

ETSI/TC SMG

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RELEASE NOTE

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1. Reason for changes

No changes since the previously distributed version.

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Title: RATE ADAPTATION ON THE BSS-MSC INTERFACE

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0. SCOPE

This recommendation 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 recommendation 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 recommendation.

Note: This recommendation should be considered together with GSM Recommendation 04.21 (Rate Adaptation on MS-BSS Interface) to give a complete description of PLMN rate adaptation.

1. GENERAL APPROACH

GSM recommendation 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.

2. THE RA1/RA1' FUNCTION

Refer to section 5 of GSM 04.21.

2.1. Radio Interface rate of 12 kbit/s

Described in section 5.1 of GSM 04.21.

2.2. Radio Interface rate of 6 kbit/s

Described in section 5.2 of GSM 04.21.

2.3. Radio Interface rate of 3.6 kbit/s

Described in section 5.3 of GSM 04.21.

2.4. Synchronisation

Refer to section 5.4 of GSM 04.21.

3. THE RA2 FUNCTION

Described in section 4 of GSM 04.21.

4. 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 (RLP) 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 (FSI). 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 four modified 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.

4.1. 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.

4.2. 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-MSB the E1 bit shall always be set to 0.

4.3. 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.

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.	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	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