EUROPEAN TELECOMMUNICATION STANDARD

ETS 300 591

September 1994

Source: ETSI TC-SMG

Reference: GSM 08.20

ICS: 33.060.30

Key words: European digital cellular telecommunications system, Global System for Mobile communications (GSM)

European digital cellular telecommunications system (Phase 2); Rate adaption on the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface (GSM 08.20)

ETSI

European Telecommunications Standards Institute

ETSI Secretariat

Postal address: F-06921 Sophia Antipolis CEDEX - FRANCE
Office address: 650 Route des Lucioles - Sophia Antipolis - Valbonne - FRANCE
X.400: c=fr, a=atlas, p=etsi, s=secretariat - **Internet:** secretariat@etsi.fr

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

Contents

Blank page

Foreword

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

This ETS defines the rate adaption on the Base Station System (BSS) to Mobile-services Switching Centre (MSC) interface. This ETS corresponds to GSM technical specification GSM 08.20 version 4.2.2.

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

Reference is made within this ETS to GSM-TSs (NOTE).

Reference is also made within this ETS to GSM xx.xx. series. The specifications in the series can be identified, with their full title, within the normative reference Clause of this ETS by the first two digits of their GSM reference number e.g. GSM 09.xx series, refers to GSM 09.01, GSM 09.02, etc.

NOTE: TC-SMG has produced documents which give the technical specifications for the implementation of the European digital cellular telecommunications system. Historically, these documents have been identified as GSM Technical Specifications (GSM-TSs). These TSs may have subsequently become I-ETSs (Phase 1), or ETSs (Phase 2), whilst others may become ETSI Technical Reports (ETRs). GSM-TSs are, for editorial reasons, still referred to in current GSM ETSs.

Blank page

0 SCOPE

This specification defines rate adaptation functions to be used in GSM PLMN Base Station Systems (BSS) and transcoders for adapting radio interface data rates to the 64 kbit/s needed at the MSC in accordance with GSM 03.10.

The number of BSS-MSC traffic channels supporting data rate adaptation may be limited. In this case some channels may not support data rate adaptation. Those that do must conform to this specification.

Note: This specification should be considered together with TS GSM 04.21 to give a complete description of PLMN rate adaptation.

1 Normative references

This ETS incorporates by dated and 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 revisions of any of these publications apply to this ETS 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 100): "European digital cellular telecommunication system (Phase 2); Definitions, abbreviations and acronyms".

[2] GSM 03.10 (ETS 300 528): "European digital cellular telecommunication system (Phase 2); GSM Public Land Mobile Network (PLMN) connection types".

[3] GSM 04.21 (ETS 300 562): "European digital cellular telecommunication system (Phase 2); Rate adaption on the Mobile Station - Base Station System (MS - BSS) interface".

[4] GSM 04.22 (ETS 300 563): "European digital cellular telecommunication system (Phase 2); Radio Link Protocol (RLP) for data and telematic services on the Mobile Station - Base Station System (MS - BSS) interface and the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface".

[5] GSM 05.03 (ETS 300 575): "European digital cellular telecommunication system (Phase 2); Channel coding".

[6] GSM 07.01 (ETS 300 582): "European digital cellular telecommunication system (Phase 2); General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".

[7] GSM 08.08 (ETS 300 590): "European digital cellular telecommunication system (Phase 2); Mobile Switching Centre - Base Station System (MSC - BSS) interface Layer 3 specification".

[8] GSM 09.07 (ETS 300 604): "European digital cellular telecommunication system (Phase 2); General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN)".

[9] CCITT Recommendation V.110: "Support of data terminal equipments (DTEs) with V-Series interfaces by an integrated services digital network".

2 ABBREVIATIONS

In addition to those below, abbreviations used in this specification are listed in GSM 01.04.

FSI Frame Start Identifier

3 GENERAL APPROACH

GSM 03.10 (section 4) defines the PLMN connection types necessary to support the GSM PLMN data and telematic services.

Within the BSS and transcoder are two data rate adaptation functions which are combined as shown in 03.10 as part of a connection type.

These functions are RA1/RA1' and RA2. The RA2 function is equivalent to that described in CCITT Recommendation V.110.

The RA1/RA1' is a relay function used as indicated in GSM 03.10.

