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# Foreword

This Technical Specification (TS) has been produced by the 3rd Generation Partnership Project (3GPP).

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

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y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

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# 1 Scope

The present document describes a generic frame format for the Adaptive Multi-Rate Wideband (AMR-WB) speech codec. This format shall be used as a common reference point when interfacing speech frames between different elements of the 3G system and between different systems. Appropriate mappings to and from this generic frame format will be used within and between each system element.

Annex A describes a second frame format which shall be used when octet alignment of AMR-WB frames is required.

# 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.

[1] 3GPP TS 26.190: "AMR Wideband Speech Codec; Speech Transcoding Functions".

[2] 3GPP TS 26.193: "AMR Wideband Speech Codec; Source Controlled Rate Operation".

[3] 3GPP TS 26.192: "AMR Wideband Speech Codec; Comfort Noise Aspects".

# 3 Definitions and Abbreviations

## 3.1 Definitions

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

**AMR-WB mode:** one of the nine AMR-WB codec bit-rates denoted also with indices 0 to 8 where 0 maps to the 6.60 kbit/s mode and 8 maps to the 23.85 kbit/s mode.

**AMR-WB codec mode:** same as AMR-WB mode.

**RX\_TYPE:** classification of the received frame as defined in [2].

**TX\_TYPE:** classification of the transmitted frame as defined in [2].

## 3.2 Abbreviations

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

CRC Cyclic Redundancy Check

FQI Frame Quality Indicator

GSM Global System for Mobile communication

LSB Least Significant Bit

MSB Most Significant BitRX Receive

SCR Source Controlled Rate operation

SID Silence Descriptor (Comfort Noise Frame)

TX Transmit

# 4 AMR-WB codec Interface format 1 (AMR-WB IF1)

This clause describes the generic frame format for both the speech and comfort noise frames of the AMR-WB speech codec. This format is referred to as AMR-WB Interface Format 1 (AMR-WB IF1). Annex A describes AMR-WB Interface Format 2 (AMR-WB IF2).

Each AMR-WB codec mode follows the generic frame structure depicted in figure 1. The frame is divided into three parts: AMR-WB Header, AMR-WB Auxiliary Information, and AMR-WB Core Frame. The AMR-WB Header part includes the Frame Type and the Frame Quality Indicator fields. The AMR-WB auxiliary information part includes the Mode Indication, Mode Request, and Codec CRC fields. The AMR-WB Core Frame part consists of the speech parameter bits or, in case of a comfort noise frame, the comfort noise parameter bits. In case of a comfort noise frame, the comfort noise parameters replace Class A bits of AMR-WB Core Frame while Class B and C bits are omitted.

It is to be noted that unlike AMR, AMR-WB uses only two bit protection classes A and B. In no case bits are assigned to protection class C and, correspondingly, no RAB subflow needs to be allocated for such a class. The mentioning of class C is only done for the purpose of keeping uniformity of this specification with the corresponding specification for AMR.



Figure 1. Generic AMR-WB frame structure

## 4.1 AMR-WB Header and AMR-WB Auxiliary Information

This subclause describes the AMR-WB Header of figure 1.

### 4.1.1 Frame Type, Mode Indication, and Mode Request

Table 1a defines the 4-bit Frame Type field. Frame Type can indicate the use of one of the nine AMR-WB codec modes, comfort noise frame, lost speech frame, or an empty frame. In addition, four Frame Type Indices are reserved for future use. The same table is reused for the Mode Indication and Mode Request fields which are 4-bit fields each and are defined only in the range 0…8 to specify one of the nine AMR-WB codec modes.

Table 1a: Interpretation of Frame Type,  
Mode Indication and Mode Request fields.

|  |  |  |  |
| --- | --- | --- | --- |
| Frame Type Index | Mode Indication | Mode Request | Frame content (AMR-WB mode, comfort noise, or other) |
| 0 | 0 | 0 | AMR-WB 6.60 kbit/s |
| 1 | 1 | 1 | AMR-WB 8.85 kbit/s |
| 2 | 2 | 2 | AMR-WB 12.65 kbit/s |
| 3 | 3 | 3 | AMR-WB 14.25 kbit/s |
| 4 | 4 | 4 | AMR-WB 15.85 kbit/s |
| 5 | 5 | 5 | AMR-WB 18.25 kbit/s |
| 6 | 6 | 6 | AMR-WB 19.85 kbit/s |
| 7 | 7 | 7 | AMR-WB 23.05 kbit/s |
| 8 | 8 | 8 | AMR-WB 23.85 kbit/s |
| 9 | - | - | AMR-WB SID (Comfort Noise Frame) |
| 10-13 | - | - | For future use |
| 14 | - | - | speech lost |
| 15 | - | - | No Data (No transmission/No reception) |
|  | - | - |  |

### 4.1.2 Frame Quality Indicator

The content of the Frame Quality Indicator field is defined in Table 1b. The field length is one bit. The Frame Quality Indicator indicates whether the data in the frame contains errors.

Table 1b: Definition of Frame Quality Indicator

|  |  |
| --- | --- |
| Frame Quality Indicator (FQI) | Quality of data |
| 0 | Bad frame or Corrupted frame  (bits may be used to assist error concealment) |
| 1 | Good frame |

### 4.1.3 Mapping to TX\_TYPE and RX\_TYPE

Table 1c shows how the AMR-WB Header data (FQI and Frame Type) maps to the TX\_TYPE and RX\_TYPE frames defined in [2].

