3GPP TS 06.93 V7.5.0 (2000-12)

Technical Specification

3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Digital cellular telecommunications system (Phase 2+); Discontinuous Transmission (DTX) for Adaptive Multi-Rate (AMR) speech traffic channels (Release 1998)

GLOBAL SYSTEM FOR
MOBILE COMMUNICATIONS

Keywords

Digital cellular telecommunications system,
Global System for Mobile communications
(GSM), AMR

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Content

Foreword

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- x the first digit:
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- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document gives a description of the general baseband operation of Adaptive Multi-Rate speech traffic channels in the transmitter and in the receiver of GSM Mobile Stations (MS)s and Base Station Systems (BSS)s during Discontinuous Transmission (DTX).

For clarity, the description is structured according to the block diagrams in figures 1 and 3. Except in the case described next, this structure of distributing the various functions between system entities is not mandatory for implementation, as long as the operation on the air interface and on the speech decoder output remains the same.

In the case of BSSs where the speech transcoder is located remote from the Base Transceiver Station (BTS), the implementation of the interfaces between the DTX handlers and the Radio Sub System (RSS) as described in the present document together with all their flags is mandatory, being part of the A-bis interface as described in GSM 08.60 and GSM 08.61.

The DTX functions described in this technical specification are mandatory for implementation in the GSM MSs. The receiver requirements are mandatory for implementation in all GSM BSSs, the transmitter requirements only for those where downlink DTX or Tandem Free Operation will be used.

2 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 telecommunication system (Phase 2+); Abbreviations and acronyms".

[2] GSM 04.08: "Digital cellular telecommunication system (Phase 2+); Mobile radio interface layer 3 specification".

[3] GSM 05.03: "Digital cellular telecommunication system (Phase 2+); Channel coding".

[4] GSM 05.05: "Digital cellular telecommunication system (Phase 2+); Radio transmission and reception".

[5] GSM 05.08: "Digital cellular telecommunication system (Phase 2+); Radio subsystem link control".

[6] GSM 05.09: "Digital cellular telecommunication system (Phase 2+); Link adaptation".

[7] GSM 06.71: "Digital cellular telecommunications system (Phase 2+); Adaptive Multi-Rate (AMR) speech processing functions; General description".

[8] GSM 06.73: "Digital cellular telecommunications system (Phase 2+); ANSI-C code for the GSM Adaptive Multi-Rate speech codec".

[9] GSM 06.74: "Digital cellular telecommunications system (Phase 2); Test vectors for the GSM Adaptive Multi-Rate speech codec".

[10] GSM 06.90: "Digital cellular telecommunications system (Phase 2+); Adaptive Multi-Rate speech transcoding".

[11] GSM 06.91: "Digital cellular telecommunications system (Phase 2+); Substitution and muting of lost frame for Adaptive Multi-Rate speech traffic channels".

[12] GSM 06.92: "Digital cellular telecommunications system (Phase 2+); Comfort noise aspects for Adaptive Multi-Rate speech traffic channels".

[13] GSM 06.94: "Digital cellular telecommunications system (Phase 2+); Voice Activity Detector (VAD) for Adaptive Multi-Rate speech traffic channels".

[14] GSM 08.60: "Digital cellular telecommunication system (Phase 2+); Inband control of remote transcoders and rate adaptors for Full Rate traffic channels".

[15] GSM 08.61: "Digital cellular telecommunication system (Phase 2+); Inband Control of Remote Transcoders and Rate Adaptors for Half Rate traffic channels".

[16] GSM 08.62: " Digital cellular telecommunications system; Inband Tandem Free Operation (TFO) of Speech Codecs".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

frame: Time interval of 20 ms, corresponding to the time segmentation of the Adaptive Multi Rate speech transcoder (GSM 06.90 [9]), also used as a short term for a traffic frame.

traffic frame: Block of 95..244 information bits transmitted on the TCH/AFS or TCH/AHS speech traffic channels.

SID frame: Frame characterised by the SID (Silence Descriptor) gross bit patterns. It may convey information on the acoustic background noise.

speech frame: Traffic frame that has been classified as a SPEECH frame.