The BSS uses the information contained in the ASSIGNMENT REQUEST message on the A-interface (see rec. GSM 08.08) to set the "E bits" and to map the "D bits" as shown below, as well as to choose the correct channel coding.

4 The RA1/RA1' FUNCTION

Refer to section 5 of GSM 04.21.

4.1 Radio Interface rate of 12 kbit/s

Described in section 5.1 of GSM 04.21.

4.2 Radio Interface rate of 6 kbit/s

Described in section 5.2 of GSM 04.21.

4.3 Radio Interface rate of 3.6 kbit/s

Described in section 5.3 of GSM 04.21.

4.4 Synchronisation

Refer to section 5.4 of GSM 04.21.

4.5 Idle frames

Refer to section 5.5 of GSM 04.21

5 THE RA2 FUNCTION

Described in section 4 of GSM 04.21.

6 SUPPORT OF NON-TRANSPARENT BEARER SERVICES

In the case of non-transparent services the RA1/RA1' function performs the same mapping as that described for transparent services, using 12 and 6 kbit/s radio interface data rates, with the following modification.

The E2 and E3 bits in the modified CCITT V.110 80 bit frames shown in figure 2 (derived from the standard CCITT V.110 frame shown in figure 1) are used to indicate each consecutive sequence of CCITT V.110 80 bit frames corresponding to the four modified CCITT V.110 60 bit frames (figure 3) received/transmitted in one radio interface frame. This allows 240 bit Radio Link Protocol frames to/from the MSC to be aligned with the 4x60 bit frames encoded by the radio subsystem channel coder as a single unit (see GSM 05.03). The 8 bits consisting of the E2 and E3 bits in one of the above sequences is referred to as the Frame Start Identifier. The FSI value is 00 01 10 11. This value is assigned to the E2 and E3 bits as shown in Table 1.

	E2	E3
First Modified CCITT V.110 80 bit frame	0	0
Second	0	1
Third	1	0
Fourth	1	1

TABLE 1

As each RLP frame is transported between the BSS and MSC in fourmodified CCITT V.110 80 bit frames, it is necessary following a transmission break and at start up, to determine which modified CCITT V.110 80 bit frame of the stream is the first for a particular RLP frame. This is needed so that correct alignment with the radio subsystem can be achieved.

Modified V.110 80 bit frames can slip in time during re-routing, and whilst sync exists within the modified CCITT V.110 80 bit frame to determine the modified CCITT V.110 80 bit frame boundaries, the FSI is required to determine which quarter of an RLP frame each modified CCITT V.110 80 bit frame contains.

6.1 Alignment

An alignment window spanning four modified CCITT V.110 80 bit frames is used to search for the pattern of 8 bits described above in order to identify alignment with an RLP frame.

In the event of failure to detect the 8 bit pattern, the alignment window is shifted one complete modified V.110 80 bit frame, discarding the contents of the most historical frame and then checking the new 8 bit pattern.

6.2 Support of Discontinuous Transmission (DTX)

The E1 bit in the modified CCITT V.110 80 bit frame shown in figure 2 is used in the direction MSC-BSS to indicate that DTX may be invoked (see GSM 04.22). The E1 bit in all of the four consecutive frames relating to the RLP frame to which DTX may be applied shall be set to 1. If DTX is not to be applied, the E1 bit shall be set to 0.

In the direction BSS-MSC the E1 bit shall always be set to 0.

6.3 Order of Transmission

The first bit of each quarter of an RLP frame to be transmitted will correspond to bit D1 of a modified V.110 frame (figures 2 and 3). The remaining 59 bits of each quarter of an RLP frame will correspond to the D and D' bits , D2 - D'12, in order left to right and top to bottom as shown in figures 2 and 3.

The first quarter of an RLP frame to be transmitted will contain the E2 and E3 bit code 00 as shown in Table 1. The second quarter will contain the code 01, etc.

7 SUPPORT OF TRANSPARENT BEARER SERVICES

The CCITT V.110 80 bit frame is used for transparent data on the interface A.

7.1 User rate adaptation on the A interface

In case of transparent services every data call is allocated a 64 kbit/s digital circuit on the A interface.

The 64 kbit/s consists of octets, bits 1 through 8, with bit 1 transmitted first.

For a 9600 b/s user rate the V.110 frame is carried with a 16 kb/s stream which occupies bit positions (1,2).