Table 1c: Mapping of Frame Quality Indicator and Frame Type to  
TX\_TYPE and RX\_TYPE [2], respectively

|  |  |  |  |
| --- | --- | --- | --- |
| Frame Quality Indicator | Frame Type Index | TX\_TYPE or RX\_TYPE | Comment |
| 1 | 0-8 | SPEECH\_GOOD | The specific Frame Type Index depends on the bit-rate being used. |
| 0 | 0-8 | SPEECH\_BAD | The specific Frame Type Index depends on the bit-rate being used. The corrupted data may be used to assist error concealment. |
| 0 | 14 | SPEECH\_LOST | No useful information. An erased or stolen frame with no data usable to assist error concealment. |
| 1 | 9 9 | SID\_FIRST or  SID\_UPDATE | SID\_FIRST and SID\_UPDATE are differentiated using one Class A bit: STI. |
| 0 | 9 | SID\_BAD |  |
| 1 | 15 | NO\_DATA | Typically a non-transmitted frame. |

### 4.1.4 Codec CRC

Generic AMR-WB codec frames with Frame Type 0…9 are associated with an 8-bit CRC for error-detection purposes. The Codec CRC field of AMR-WB Auxiliary Information in figure 1 contains the value of this CRC. These eight parity bits are generated by the cyclic generator polynomial:

- G(x)=D8 + D6 + D5 + D4 + 1

which is computed over all Class A bits of AMR-WB Core Frame. Class A bits for Frame Types 0…8 are defined in subclause 4.2.2 (for speech bits) and for Frame Type 9 in subclause 4.2.3 (for comfort noise bits).

When Frame Type Index of table 1a is 14 or 15, the CRC field is not included in the Generic AMR-WB frame.

## 4.2 AMR-WB Core Frame

This subclause contains the description of AMR-WB Core Frame of figure 1. The descriptions for AMR-WB Core Frame with speech bits and with comfort noise bit are given separately.

### 4.2.1 AMR-WB Core Frame with speech bits: Bit ordering

This subclause describes how AMR-WB Core Frame carries the coded speech data. The bits produced by the speech encoder are denoted as {*s*(1),*s*(2),...,*s*(*K*)}, where *K* refers to the number of bits produced by the speech encoder as shown in table 2. The notation *s*(*i*) follows that of [1]. The speech encoder output bits are ordered according to their subjective importance. This bit ordering can be utilized for error protection purposes when the speech data is, for example, carried over a radio interface. Tables B.1 to B.9 in Annex B define the AMR-WB IF1 bit ordering for all the nine AMR-WB codec modes. In these tables the speech bits are numbered in the order they are produced by the corresponding speech encoder as described in the relevant tables of 3GPP TS 26.190 [1]. The reordered bits are denoted below, in the order of decreasing importance, as {*d*(0),*d*(1),...,*d*(*K-1*)}.

The ordering algorithm is described in pseudo code as:

- for *j* = 0 to *K*-1

- *d*(*j*) := *s*(*tablem*(*j*)+1);

where *tablem*(*j*) refers to the relevant table in Annex B depending on the AMR-WB mode *m*=0..8. The Annex B tables should be read line by line from left to right. The first element of the table has the index 0.

### 4.2.2 AMR-WB Core Frame with speech bits: Class division

The reordered bits are further divided into three indicative classes according to their subjective importance. The three different importance classes can then be subject to different error protection in the network.

The importance classes are Class A, Class B, and Class C. Class A contains the bits most sensitive to errors and any error in these bits typically results in a corrupted speech frame which should not be decoded without applying appropriate error concealment. This class is protected by the Codec CRC in AMR-WB Auxiliary Information. Classes B and C contain bits where increasing error rates gradually reduce the speech quality, but decoding of an erroneous speech frame is usually possible without annoying artifacts. Class B bits are more sensitive to errors than Class C bits. The importance ordering applies also within the three different classes and there are no significant step-wise changes in subjective importance between neighbouring bits at the class borders.

The number of speech bits in each class (Class A, Class B, and Class C) for each AMR-WB mode is shown in table 2. The classification in table 2 and the importance ordering *d*(*j*), together, are sufficient to assign all speech bits to their correct classes. For example, when the AMR-WB codec mode is 6.60, then the Class A bits are *d*(0)..*d*(53), Class B bits are *d*(54)..*d*(131), and there are no Class C bits.

Table 2: Number of bits in Classes A, B, and C for each AMR-WB codec mode

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Frame Type | AMR-WB codec mode | Total number of bits | Class A | Class B | Class C |
| 0 | 6.60 | 132 | 54 | 78 | 0 |
| 1 | 8.85 | 177 | 64 | 113 | 0 |
| 2 | 12.65 | 253 | 72 | 181 | 0 |
| 3 | 14.25 | 285 | 72 | 213 | 0 |
| 4 | 15.85 | 317 | 72 | 245 | 0 |
| 5 | 18.25 | 365 | 72 | 293 | 0 |
| 6 | 19.85 | 397 | 72 | 325 | 0 |
| 7 | 23.05 | 461 | 72 | 389 | 0 |
| 8 | 23.85 | 477 | 72 | 405 | 0 |

### 4.2.3 AMR-WB Core Frame with comfort noise bits

The AMR-WB Core Frame content for the additional frame types with Frame Type Indices 9-15 in table 1a are described in this subclause. These mainly consist of the frames related to Source Controlled Rate Operation specified in [2].

The data content (comfort noise bits) of the additional frame types is carried in AMR-WB Core Frame. The comfort noise bits are all mapped to Class A of AMR-WB Core Frame and Classes B and C are not used. This is a notation convention only and the class division has no meaning for comfort noise bits.

The number of bits in each class (Class A, Class B, and Class C) for the AMR-WB comfort noise bits (Frame Type Index 9) is shown in table 3. The contents of SID\_UPDATE and SID\_FIRST are divided into three parts (SID Type Indicator (STI), Mode Indication (mi(i)), and Comfort Noise Parameters (s(i)) as defined in [2].