VAD flag: Boolean flag, generated by the VAD algorithm defined in GSM 06.94 indicating the presence ("1") or the absence ("0") of a speech frame.

RX_TYPE: flag with eight values, generated by the RX radio subsystem, indicating to the RX DTX handler the type of data in the current frame. Refer to Table 2.

TX_TYPE: flag with eight values, generated by the TX DTX handler, indicating to the TX radio subsystem the type of data in the current frame. Refer to Table 1.

hangover period: A period of 7 frames added at the end of a speech burst in which VAD flag ="0" and TX_TYPE is "SPEECH".

3.2 Symbols

For the purposes of the present document, the following symbols apply:

$N_{elapsed}$ Number of elapsed frames since the last updated SID frame.

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

BSC Base Station Controller

BSS	Base Station System
BTS	Base Transceiver Station
CHD	Channel Decoder
CHE	Channel Encoder
DTX	Discontinuous Transmission
ETS	European Telecommunication Standard
FACCH	Fast Associated Control CHannel
GSM	Global System for Mobile Telecommunications
MS	Mobile Station
RATSCCH	Robust Amr Traffic Synchronised Control CHannel
RSS	Radio Sub System
RX	Receive
SACCH	Slow Associated Control CHannel
SID	SIlence Descriptor
TX	Transmit
VAD	Voice Activity Detector

For abbreviations not given in this subclause, see GSM 01.04.

4 General

Discontinuous Transmission (DTX) is a mechanism, which allows the radio transmitter to be switched off most of the time during speech pauses for the following two purposes:

- to save power in the Mobile Station (MS);
- to reduce the overall interference level over the air interface.

DTX in uplink shall be in operation within the GSM MS, if commanded so by the network, see GSM 04.08. The MS shall handle DTX in downlink at any time, regardless, whether DTX in uplink is commanded or not.

4.1 General organisation

The overall DTX mechanism described in the present document requires the following functions:

- a Voice Activity Detector (VAD) on the transmit (TX) side;
- evaluation of the background acoustic noise on the transmit (TX) side, in order to transmit characteristic parameters to the receive (RX) side;
- generation on the receive (RX) side of a similar noise, called comfort noise, during periods where the radio transmission is switched off.

The Voice Activity Detector (VAD) is defined in GSM 06.94 and the comfort noise functions in GSM 06.92. Both are based partly on the speech transcoder and its internal variables, defined in GSM 06.90.

In addition to these functions, if the parameters arriving at the RX side are detected to be seriously corrupted by errors, the speech or comfort noise must be generated from substituted data in order to avoid seriously annoying effects for the listener. This function is defined in GSM 06.91.

An overall description of the speech processing parts can be found in GSM 06.71.

The description for Tandem Free Operation is given in GSM 08.62.

5 Transmit (TX) side

A block diagram of the transmit side DTX functions is shown in figure 1.

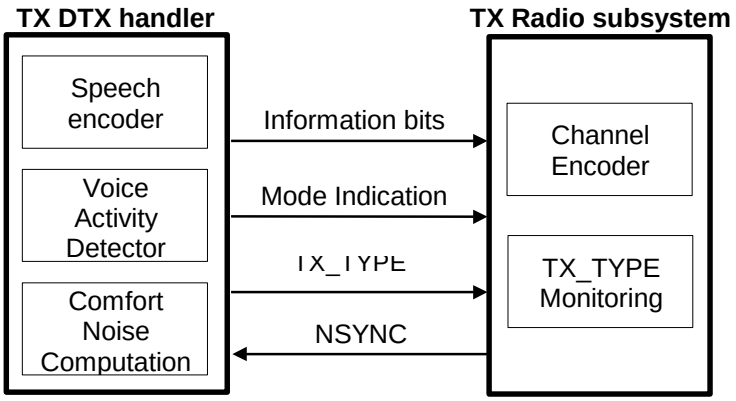


Figure 1: Block diagram of the transmit side DTX functions

5.1 General operation

The TX DTX handler passes traffic frames, individually marked by TX_TYPE, to the Radio Subsystem (RSS). Each frame passed to the RSS consists of bit fields containing the information bits, the codec mode indication, and the TX_TYPE. TX_TYPE is 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. In case of ongoing Tandem Free Operation (see GSM 08.62) frames with errors may arrive in downlink in the BTS.