For user rates of either 4800 b/s, 2400 b/s, 1200 b/s, 300 b/s or 1200/75 b/s the V.110 frame is carried with a 8 kb/s stream which occupies bit position (1). For user rates < 1200b/s asynchronous characters are padded with additional stop elements by the RA0 function (in the MSC/IWF) to fit into 600 b/s synchronous RA1 rate prior to rate adaptation to 64kb/s.

No use of 4 kb/s stream is foreseen.

In a given V.110 frame on the A interface:

- for 9600 b/s there is no repetition of bits D within the 16 kb/s stream ;
- for 4800 b/s there is no repetition of bits D within the 8 kb/s stream ;
- for 2400 b/s each bit D is repeated twice within the 8 kb/s stream (D1 D1 D2 D2 etc) ;
- for 1200 b/s each bit D is repeated four times within the 8 kb/s stream (D1 D1 D1 D1 D2 D2 D2 D2 etc) ;
- for 600 b/s each bit D is repeated eight times within the 8kb/s stream (D1 D1 D1 D1 D1 D1 D1 D1 D2 D2 D2 D2 D2 D2 D2 D2 etc);
- for 1200/75 b/s each bit D is repeated four times within the 8 kb/s stream for 1200 b/s. 75 bit/s will be padded by additional stop elements to fit 600 b/s by the RA0 function. For the resulting 600 b/s each bit D is repeated eight times within the 8kb/s stream.

7.2 Handling of status bits X, SA, SB

The status bit SA is coded repeatedly as S1, S3, S6, S8, and SB is coded repeatedly as S4 and S9 in figure 1.

The handling of the status bits will comply with the synchronisation procedures for transparent services which are described in GSM 09.07 (MSC), GSM 04.21 (BSS), GSM 07.01 (MS).

7.3 Handling of bits E1 to E7

Bits E1 to E3 are used according to 04.21.

Bits E4 to E7 may be used for network independent clocking as indicated in GSM 04.21.

OCTET No.	BIT NUMBER							
	0	1	2	3	4	5	6	7
0	0	0	0	0	0	0	0	0
1	1	D1	D2	D3	D4	D5	D6	S1
2	1	D7	D8	D9	D10	D11	D12	X
3	1	D13	D14	D15	D16	D17	D18	S3
4	1	D19	D20	D21	D22	D23	D24	S4
5	1	E1	E2	E3	E4	E5	E6	E7
6	1	D25	D26	D27	D28	D29	D30	S6
7	1	D31	D32	D33	D34	D35	D36	X
8	1	D37	D38	D39	D40	D41	D42	S8
9	1	D43	D44	D45	D46	D47	D48	S9

Figure 1 The CCITT V.110 80 bit frame for Transparent Data

OCTET No.	BITNUMBER							
	0	1	2	3	4	5	6	7
0	0	0	0	0	0	0	0	0
1	1	D1	D2	D3	D4	D5	D6	D'1
2	1	D7	D8	D9	D10	D11	D12	D'2
3	1	D13	D14	D15	D16	D17	D18	D'3
4	1	D19	D20	D21	D22	D23	D24	D'4
5	1	E1	E2	E3	D'5	D'6	D'7	D'8
6	1	D25	D26	D27	D28	D29	D30	D'9
7	1	D31	D32	D33	D34	D35	D36	D'10
8	1	D37	D38	D39	D40	D41	D42	D'11
9	1	D43	D44	D45	D46	D47	D48	D'12

Figure 2 The modified CCITT V.110 80 bit frame for Non-Transparent Data

D1	D2	D3	D4	D5	D6	D'1
D7	D8	D9	D10	D11	D12	D'2
D13	D14	D15	D16	D17	D18	D'3
D19	D20	D21	D22	D23	D24	D'4
D'5	D'6	D'7	D'8	D25	D26	D27
D28	D29	D30	D'9	D31	D32	D33
D34	D35	D36	D'10	D37	D38	D39
D40	D41	D42	D'11	D43	D44	D45
D46	D47	D48	D'12			

Figure 3 Modified CCITT V.110 60 bit frame for Non-Transparent Data

History

Document history	
September 1994	First Edition
June 1996	Converted into Adobe Acrobat Portable Document Format (PDF)