The comfort noise parameter bits produced by the AMR-WB speech encoder are denoted as s(i) = {*s*(1),*s*(2),...,*s*(35)}. The notation *s*(*i*) follows that of [3]. These bits are numbered in the order they are produced by the AMR-WB encoder without any reordering. These bits are followed by the SID Type Indicator STI and the Mode Indication bits   
 mi(i) = {*mi*(0),*mi*(1),*mi*(2), *mi*(3)} = {LSB ::: MSB}. Thus, the AMR-WB SID or comfort noise bits {*d*(0),*d*(1),…,*d*(39)}are formed as defined by the pseudo code below.

- for *j* = 0 to 34;

- *d*(*j*) := *s*(*j*+1);

- *d*(35) := *STI*;

- for *j* = 36 to 39;

- *d*(*j*) := *smi*(39-*j*).

Table 3. Bit classification for Frame Type 9: AMR-WB SID (Comfort Noise Frame)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Frame Type Index | FQI | AMR-WB  TX\_TYPE or RX\_TYPE | Total number of bits | Class A | | | Class B | Class C |
|  |  |  |  | **SID Type Indicator STI** | **Mode Indication mi(i)** | **Comfort Noise Parameters(i)** |  |  |
| 9 | 1 | SID\_UPDATE | 40 | 1 (= "1") | 4 | 35 | 0 | 0 |
| 9 | 1 | SID\_FIRST | 40 | 1 (= "0") | 4 | 35 (= "0") | 0 | 0 |
| 9 | 0 | SID\_BAD | 40 | 1 | 4 | 35 | 0 | 0 |

AMR-WB no transmission frame type (14 or 15) contains the AMR-WB Header information (as defined in Figure 1), while AMR-WB Auxiliary Information and AMR-WB Core frame are omitted. The AMR-WB Header includes the corresponding Frame Type and the Frame Quality Indicator (as defined in table 1c).

## 4.3 Generic AMR-WB Frame Composition

The generic AMR-WB frame is formed as a concatenation of AMR-WB Header, AMR-WB Auxiliary Information and the AMR-WB Core Frame, in this order. The MSB of the Frame Type is placed in bit 8 of the first octet (see example in table 5 below), the LSB of the Frame Type is placed in bit 5. Then the next parameter follows, which is the Frame Quality Indicator, and so on.After FQI, three spare bits are inserted to align the Codec CRC and the AMR-WB Core frame to the octet boundary. The first bit of the AMR-WB Core frame d(0) is placed in bit 8 of octet 4. The last bit of the generic AMR-WB frame is the last bit of AMR-WB Core Frame, which is the last bit of speech bits or the last bit of comfort noise bits, as defined in subclauses 4.2.1 and 4.2.3. Table 5 shows the composition for the example of the Codec Mode 12.65 kbit/s and table 6 shows the composition for the AMR-WB SID frame.

Table 5: Mapping of an AMR-WB speech coding mode into the generic AMR-WB frame, AMR-WB IF1,  
example: AMR-WB 12.65 kbit/s (Mode Indication = 3), "good frame", Mode Request = 1.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | MSB | Mapping of bits AMR-WB 12.65 | | | | | | | | LSB |
| **Octet** | bit 8 | bit 7 | bit 6 | bit 5 | bit 4 | bit 3 | | | bit 2 | bit 1 |
| **1** | Frame Type (=3) | | | | FQI | spare | | | | |
| 0 | 0 | 1 | 1 | 1 | 0 | | | 0 | 0 |
| **2** | Mode Indication (=3) MSB … LSB | | | | Mode Request (=1) MSB … LSB | | | | | |
| 0 | 0 | 1 | 1 | 0 | 0 | | | 0 | 1 |
| **3** | Codec CRC | | | | | | | | | |
| CRC(7) | CRC(6) | CRC(5) | CRC(4) | CRC(3) | CRC(2) | | | CRC(1) | CRC(0) |
| **4** | AMR-WB Core Frame (octet 1) | | | | | | | | | |
| d(0) | d(1) | d(2) | d(3) | d(4) | d(5) | | | d(6) | d(7) |
| **5..34** | AMR-WB Core Frame (octets 2 to 31) | | | | | | | | | |
| d(8) | … | … | … | … | … | | | … | … |
| **35** | AMR-WB Core Frame (octet 32) | | | | | | undefined | | | |
| d(248) | d(249) | d(250) | d(251) | d(252) | | |  |  |  |

Table 6: Mapping of an AMR-WB SID frame into the generic AMR-WB frame, AMR-WB IF1,  
example: AMR-WB SID\_Update, "good frame", Mode Indication = 3, Mode Request = 2.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | MSB | Mapping of bits AMR-WB SID | | | | | | LSB |
| **Octet** | bit 8 | bit 7 | bit 6 | bit 5 | bit 4 | bit 3 | bit 2 | bit 1 |
| **1** | Frame Type (=9) | | | | FQI | spare | | |
|  | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| **2** | Mode Indication | | | | Mode Request (=2) MSB … LSB | | | |
| undefined | | | | 0 | 0 | 1 | 0 |
| **3** | Codec CRC | | | | | | | |
| CRC(7) | CRC(6) | CRC(5) | CRC(4) | CRC(3) | CRC(2) | CRC(1) | CRC(0) |
| **4** | AMR-WB Core Frame (octet 1) | | | | | | | |
| d(0)=s(1) | d(1)=s(2) | d(2) | d(3) | d(4) | d(5) | d(6) | d(7) |
| **5..7** | AMR-WB Core Frame (octets 2 to 4) | | | | | | | |
| d(8) | … | … | … | … | … | … | … |
| **8** | AMR-WB Core Frame (octet 5) | | | STI | Mode Indication (=3)  MSB … LSB | | | |
| d(32) | d(33) | d(34) = s(35) | 1 | 0 | 0 | 1 | 1 |

Table 7 summarizes all possible AMR-WB frame format combinations in terms of number of bits in each field.