Table 1: TX TYPE identifiers

TX_TYPE Legend	Information Bits	Mode Indication
SPEECH_GOOD	speech frame, size 95..244 bits depending on codec mode; no errors known.	current code mode
SPEECH_DEGRADED (only in downlink in TFO)	Speech frame, size 95..244 bits, depending on codec mode; there might be errors in class 2 bits.	current codec mode
SPEECH_BAD (only in downlink in TFO)	Speech frame, size 95..244 bits, depending on codec mode; there are errors in class 1 bits.	current codec mode
SID_FIRST	marks the end of a talkspurt, respectively the beginning of a speech pause; does not contain information bits.	the codec mode that would have been used if TX_TYPE had been SPEECH
SID_UPDATE	comfort noise, 35 bits; no errors known	the codec mode that would have been used if TX_TYPE had been SPEECH
SID_BAD (only in downlink in TFO)	comfort noise, 35 bits; errors detected, parameters unusable	the codec mode that would have been used if TX_TYPE had been SPEECH
ONSET (only in downlink in TFO)	announces the beginning of a speech burst; does not contain information bits	the codec mode of the following speech frame
NO_DATA	no useful information	no useful information

TX_TYPE = "NO_DATA" indicates that the Information Bit and Codec Mode fields do not contain any useful data (and shall not be transmitted over the air interface). The purpose of this TX_TYPE is to provide the option to save transmission between the transcoder and the radio base station if a packet oriented transmission is used.

The scheduling of the frames for transmission on the air interface is controlled by the TX DTX handler by the use of the TX_TYPE field.

5.1.1 Functions of the TX DTX handler

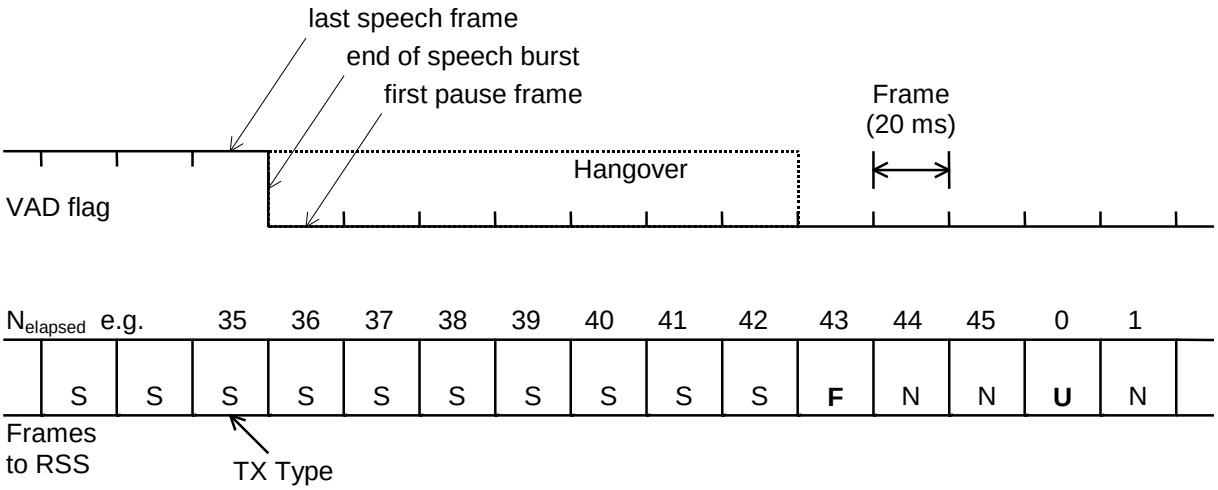
To allow an exact verification of the TX DTX handler functions, all frames before the reset of the system are treated as if there were speech frames of an infinitely long time. Therefore, and in order to ensure the correct estimation of comfort noise parameters at RX DTX side, the first 7 frames after the reset or after enabling the DTX operation shall always be marked with TX_TYPE= " SPEECH_GOOD ", even if VAD flag ="0" (hangover period, see figure 2).

