Technical Specification Group Services and System Aspects ***TSGS#18(02)0688***
Meeting #18, New Orleans, USA, 9 - 12 December 2002

Source: **TSG-SA WG4**

Title: CR to TS 26.093 - Correction of uplink SCR operation activation for UMTS AMR (Release 5)

Document for: **Approval**

Agenda Item: **7.4.3**

The following CR, agreed at the TSG-SA WG4 meeting #23, is presented to TSG SA #18 for approval.

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.093	010	3	Rel-5	Correction of uplink SCR operation activation for UMTS AMR	F	5.1.0	S4	TSG-SA WG4#23	S4-020623

3GPP TSG-SA4 Meeting #23
Montreal, Canada, 30 Sept. – 04 Oct. 2002

Tdoc ⌘S4-020623

CR-Form-v7

CHANGE REQUEST

⌘ **26.093** **CR** **010** ⌘ **rev** **3** ⌘ Current version: **5.1.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [X] Core Network [ ]

Title:	⌘	Correction of uplink SCR operation activation for UMTS AMR
Source:	⌘	TSG SA WG4
Work item code:	⌘	AMR
Date:	⌘	10/12/2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	No signaling exists in order to activate uplink SCR. Furthermore, the network is not mandated to allocate the appropriate RABs in order to enable the UE to activate the uplink SCR operation (transmission of SID frames…). Three alternatives may be adopted: - to define new signaling - or leave the activation free to the UE - or to always activate the uplink SCR The third alternative is retained.
Summary of change:	⌘	It is stated that the uplink SCR operation is always activated and not controlled by the network.
Consequences if not approved:	⌘	If the uplink SCR is activated and the RAB do not support the corresponding AMR frames types (SID frames…) then the system will not work.

Clauses affected:	⌘	4, 5.1.2 and 5.3

		Y	N			
Other specs affected:	⌘	X		Other core specifications	⌘	TS 26.102, TS 26.103
			X	Test specifications		
			X	O&M Specifications		

Other comments:	⌘	

4 General

Source Controlled Rate operation (SCR) is a mechanism for the AMR Speech Codec, which allows to encode the input signal at a lower average rate by taking speech inactivity into account. The SCR scheme may be used for the following purposes:

-to save power in the User Equipment;

-to reduce the overall interference and load in the networks.

SCR in the transmitting path (uplink) shall be in operation in UEs, if commanded so by the network. Note that for UMTS AMR and UMTS AMR2 codec types, the uplink SCR operation shall always be activated. The UE shall handle SCR in the receiving path (downlink) at any time, regardless, whether SCR in the transmitting path is ~~commanded~~ enabled or not.

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5 AMR SCR operation

5.1 Transmit (TX) side

A block diagram of the transmit side SCR functions is shown in Figure 2.

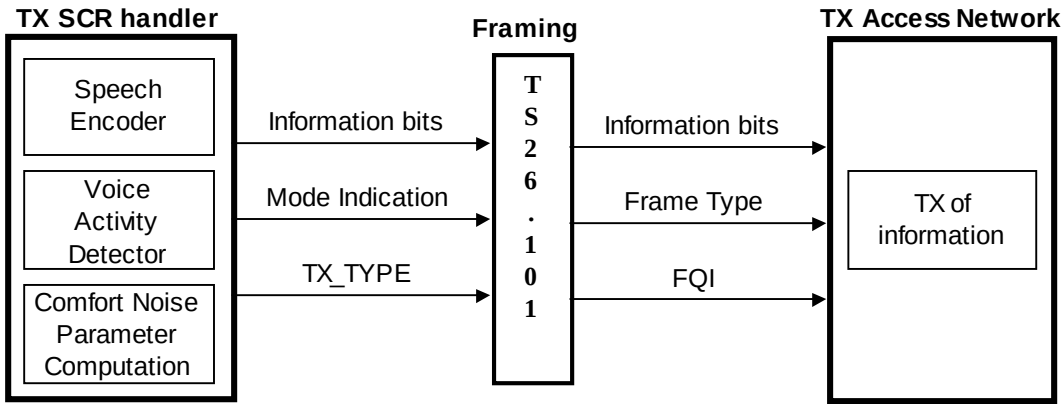


Figure 2: Block diagram of SCR functions at the TX side

5.1.1 General operation

The TX SCR handler passes traffic frames, individually marked by TX_TYPE, to the Framing unit. Each frame consists of bit fields containing the information bits, the codec mode indication, and the TX_TYPE. TX_TYPE shall be used to specify the contents of the frame. The table below provides an overview of the different TX_TYPEs used and explains the required contents in the information bit and the mode indication bit fields.

Table 1: SCR TX_TYPE identifiers for UMTS_AMR and UMTS_AMR2

TX_TYPE	Information Bits	Mode Indication
SPEECH_GOOD	Speech frame, size 95..244 bits, depending on codec mode	Current codec mode
SPEECH_BAD	Corrupt speech frame (bad CRC), size 95..244 bits, depending on codec mode	Current codec mode
SID_FIRST	Marker for the end of talkspurt, no further information, all 35 comfort noise bits set to “0”	The codec mode that would have been used if TX_TYPE had been “SPEECH_GOOD”
SID_UPDATE	35 comfort noise bits	The codec mode that would have been used if TX_TYPE had been “SPEECH_GOOD”
SID_BAD	Corrupt SID update frame (bad CRC)	The codec mode that would have been used if TX_TYPE had been “SPEECH_GOOD”
NO_DATA	No useful information, nothing to be transmitted	No useful information

TX_TYPE = “NO_DATA” indicates that the Information Bit and Codec Mode fields do not contain any useful data (and should not be transmitted over AN). The purpose of this TX_TYPE is to provide the option to save network transmission between the transcoder and AN. Note, the TX_TYPEs “SPEECH_BAD” and “SID_BAD” may occur in TFO and TrFO situations.