Table 7. Number of bits for different fields in different AMR-WB frame compositions

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Frame Type Index | Frame Type | Frame Quality Indicator | | Mode Indication | Mode Request | Codec CRC | Class A | Class B | Class C | Total |
|  |  | |  |  |  |  | AMR-WB Core Frame | | |  |
| 0 | 4 | 1 | | 4 | 4 | 8 | 54 | 78 | 0 | 153 |
| 1 | 4 | 1 | | 4 | 4 | 8 | 64 | 113 | 0 | 198 |
| 2 | 4 | 1 | | 4 | 4 | 8 | 72 | 181 | 0 | 274 |
| 3 | 4 | 1 | | 4 | 4 | 8 | 72 | 213 | 0 | 306 |
| 4 | 4 | 1 | | 4 | 4 | 8 | 72 | 245 | 0 | 338 |
| 5 | 4 | 1 | | 4 | 4 | 8 | 72 | 293 | 0 | 386 |
| 6 | 4 | 1 | | 4 | 4 | 8 | 72 | 325 | 0 | 418 |
| 7 | 4 | 1 | | 4 | 4 | 8 | 72 | 389 | 0 | 482 |
| 8 | 4 | 1 | | 4 | 4 | 8 | 72 | 405 | 0 | 498 |
| 9 | 4 | 1 | | 4 | 4 | 8 | 40 | 0 | 0 | 61 |
| 10-13 | Not used |  | |  |  |  |  |  |  |  |
| 14 | 4 | 1 | | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| 15 | 4 | 1 | | 0 | 0 | 0 | 0 | 0 | 0 | 4 |

Annex A (normative):  
AMR-WB Interface Format 2 (with octet alignment)

This annex defines an octet-aligned frame format for the AMR-WB codec. This format is useful, for example, when the AMR-WB codec is used in connection with applicable ITU-T H‑series of recommendations. The format is referred to as AMR-WB Interface Format 2 (AMR-WB IF2).

The AMR-WB IF2 frame is formed by concatenation of the 4-bit Frame Type field (as defined for AMR-WB IF1 in subclause 4.1.1),the 1-bit Frame Quality Indicator field (as defined for AMR-WB IF1 in subclause 4.1.2) and the AMR-WB Core Frame (as defined for AMR-WB IF1 in subclause 4.2) as shown in figure A.1. The length of the AMR-WB Core Frame field depends on the particular Frame Type. The total number of bits in the AMR-WB IF2 speech frames in the different modes is typically not a multiple of eight and bit stuffing is needed to achieve an octet structure.



Figure A.1: Frame structure for AMR-WB IF2

Table A.1a shows an example how the AMR-WB 8.85 kbit/s mode is mapped into AMR-WB IF2. The four MSBs of the first octet (octet 1) consist of the Frame Type (=1) for the AMR-WB 8.85 kbit/s mode (see table 1a in AMR-WB IF1 specification) and the Frame Quality Indicator bit. This field is followed by the 177 AMR-WB Core Frame speech bits (*d*(0)…*d*(176)) which consist of 64 Class A bits and 113 Class B bits as described in table 2 for AMR-WB IF1. This results in a total of 182 bits and 2 bits are needed for Bit Stuffing to arrive to the closest multiple of 8 which is 184 bits.

Table A.1a: Example mapping of the AMR-WB speech coding mode 8.85kbit/s into AMR-WB IF2.  
The bits used for Bit Stuffing are denoted as UB (for "unused bit").

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Octet | MSB | Mapping of bits AMR-WB 8.85 kbit/s | | | | | | LSB |
|  | bit 8 | bit 7 | bit 6 | bit 5 | bit 4 | bit 3 | bit 2 | bit 1 |
|  | Frame Type (= 1)  MSB LSB | | | |  |  |  |  |
| 1 | 0 | 0 | 0 | 1 | FQI | d(0) | d(1) | d(2) |
| 2 | d(3) | d(4) | d(5) | d(6) | d(7) | d(8) | d(9) | d(10) |
| 3:::22 | d(11) | … | … | … | … | … | … | … |
| 23 | d(171) | d(172) | d(173) | d(174) | d(175) | d(176) | Stuffing bits | |
| d(171) | d(172) | d(173) | d(174) | d(175) | d(176) | UB | UB |

Table A.1b shows the composition of AMR-WB IF2 frames for all Frame Types in terms of how many bits are used for each field of figure A.1.

Table A.2 specify how the AMR-WB Core Frame comfort noise bits of Frame Type 9 is mapped to AMR-WB IF2. Table A.3 specifies the mapping for an empty or lost frame ("no transmission" or " speech lost").