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 GSM 06.94).

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

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

At the end of a speech burst (transition VAD flag ="1" to VAD flag ="0"), it takes 8 consecutive frames to make a new updated SID analysis available at receiver side (see GSM 06.92). Normally, the first 7 speech encoder output frames after the end of the speech burst shall therefore be passed directly to the RSS, marked with TX_TYPE =" SPEECH_GOOD " ("hangover period"). The end of the speech is then indicated by passing frame 8 after the end of the speech burst to the RSS, marked with TX_TYPE = “SID_FIRST” (see figure 2).



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

Figure 2: Normal hangover procedure ($N_{elapsed}$ > 23)

If, however, at the end of the speech burst, less than 24 frames have elapsed since the last SID_UPDATE frame was computed and passed to the RSS, then this last analysed SID_UPDATE frame shall repeatedly be passed to the RSS 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 activity on the air in cases where short background noise spikes are taken for speech, by avoiding the "hangover" waiting for the SID frame computation.

Once the first SID analysis after the end of a speech burst has been computed and the SID_FIRST frame has been passed to the Radio Subsystem, the TX DTX handler shall at regular intervals compute and pass updated SID_UPDATE (Comfort Noise) frames to the Radio Subsystem (RSS) as long as VAD flag = "0". SID_UPDATE frames shall be generated every 8^{th} 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.

In order to ensure TX/RX DTX handler synchronisation at handover, the uplink TX DTX handler in the MS shall accept messages from TX RSS with control parameter NSYNC, resulting in the following operation during a period of the next NSYNC frames:

- The TX DTX handler shall send SID_UPDATE instead of NO_DATA frames to the TX RSS.
- If, however, during this period of NSYNC frames, VAD flag is equal to 1 at least for one speech frame, TX DTX handler shall send SPEECH frames for the rest of the period of the NSYNC frames. Note the TX DTX handler shall send SPEECH frames at least for the duration of the hangover period.

5.1.2 Functions of the TX Radio Subsystem

The TX Radio Subsystem has the following overall functionality. The radio transmission is cut after the transmission of a SID_FIRST frame when the speaker stops talking. During speech pauses the transmission is resumed at regular intervals for transmission of one SID_UPDATE frame, in order to update the generated comfort noise on the RX side (and to improve the measurement of the link quality by the RSS). Note that the transcoder knows what frames to send. In the case when nothing is to be transmitted it outputs frames marked with TX_TYPE = "NO_DATA".

Within the TX Radio Subsystem the TX_TYPE Monitoring unit controls the operation of the Channel Encoder (as specified in GSM 05.03) and the Transmission of the frame. Control input to the TX_TYPE Monitoring unit is the TX_TYPE. Control output and input to the Channel Encoder are indicators specifying the frame format. These frame format indicators are defined in GSM 05.03, they are different for TCH/AFS and TCH/AHS.

5.1.2.1 Functions of the TX Radio Subsystem for TCH/AFS

The TX Radio Subsystem operates in the following way regarding DTX (without TFO):

- all frames marked with TX_TYPE = " SPEECH_GOOD " are scheduled for normal channel coding and transmission. The frame format for CHE operation shall be SPEECH. If, however, the previous frame was not of TX_TYPE = "SPEECH_GOOD", an ONSET frame format followed by SPEECH_GOOD shall be signalled to the CHE;
- for frames marked with TX_TYPE = "SID_FIRST" a SID_FIRST frame format is signalled to the CHE;
- frames marked with TX_TYPE = "SID_UPDATE" are scheduled for SID_UPDATE frame channel coding and transmission. The frame format signalled to CHE is SID_UPDATE;
- for frames marked with TX_TYPE = "NO_DATA" no processing or transmission is carried out.