The scheduling of the frames for transmission on the Access Network is controlled by the TX SCR handler by the use of the TX_TYPE field.

5.1.2 Functions of the TX SCR handler

If TX SCR operation is disabled, the TX SCR handler continuously generates speech frames, i.e. frames marked with TX_TYPE=”SPEECH_GOOD”.

If the TX SCR operation is enabled, the VAD flag controls the TX SCR handler operation as described in the following paragraphs.

Note that the TX SCR operation is always enabled on the UE side for UMTS AMR and UMTS AMR2 codec types.

5.1.2.1 AMR SCR Timing procedures

To allow an exact verification of the TX SCR handler functions, all frames before the reset of the system are treated as if there were speech frames of an infinitely long time. Therefore, and in order to ensure the correct estimation of comfort noise parameters at RX SCR side, the first 7 frames after the reset or after enabling the SCR operation shall always be marked with TX_TYPE= "SPEECH_GOOD", even if VAD flag ="0" (hangover period, see figure 3).

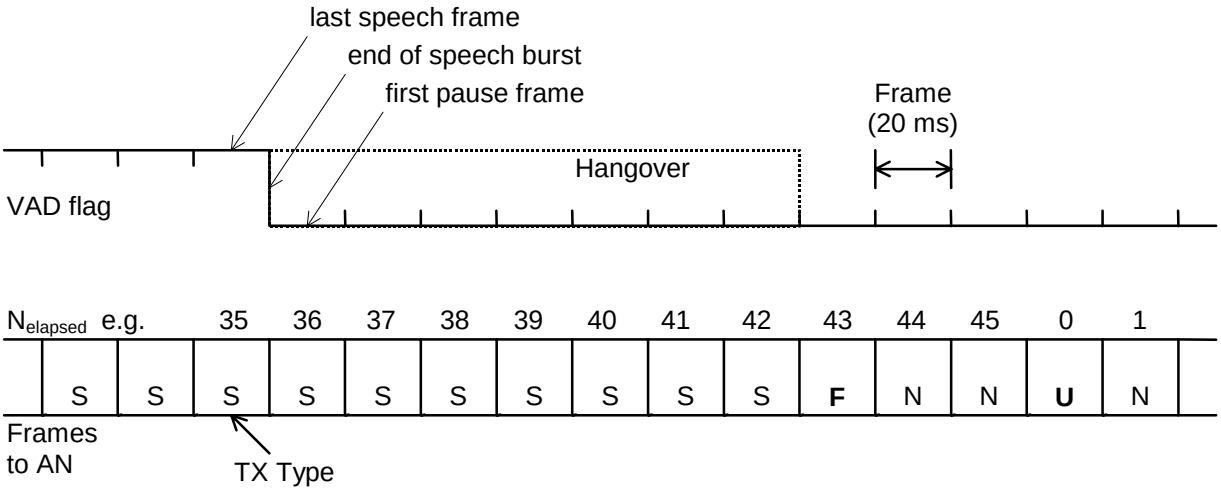
The Voice Activity Detector (VAD) shall operate all the time in order to assess whether the input signal contains speech or not. The output is a binary flag (VAD flag ="1" or VAD flag ="0", respectively) on a frame by frame basis (see [7]).

The VAD flag controls indirectly, via the TX SCR handler operations described below, the overall SCR operation on the transmit side.

Whenever VAD flag ="1", the speech encoder output frame along with mode information shall be passed directly to the AN, marked with TX_TYPE =" SPEECH_GOOD "

At the end of a speech burst (transition VAD flag ="1" to VAD flag ="0"), it takes eight consecutive frames to make a new updated SID analysis available (see [6]). Normally, the first seven speech encoder output frames after the end of the speech burst shall therefore be passed directly to the AN, marked with TX_TYPE =" SPEECH_GOOD " ("hangover period").

The end of the speech is then indicated by passing frame eight after the end of the speech burst to the AN, marked with TX_TYPE = “SID_FIRST” (see figure 3). SID_FIRST frames do not contain data.



TX Types: “S” = SPEECH; “F” = SID_FIRST; “U” = “SID_UPDATE; “N” = NO DATA
$N_{elapsed}$: No. of elapsed frames since last SID_UPDATE

Figure 3: Normal hangover procedure for AMR ($N_{elapsed}$ > 23)

If, however, at the end of the speech burst, less than 24 frames have elapsed since the last SID_UPDATE frame was computed, then this last analysed SID_UPDATE frame should be passed to the AN whenever a SID_UPDATE frame is to be produced, until a new updated SID analysis is available (8 consecutive frames marked with VAD flag ="0").This reduces the load on the network in cases where short background noise spikes are taken for speech, by avoiding the "hangover" waiting for the SID frame computation.

Once the SID_FIRST frame has been passed to the AN, the TX SCR handler shall at regular intervals compute and pass updated SID_UPDATE (Comfort Noise) frames to the AN as long as VAD flag = "0". SID_UPDATE frames shall be generated every 8th frame. The first SID_UPDATE shall be sent as the third frame after the SID_FIRST frame.

The speech encoder is operated in full speech modality if TX_TYPE = " SPEECH_GOOD " and otherwise in a simplified mode, because not all encoder functions are required for the evaluation of comfort noise parameters and because comfort noise parameters are only to be generated at certain times.

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5.3 AMR SID Information format

~~When the TX SCR handler is ordered by the network to operate in AMR mode with SCR operation enabled t~~The SID_UPDATE frame format is according to [5]. This is the default and only mandatory operating mode of the SCR handler.