Table A.1b: Composition of AMR-WB IF2 Frames for all Frame Types

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Frame Type Index | Frame content | Number of bits in Frame Type | Number of bits in Frame Quality Indicator | Number of Bits in AMR-WB Core Frame | Number of Bits in Bit Stuffing | Number of octets (N) |
| 0 | AMR-WB 6.60 kbit/s | 4 | 1 | 132 | 7 | 18 |
| 1 | AMR-WB 8.85 kbit/s | 4 | 1 | 177 | 2 | 23 |
| 2 | AMR-WB 12.65 kbit/s | 4 | 1 | 253 | 6 | 33 |
| 3 | AMR-WB 14.25 kbit/s | 4 | 1 | 285 | 6 | 37 |
| 4 | AMR-WB 15.85 kbit/s | 4 | 1 | 317 | 6 | 41 |
| 5 | AMR-WB 18.25 kbit/s | 4 | 1 | 365 | 6 | 47 |
| 6 | AMR-WB 19.85 kbit/s | 4 | 1 | 397 | 6 | 51 |
| 7 | AMR-WB 23.05 kbit/s | 4 | 1 | 461 | 6 | 59 |
| 8 | AMR-WB 23.85 kbit/s | 4 | 1 | 477 | 6 | 61 |
| 9 | AMR-WB SID (Comfort Noise Frame) | 4 | 1 | 40 | 3 | 6 |
| 10-13 | For future use | - | - | - | - | - |
| 14 | speech lost | 4 | 1 | 0 | 3 | 1 |
| 15 | No Data (No transmission/No reception) | 4 | 1 | 0 | 3 | 1 |

Table A.2: Mapping of bits for Frame Type 9 (AMR-WB SID)  
(Bits s1 to s35 refer to TS 26.192)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | MSB | Mapping of bits AMR-WB SID | | | | | | | LSB |
| **Octet** | bit 8 | bit 7 | bit 6 | bit 5 | bit 4 | bit 3 | | bit 2 | bit 1 |
|  | Frame Type (= 9)  MSB ........... LSB | | | |  | |  | |  |
| 1 | 1 | 0 | 0 | 1 | FQI | s1 | | s2 | s3 |
| 2 | s4 | s5 | s6 | s7 | s8 | s9 | | s10 | s11 |
| 3 | s12 | s13 | S14 | s15 | s16 | s17 | | s18 | s19 |
| 4 | s20 | s21 | S22 | s23 | s24 | s25 | | s26 | s27 |
| 5 | s28 | s29 | S30 | s31 | s32 | s33 | | s34 | s35 |
|  | SID Type Indicator | Mode Indication MSB mi(i) LSB | | | | Stuffing bits | | | |
| 6 | t1 | mi(3) | mi(2) | mi(1) | mi(0) | UB | | UB | UB |

Definitions of additional descriptor bits needed for the silence descriptor in the table are as follows: SID-type Indicator STI is {0=SID\_FIRST, 1=SID\_UPDATE }, Speech Mode Indication (mi(0)- mi(3)) is the AMR-WB codec mode according to the first nine entries in table 1a. Note that in parameter mi the index 3 refers to MSB.

Table A.3: Mapping of bit for Frame Type 14 (Speech Lost) and for Frame Type 15 (No Data)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Transmitted Octets | MSB | Mapping of bits | | | | | | | LSB |
|  | Frame Type 14 = 1 1 1 0 Frame Type 15 = 1 1 1 1 | | | | |  | Stuffing bits | | |
| 1 | mi(3) | mi(2) | mi(1) | mi(0) | FQI | | UB | UB | UB |

Annex B (normative):  
Tables for AMR-WB Core Frame bit ordering

This annex contains the tables required for ordering the AMR-WB Core Frame speech bits corresponding to the different AMR-WB modes. These tables represent *tablem*(*j*) in subclause 4.2.1 where *m*=0..8 is the AMR-WB mode. The tables are read from left to right so that the first element (top left corner) of the table has index 0 and the last element (the rightmost element of the last row) has the index *K*-1 where *K* is the total number of speech bits in the specific mode. For example, *table*0(20)=60, as defined in table B.1.

Table B.1: Ordering of the speech encoder bits for the 6.60 kbit/s mode: *table*0(*j*)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 5 | 6 | 7 | 61 | 84 | 107 | 130 | 62 | 85 |
| 8 | 4 | 37 | 38 | 39 | 40 | 58 | 81 | 104 | 127 |
| 60 | 83 | 106 | 129 | 108 | 131 | 128 | 41 | 42 | 80 |
| 126 | 1 | 3 | 57 | 103 | 82 | 105 | 59 | 2 | 63 |
| 109 | 110 | 86 | 19 | 22 | 23 | 64 | 87 | 18 | 20 |
| 21 | 17 | 13 | 88 | 43 | 89 | 65 | 111 | 14 | 24 |
| 25 | 26 | 27 | 28 | 15 | 16 | 44 | 90 | 66 | 112 |
| 9 | 11 | 10 | 12 | 67 | 113 | 29 | 30 | 31 | 32 |
| 34 | 33 | 35 | 36 | 45 | 51 | 68 | 74 | 91 | 97 |
| 114 | 120 | 46 | 69 | 92 | 115 | 52 | 75 | 98 | 121 |
| 47 | 70 | 93 | 116 | 53 | 76 | 99 | 122 | 48 | 71 |
| 94 | 117 | 54 | 77 | 100 | 123 | 49 | 72 | 95 | 118 |
| 55 | 78 | 101 | 124 | 50 | 73 | 96 | 119 | 56 | 79 |
| 102 | 125 |  |  |  |  |  |  |  |  |