If a SID_FIRST frame or a SID_UPDATE frame is stolen for Fast Associated Control Channel (FACCH) signalling purposes, then the subsequent frame shall be scheduled for transmission of the SID_FIRST or SID_UPDATE frame (whichever applies) instead.

SPEECH frames shall override possible SID_FIRST or SID_UPDATE frames in exceptional cases.

At handover, TX/RX DTX handler synchronisation shall be initiated. At the time instant before the MS starts sending to the new base station, a message shall be sent to the uplink TX DTX handler with the parameter NSYNC = 12.

5.1.2.2 Functions of the TX Radio Subsystem for TCH/AHS

The TX Radio Subsystem operates in the following way regarding DTX:

- all frames marked with TX_TYPE = " SPEECH_GOOD " are scheduled for normal channel coding and transmission. The frame format for CHE operation shall be SPEECH. However, if the previous frame was of TX_TYPE = "SID_FIRST", a SID_FIRST_INH frame format followed by SPEECH_GOOD shall be signalled to the CHE. If the previous frame was of TX_TYPE = "SID_UPDATE", a SID_UPDATE_INH frame format followed by SPEECH_GOOD shall be signalled to the CHE. If the previous frame was of TX_TYPE "NO_DATA", an ONSET frame format followed by SPEECH_GOOD shall be signalled to the CHE;
- for frames marked with TX_TYPE = "SID_FIRST" a SID_FIRST_P1 frame format is signalled to the CHE. Note: All 4 TDMA frames carrying the bits of this frame shall be transmitted. The Mode Indication received with the frame is stored for potential use in the next frame;

- for frames marked with TX_TYPE = "SID_UPDATE" a SID_UPDATE frame format is signalled to the CHE. All 4 TDMA frames carrying the bits of this frame shall be transmitted;

- for frames marked with TX_TYPE = "NO_DATA", no processing or transmission is carried out. However, if the preceding frame was marked with TX_TYPE = "SID_FIRST", a SID_FIRST_P2 frame format is signalled to CHE. Note: The 2 TDMA frames carrying bits of this frame shall be transmitted. If, depending on the current frame number, the Mode Indication is to be transmitted with these TDMA frames, the Mode Indication shall be used that was stored during the processing of the preceding SID_FIRST frame.

If a SID_FIRST frame or a SID_UPDATE frame is affected by Fast Associated Control Channel (FACCH) signalling purposes, then the SID_FIRST or SID_UPDATE frame (whichever applies) shall be re-scheduled for transmission immediately after the FACCH signalling.

Note: a SID_FIRST or a SID_UPDATE frame is considered as stolen when this frame must be replaced by a FACCH frame, or by a RATSCCH frame, or when this frame is replaced by another re-scheduled SID_FIRST frame.

SPEECH frames shall override possible SID_FIRST or SID_UPDATE frames in exceptional cases.

At handover, TX/RX DTX handler synchronisation shall be initiated. At the time instant before the MS starts sending to the new base station, a message shall be sent to the uplink TX DTX handler with the parameter NSYNC = 12.

5.1.2.3 Functions of the Downlink TX Radio Subsystem for TFO

The TX Radio Subsystem in the BTS shall in addition operate in the following way regarding DTX, if TFO is ongoing (see GSM 08.62):

- Frames with TX_TYPE = SPEECH_GOOD, SID_FIRST and SID_UPDATE shall be handled as usual in DTX, regardless whether DTX in downlink is requested or not. Also NO_DATA shall be handled as usual, if DTX is requested.

- Frames with TX_TYPE = NO_DATA shall be replaced by SID_FILLER frames, if DTX in downlink is not requested. By this the radio transmission continues in downlink, although no parameters are transmitted in speech pauses on the Abis interface. The MS generates Comfort Noise in these speech pauses.

- Frames with TX_TYPE = SPEECH_DEGRADED shall be handled exactly like SPEECH_GOOD frames.

- For frame with TX_TYPE = SPEECH_BAD and SID_BAD the CHE shall perform its regular processing, but then shall invert the six, respectively 14 CRC bits before convolutional encoding and transmitting the frames on the air interface. By this the error concealment mechanism in the MS is triggered to handle these corrupted frames.

