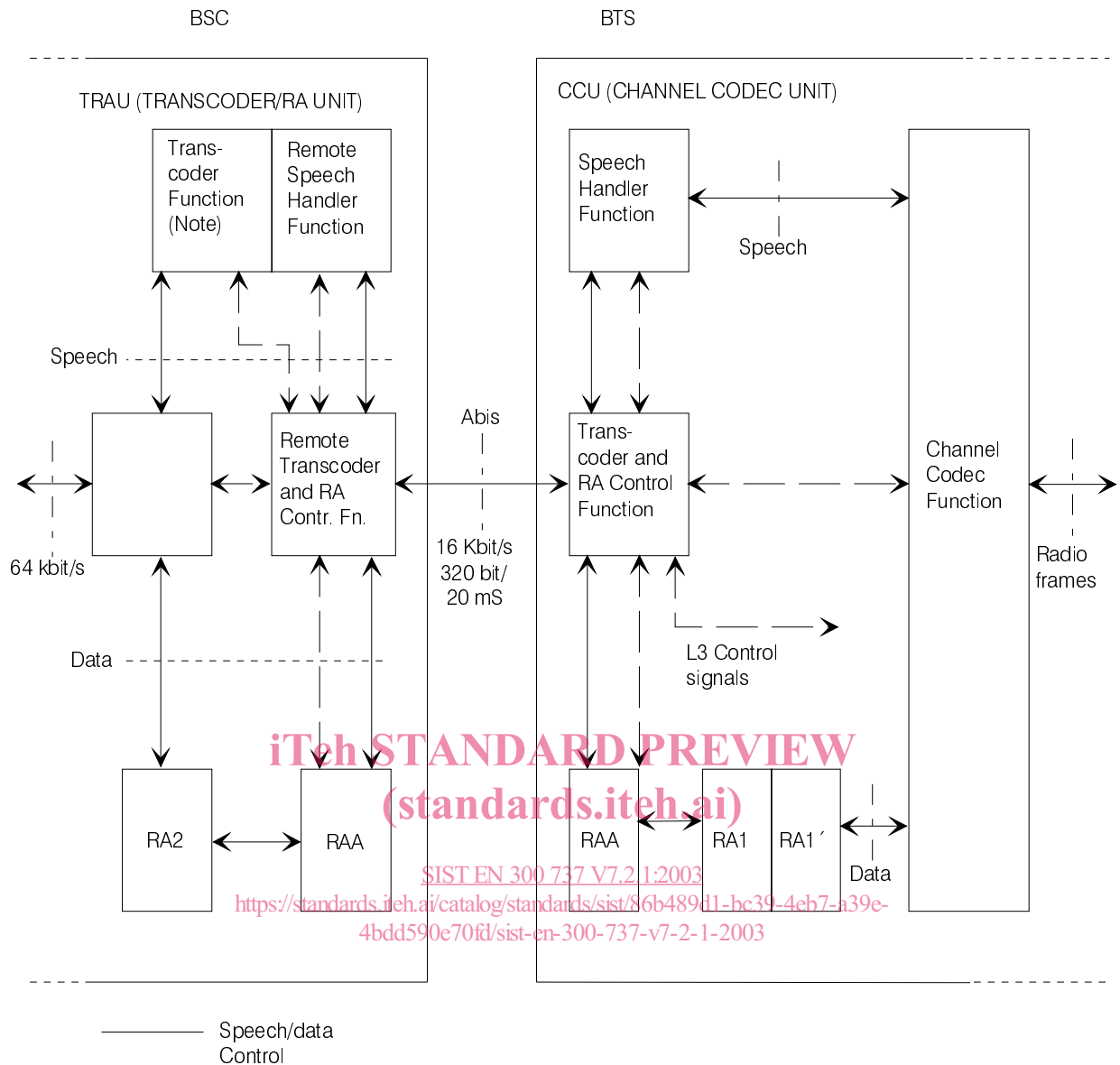
- "Transcoder and Rate Adaptor Control Function" (TRACF);
- "Speech Handler Function" (SHF);
- The RAA function in case of 4,8 kbit/s and 9,6 kbit/s channel coding;
- The RA1/RA1' function in case of 4,8 kbit/s and 9,6 kbit/s channel coding;
- The RA1'/RAA' function in case of 14,5 kbit/s channel coding;
- The channel codec function;
- If AMR is supported, the Link Adaptation (see GSM 05.09).

The present document will not describe the procedures inside the TRAU and the CCU. The layout in figure 2.1 is only intended as a reference model.

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NOTE 1: This recommendation assumes the DTX handler function to be a part of the Transcoder Function.

NOTE 2: This figure applies only for 4,8 kbit/s and 9,6 kbit/s channel coding.

Figure 2.1: Functional entities for handling of remote control of remote transcoders and rate adaptors

3 Frame Structure

3.1 Frames for Speech Services

3.1.1 Frames for Full Rate and Enhanced Full Rate Speech

Octet no.	Bit number							
	1	2	3	4	5	6	7	8
0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0
2	1	C1	C2	C3	C4	C5	C6	C7
3	C8	C9	C10	C11	C12	C13	C14	C15
4	1	D1	D2	D3	D4	D5	D6	D7
5	D8	D9	D10	D11	D12	D13	D14	D15
6	1	D16	D17	D18	D19	D20	D21	D22
7	D23	D24	D25	D26	D27	D28	D29	D30
8	1	D31	D32	D33	D34	D35	D36	D37
9	D38	D39	D40	D41	D42	D43	D44	D45
10	1	D46	D47	D48	D49	D50	D51	D52
11	D53	D54	D55	D56	D57	D58	D59	D60
12	1	D61	D62	D63	D64	D65	D66	D67
13	D68	D69	D70	D71	D72	D73	D74	D75
14	1	D76	D77	D78	D79	D80	D81	D82
15	D83	D84	D85	D86	D87	D88	D89	D90
16	1	D91	D92	D93	D94	D95	D96	D97
17	D98	D99	D100	D101	D102	D103	D104	D105
18	1	D106	D107	D108	D109	D110	D111	D112
19	D113	D114	D115	D116	D117	D118	D119	D120
20	1	D121	D122	D123	D124	D125	D126	D127
21	D128	D129	D130	D131	D132	D133	D134	D135
22	1	D136	D137	D138	D139	D140	D141	D142
23	D143	D144	D145	D146	D147	D148	D149	D150
24	1	D151	D152	D153	D154	D155	D156	D157
25	D158	D159	D160	D161	D162	D163	D164	D165
26	1	D166	D167	D168	D169	D170	D171	D172
27	D173	D174	D175	D176	D177	D178	D179	D180
28	1	D181	D182	D183	D184	D185	D186	D187
29	D188	D189	D190	D191	D192	D193	D194	D195
30	1	D196	D197	D198	D199	D200	D201	D202
31	D203	D204	D205	D206	D207	D208	D209	D210
32	1	D211	D212	D213	D214	D215	D216	D217
33	D218	D219	D220	D221	D222	D223	D224	D225
34	1	D226	D227	D228	D229	D230	D231	D232
35	D233	D234	D235	D236	D237	D238	D239	D240
36	1	D241	D242	D243	D244	D245	D246	D247
37	D248	D249	D250	D251	D252	D253	D254	D255
38	1	D256	D257	D258	D259	D260	C16	C17
39	C18	C19	C20	C21	T1	T2	T3	T4