Table B.2: Ordering of the speech encoder bits for the 8.85 kbit/s mode: *table*1(*j*)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 4 | 6 | 7 | 5 | 3 | 47 | 48 | 49 | 112 |
| 113 | 114 | 75 | 106 | 140 | 171 | 80 | 111 | 145 | 176 |
| 77 | 108 | 142 | 173 | 78 | 109 | 143 | 174 | 79 | 110 |
| 144 | 175 | 76 | 107 | 141 | 172 | 50 | 115 | 51 | 2 |
| 1 | 81 | 116 | 146 | 19 | 21 | 12 | 17 | 18 | 20 |
| 16 | 25 | 13 | 10 | 14 | 24 | 23 | 22 | 26 | 8 |
| 15 | 52 | 117 | 31 | 82 | 147 | 9 | 33 | 11 | 83 |
| 148 | 53 | 118 | 28 | 27 | 84 | 149 | 34 | 35 | 29 |
| 46 | 32 | 30 | 54 | 119 | 37 | 36 | 39 | 38 | 40 |
| 85 | 150 | 41 | 42 | 43 | 44 | 45 | 55 | 60 | 65 |
| 70 | 86 | 91 | 96 | 101 | 120 | 125 | 130 | 135 | 151 |
| 156 | 161 | 166 | 56 | 87 | 121 | 152 | 61 | 92 | 126 |
| 157 | 66 | 97 | 131 | 162 | 71 | 102 | 136 | 167 | 57 |
| 88 | 122 | 153 | 62 | 93 | 127 | 158 | 67 | 98 | 132 |
| 163 | 72 | 103 | 137 | 168 | 58 | 89 | 123 | 154 | 63 |
| 94 | 128 | 159 | 68 | 99 | 133 | 164 | 73 | 104 | 138 |
| 169 | 59 | 90 | 124 | 155 | 64 | 95 | 129 | 160 | 69 |
| 100 | 134 | 165 | 74 | 105 | 139 | 170 |  |  |  |

Table B.3: Ordering of the speech encoder bits for the 12.65 kbit/s mode: *table*2(*j*)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 4 | 6 | 93 | 143 | 196 | 246 | 7 | 5 | 3 |
| 47 | 48 | 49 | 50 | 51 | 150 | 151 | 152 | 153 | 154 |
| 94 | 144 | 197 | 247 | 99 | 149 | 202 | 252 | 96 | 146 |
| 199 | 249 | 97 | 147 | 200 | 250 | 100 | 203 | 98 | 148 |
| 201 | 251 | 95 | 145 | 198 | 248 | 52 | 2 | 1 | 101 |
| 204 | 155 | 19 | 21 | 12 | 17 | 18 | 20 | 16 | 25 |
| 13 | 10 | 14 | 24 | 23 | 22 | 26 | 8 | 15 | 53 |
| 156 | 31 | 102 | 205 | 9 | 33 | 11 | 103 | 206 | 54 |
| 157 | 28 | 27 | 104 | 207 | 34 | 35 | 29 | 46 | 32 |
| 30 | 55 | 158 | 37 | 36 | 39 | 38 | 40 | 105 | 208 |
| 41 | 42 | 43 | 44 | 45 | 56 | 106 | 159 | 209 | 57 |
| 66 | 75 | 84 | 107 | 116 | 125 | 134 | 160 | 169 | 178 |
| 187 | 210 | 219 | 228 | 237 | 58 | 108 | 161 | 211 | 62 |
| 112 | 165 | 215 | 67 | 117 | 170 | 220 | 71 | 121 | 174 |
| 224 | 76 | 126 | 179 | 229 | 80 | 130 | 183 | 233 | 85 |
| 135 | 188 | 238 | 89 | 139 | 192 | 242 | 59 | 109 | 162 |
| 212 | 63 | 113 | 166 | 216 | 68 | 118 | 171 | 221 | 72 |
| 122 | 175 | 225 | 77 | 127 | 180 | 230 | 81 | 131 | 184 |
| 234 | 86 | 136 | 189 | 239 | 90 | 140 | 193 | 243 | 60 |
| 110 | 163 | 213 | 64 | 114 | 167 | 217 | 69 | 119 | 172 |
| 222 | 73 | 123 | 176 | 226 | 78 | 128 | 181 | 231 | 82 |
| 132 | 185 | 235 | 87 | 137 | 190 | 240 | 91 | 141 | 194 |
| 244 | 61 | 111 | 164 | 214 | 65 | 115 | 168 | 218 | 70 |
| 120 | 173 | 223 | 74 | 124 | 177 | 227 | 79 | 129 | 182 |
| 232 | 83 | 133 | 186 | 236 | 88 | 138 | 191 | 241 | 92 |
| 142 | 195 | 245 |  |  |  |  |  |  |  |

Table B.4: Ordering of the speech encoder bits for the 14.25 kbit/s mode: *table*3(*j*)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 4 | 6 | 101 | 159 | 220 | 278 | 7 | 5 | 3 |
| 47 | 48 | 49 | 50 | 51 | 166 | 167 | 168 | 169 | 170 |
| 102 | 160 | 221 | 279 | 107 | 165 | 226 | 284 | 104 | 162 |
| 223 | 281 | 105 | 163 | 224 | 282 | 108 | 227 | 106 | 164 |
| 225 | 283 | 103 | 161 | 222 | 280 | 52 | 2 | 1 | 109 |
| 228 | 171 | 19 | 21 | 12 | 17 | 18 | 20 | 16 | 25 |
| 13 | 10 | 14 | 24 | 23 | 22 | 26 | 8 | 15 | 53 |
| 172 | 31 | 110 | 229 | 9 | 33 | 11 | 111 | 230 | 54 |
| 173 | 28 | 27 | 112 | 231 | 34 | 35 | 29 | 46 | 32 |
| 30 | 55 | 174 | 37 | 36 | 39 | 38 | 40 | 113 | 232 |
| 41 | 42 | 43 | 44 | 45 | 56 | 114 | 175 | 233 | 62 |
| 120 | 181 | 239 | 75 | 133 | 194 | 252 | 57 | 115 | 176 |
| 234 | 63 | 121 | 182 | 240 | 70 | 128 | 189 | 247 | 76 |
| 134 | 195 | 253 | 83 | 141 | 202 | 260 | 92 | 150 | 211 |
| 269 | 84 | 142 | 203 | 261 | 93 | 151 | 212 | 270 | 85 |
| 143 | 204 | 262 | 94 | 152 | 213 | 271 | 86 | 144 | 205 |
| 263 | 95 | 153 | 214 | 272 | 64 | 122 | 183 | 241 | 77 |
| 135 | 196 | 254 | 65 | 123 | 184 | 242 | 78 | 136 | 197 |
| 255 | 87 | 145 | 206 | 264 | 96 | 154 | 215 | 273 | 58 |
| 116 | 177 | 235 | 66 | 124 | 185 | 243 | 71 | 129 | 190 |
| 248 | 79 | 137 | 198 | 256 | 88 | 146 | 207 | 265 | 97 |
| 155 | 216 | 274 | 59 | 117 | 178 | 236 | 67 | 125 | 186 |
| 244 | 72 | 130 | 191 | 249 | 80 | 138 | 199 | 257 | 89 |
| 147 | 208 | 266 | 98 | 156 | 217 | 275 | 60 | 118 | 179 |
| 237 | 68 | 126 | 187 | 245 | 73 | 131 | 192 | 250 | 81 |
| 139 | 200 | 258 | 90 | 148 | 209 | 267 | 99 | 157 | 218 |
| 276 | 61 | 119 | 180 | 238 | 69 | 127 | 188 | 246 | 74 |
| 132 | 193 | 251 | 82 | 140 | 201 | 259 | 91 | 149 | 210 |
| 268 | 100 | 158 | 219 | 277 |  |  |  |  |  |