- ONSET frames may be ignored by the TX Radio Subsystem and need not to be processed.

Definition: SID_FILLER frames are like SID_BAD frames, but with all information bits set to "1". The 14 CRC bits shall artificially be inverted by the CHE before convolutional encoding and transmission.

5.1.2.4 Functions of the TX Radio Subsystem for RATSCCH

During regular speech transmission (in the middle of a speech burst) RATSCCH replaces (steals) one (TCH/AFS) respectively two (TCH/AHS) speech frames (see GSM 05.09). Also in all non speech cases the RATSCCH shall be handled like speech. The respective RATSCCH frame formats (RATSCCH in case of TCH/AFS, respectively RATSCCH_MARKER and RATSCCH_DATA in case of TCH/AHS) shall be signalled to the CHE.

If RATSCCH has to be sent during a speech pause in DTX, then first an ONSET frame shall be signalled to the CHE, followed by the RATSCCH frame(s) and finally by the respective SID_FIRST frame(s).

If a SID_UPDATE frame is affected by RATSCCH signalling, then the SID_UPDATE frame shall be re-scheduled for transmission immediately after the RATSCCH signalling.

FACCH should be handled in the same way as a RATSCCH, i.e. like a short speech burst.

6 Receive (RX) side

A block diagram of the receive side DTX functions is shown in figure 3.

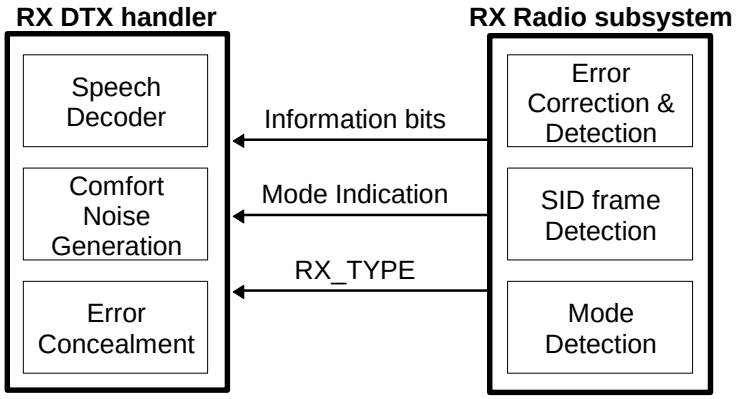


Figure 3: Block diagram of the receive side DTX functions

6.1 General operation

Whatever their context (speech, SID, FACCH or none), the RSS continuously passes the received traffic frames to the RX DTX handler, individually marked by various pre-processing functions with RX_TYPE as described in subclause 6.1.1 and table 2, which serves to classify the traffic frame. This classification allows the RX DTX handler to determine in a simple way how the received frame is to be handled.

Table 2: RX_TYPE identifiers

RX_TYPE Legend	Description
SPEECH_GOOD	Speech frame with CRC OK, Channel Decoder soft values also OK
SPEECH_DEGRADED	Speech frame with CRC OK, but 1B bits and class2 bits may be corrupted
SPEECH_BAD	(likely) speech frame, bad CRC (or very bad Channel Decoder measures)
SID_FIRST	first SID marks the beginning of a comfort noise period
SID_UPDATE	SID update frame (with correct CRC)
SID_BAD	Corrupt SID update frame (bad CRC; applicable only for SID_UPDATE frames)
ONSET	ONSET frames precede the first speech frame of a speech burst
NO_DATA	Nothing useable (for the speech decoder) was received. This applies for the cases of no received frames (DTX) or received FACCH or RATSCCH or SID_FILLER signalling frames.

6.1.1 Functions of the RX radio subsystem

The RX radio subsystem uses a combination of gross-bit markers, receiver measurements, and CRC checks to classify each received frame. The basic operation for each frame is outlined below:

the receiver first searches for the RATSCCH, SID_UPDATE, SID_FIRST or ONSET gross bit markers.