Table B.5: Ordering of the speech encoder bits for the 15.85 kbit/s mode: *table*4(*j*)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 4 | 6 | 109 | 175 | 244 | 310 | 7 | 5 | 3 |
| 47 | 48 | 49 | 50 | 51 | 182 | 183 | 184 | 185 | 186 |
| 110 | 176 | 245 | 311 | 115 | 181 | 250 | 316 | 112 | 178 |
| 247 | 313 | 113 | 179 | 248 | 314 | 116 | 251 | 114 | 180 |
| 249 | 315 | 111 | 177 | 246 | 312 | 52 | 2 | 1 | 117 |
| 252 | 187 | 19 | 21 | 12 | 17 | 18 | 20 | 16 | 25 |
| 13 | 10 | 14 | 24 | 23 | 22 | 26 | 8 | 15 | 53 |
| 188 | 31 | 118 | 253 | 9 | 33 | 11 | 119 | 254 | 54 |
| 189 | 28 | 27 | 120 | 255 | 34 | 35 | 29 | 46 | 32 |
| 30 | 55 | 190 | 37 | 36 | 39 | 38 | 40 | 121 | 256 |
| 41 | 42 | 43 | 44 | 45 | 56 | 122 | 191 | 257 | 63 |
| 129 | 198 | 264 | 76 | 142 | 211 | 277 | 89 | 155 | 224 |
| 290 | 102 | 168 | 237 | 303 | 57 | 123 | 192 | 258 | 70 |
| 136 | 205 | 271 | 83 | 149 | 218 | 284 | 96 | 162 | 231 |
| 297 | 62 | 128 | 197 | 263 | 75 | 141 | 210 | 276 | 88 |
| 154 | 223 | 289 | 101 | 167 | 236 | 302 | 58 | 124 | 193 |
| 259 | 71 | 137 | 206 | 272 | 84 | 150 | 219 | 285 | 97 |
| 163 | 232 | 298 | 59 | 125 | 194 | 260 | 64 | 130 | 199 |
| 265 | 67 | 133 | 202 | 268 | 72 | 138 | 207 | 273 | 77 |
| 143 | 212 | 278 | 80 | 146 | 215 | 281 | 85 | 151 | 220 |
| 286 | 90 | 156 | 225 | 291 | 93 | 159 | 228 | 294 | 98 |
| 164 | 233 | 299 | 103 | 169 | 238 | 304 | 106 | 172 | 241 |
| 307 | 60 | 126 | 195 | 261 | 65 | 131 | 200 | 266 | 68 |
| 134 | 203 | 269 | 73 | 139 | 208 | 274 | 78 | 144 | 213 |
| 279 | 81 | 147 | 216 | 282 | 86 | 152 | 221 | 287 | 91 |
| 157 | 226 | 292 | 94 | 160 | 229 | 295 | 99 | 165 | 234 |
| 300 | 104 | 170 | 239 | 305 | 107 | 173 | 242 | 308 | 61 |
| 127 | 196 | 262 | 66 | 132 | 201 | 267 | 69 | 135 | 204 |
| 270 | 74 | 140 | 209 | 275 | 79 | 145 | 214 | 280 | 82 |
| 148 | 217 | 283 | 87 | 153 | 222 | 288 | 92 | 158 | 227 |
| 293 | 95 | 161 | 230 | 296 | 100 | 166 | 235 | 301 | 105 |
| 171 | 240 | 306 | 108 | 174 | 243 | 309 |  |  |  |