If the RATSCCH signalling is detected, then the RATSCCH frame (TCH/AFS) respectively the RATSCCH_MARKER and RATSCCH_DATA frames (TCH/AHS) shall be decoded and handled as described in GSM 05.09. They shall be passed to the RX DTX handler as a NO_DATA frame(s).

If the SID_FIRST marker is detected the frame is passed to the RX DTX handler as a SID_FIRST frame.

If the SID_UPDATE marker is detected, then the frame shall be decoded and passed to the RX DTX handler as a SID_UPDATE or a SID_BAD or a NO_DATA frame, depending on the CRC and the information bits, along with the comfort noise parameters, if applicable. A NO_DATA frame shall be passed on, if all information bits of a SID_UPDATE frame are set to "1" and the CRC is bad (see SID_FILLER in subclause 5.1.2.3).

If the ONSET marker is detected, then an ONSET frame shall be passed to the RX DTX handler.

- if neither SID_UPDATE nor SID_FIRST markers are detected, the frame shall be channel decoded assuming it to be a speech frame. Depending on the CRC for speech frame channel decoding along with other receiver measurements the frame shall then be passed to the RX DTX handler marked as either SPEECH_GOOD, SPEECH_ DEGRADED, SPEECH_BAD or NO_DATA frame.

6.1.2 Functions of the RX DTX handler

The RX DTX handler is responsible for the overall DTX operation on the RX side. It consists of two main modes: SPEECH and COMFORT_NOISE. The initial mode shall be SPEECH.

The DTX operation on the RX side shall be as follows:

- The RX DTX handler shall enter mode SPEECH, when a frame classified as SPEECH_GOOD or SPEECH_DEGRADED is received. ONSET frames may be taken into account to identify the beginning of a speech burst;

whenever a frame classified as SPEECH_GOOD is received the RX DTX handler shall pass it directly on to the speech decoder;

if the RX DTX handler is in mode SPEECH, then frames classified as SPEECH_DEGRADED, SPEECH_BAD or NO_DATA shall be substituted and muted as defined in GSM 06.91. Frames classified as NO_DATA shall be handled like SPEECH_BAD frames without valid speech information;

frames classified as SID_FIRST, SID_UPDATE or SID_BAD shall bring the RX DTX handler into mode COMFORT_NOISE and shall result in comfort noise generation, as defined in GSM 06.92. SID_BAD frames shall be substituted and muted as defined in GSM 06.91. In mode COMFORT_NOISE the RX DTX handler shall ignore all unusable frames (NO_DATA, SPEECH_BAD) delivered by the RSS; comfort noise generation shall continue, until timeout may apply (see GSM 06.91).

Annex A (informative): Document change history

SMG	SPEC	CR	PH	VERS	NEW_VE	SUBJECT
29	06.93	A001	R98	7.0.0	7.1.0	Changed SID update rate for AMR codec on TCH/AFS
29	06.93	A002	R98	7.0.0	7.1.0	Specification of handling of SPARE and NO_DATA RX_TYPEs
30	06.93	A003	R98	7.1.0	7.2.0	Introduction of the RATSCCH and TFO for AMR (**strategic**)
30	06.93	A004	R98	7.1.0	7.2.0	Correction to specification of RX_TYPE identifier
30	06.93	A005	R98	7.1.0	7.2.0	RX/TX DTX handler synchronisation in uplink at handover
sa6	06.93	A006	R98	7.2.0	7.3.0	Editorial clarifications concerning RATSCCH and RX/TX DTX handler synchronization at handover
sa6	06.93	A007	R98	7.2.0	7.3.0	Onset frame signaling by the TX RSS
sa8	06.93	A008	R98	7.3.0	7.4.0	Re-scheduling of stolen SID_UPDATE Frames for AMR

Change history							
Date	TSG SA#	TSG Doc.	CR	Rev	Subject/Comment	Old	New
12-2000	10	SP-000574	A009	1	Re-scheduling of stolen SID_UPDATE frames for AMR (Part 2)	7.4.0	7.5.0
12-2000	10	SP-000574	A010		Re-scheduling of stolen SID_UPDATE frames by SID_FIRST frames for AMR. Clarification of Hangover period after Handover	7.4.0	7.5.0