Table B.6: Ordering of the speech encoder bits for the 18.25 kbit/s mode: *table*5(*j*)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 4 | 6 | 121 | 199 | 280 | 358 | 7 | 5 | 3 |
| 47 | 48 | 49 | 50 | 51 | 206 | 207 | 208 | 209 | 210 |
| 122 | 200 | 281 | 359 | 127 | 205 | 286 | 364 | 124 | 202 |
| 283 | 361 | 125 | 203 | 284 | 362 | 128 | 287 | 126 | 204 |
| 285 | 363 | 123 | 201 | 282 | 360 | 52 | 2 | 1 | 129 |
| 288 | 211 | 19 | 21 | 12 | 17 | 18 | 20 | 16 | 25 |
| 13 | 10 | 14 | 24 | 23 | 22 | 26 | 8 | 15 | 53 |
| 212 | 31 | 130 | 289 | 9 | 33 | 11 | 131 | 290 | 54 |
| 213 | 28 | 27 | 132 | 291 | 34 | 35 | 29 | 46 | 32 |
| 30 | 55 | 214 | 37 | 36 | 39 | 38 | 40 | 133 | 292 |
| 41 | 42 | 43 | 44 | 45 | 56 | 134 | 215 | 293 | 198 |
| 299 | 136 | 120 | 138 | 60 | 279 | 58 | 62 | 357 | 139 |
| 140 | 295 | 156 | 57 | 219 | 297 | 63 | 217 | 137 | 170 |
| 300 | 222 | 64 | 106 | 61 | 78 | 294 | 92 | 142 | 141 |
| 135 | 221 | 296 | 301 | 343 | 59 | 298 | 184 | 329 | 315 |
| 220 | 216 | 265 | 251 | 218 | 237 | 352 | 223 | 157 | 86 |
| 171 | 87 | 164 | 351 | 111 | 302 | 65 | 178 | 115 | 323 |
| 72 | 192 | 101 | 179 | 93 | 73 | 193 | 151 | 337 | 309 |
| 143 | 274 | 69 | 324 | 165 | 150 | 97 | 338 | 110 | 310 |
| 330 | 273 | 68 | 107 | 175 | 245 | 114 | 79 | 113 | 189 |
| 246 | 259 | 174 | 71 | 185 | 96 | 344 | 100 | 322 | 83 |
| 334 | 316 | 333 | 252 | 161 | 348 | 147 | 82 | 269 | 232 |
| 260 | 308 | 353 | 347 | 163 | 231 | 306 | 320 | 188 | 270 |
| 146 | 177 | 266 | 350 | 256 | 85 | 149 | 116 | 191 | 160 |
| 238 | 258 | 336 | 305 | 255 | 88 | 224 | 99 | 339 | 230 |
| 228 | 227 | 272 | 242 | 241 | 319 | 233 | 311 | 102 | 74 |
| 180 | 275 | 66 | 194 | 152 | 325 | 172 | 247 | 244 | 261 |
| 117 | 158 | 166 | 354 | 75 | 144 | 108 | 312 | 94 | 186 |
| 303 | 80 | 234 | 89 | 195 | 112 | 340 | 181 | 345 | 317 |
| 326 | 276 | 239 | 167 | 118 | 313 | 70 | 355 | 327 | 253 |
| 190 | 176 | 271 | 104 | 98 | 153 | 103 | 90 | 76 | 267 |
| 277 | 248 | 225 | 262 | 182 | 84 | 154 | 235 | 335 | 168 |
| 331 | 196 | 341 | 249 | 162 | 307 | 148 | 349 | 263 | 321 |
| 257 | 243 | 229 | 356 | 159 | 119 | 67 | 187 | 173 | 145 |
| 240 | 77 | 304 | 332 | 314 | 342 | 109 | 254 | 81 | 278 |
| 105 | 91 | 346 | 318 | 183 | 250 | 197 | 328 | 95 | 155 |
| 169 | 268 | 226 | 236 | 264 |  |  |  |  |  |

Table B.7: Ordering of the speech encoder bits for the 19.85 kbit/s mode: *table*6(*j*)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 4 | 6 | 129 | 215 | 304 | 390 | 7 | 5 | 3 |
| 47 | 48 | 49 | 50 | 51 | 222 | 223 | 224 | 225 | 226 |
| 130 | 216 | 305 | 391 | 135 | 221 | 310 | 396 | 132 | 218 |
| 307 | 393 | 133 | 219 | 308 | 394 | 136 | 311 | 134 | 220 |
| 309 | 395 | 131 | 217 | 306 | 392 | 52 | 2 | 1 | 137 |
| 312 | 227 | 19 | 21 | 12 | 17 | 18 | 20 | 16 | 25 |
| 13 | 10 | 14 | 24 | 23 | 22 | 26 | 8 | 15 | 53 |
| 228 | 31 | 138 | 313 | 9 | 33 | 11 | 139 | 314 | 54 |
| 229 | 28 | 27 | 140 | 315 | 34 | 35 | 29 | 46 | 32 |
| 30 | 55 | 230 | 37 | 36 | 39 | 38 | 40 | 141 | 316 |
| 41 | 42 | 43 | 44 | 45 | 56 | 142 | 231 | 317 | 63 |
| 73 | 92 | 340 | 82 | 324 | 149 | 353 | 159 | 334 | 165 |
| 338 | 178 | 163 | 254 | 77 | 168 | 257 | 153 | 343 | 57 |
| 248 | 238 | 79 | 252 | 166 | 67 | 80 | 201 | 101 | 267 |
| 143 | 164 | 341 | 255 | 339 | 187 | 376 | 318 | 78 | 328 |
| 362 | 115 | 232 | 242 | 253 | 290 | 276 | 62 | 58 | 158 |
| 68 | 93 | 179 | 319 | 148 | 169 | 154 | 72 | 385 | 329 |
| 333 | 344 | 102 | 83 | 144 | 233 | 323 | 124 | 243 | 192 |
| 354 | 237 | 64 | 247 | 202 | 209 | 150 | 116 | 335 | 268 |
| 239 | 299 | 188 | 196 | 298 | 94 | 195 | 258 | 123 | 363 |
| 384 | 109 | 325 | 371 | 170 | 370 | 84 | 110 | 295 | 180 |
| 74 | 210 | 191 | 106 | 291 | 205 | 367 | 381 | 377 | 206 |
| 355 | 122 | 119 | 120 | 383 | 160 | 105 | 108 | 277 | 380 |
| 294 | 284 | 285 | 345 | 208 | 269 | 249 | 366 | 386 | 300 |
| 297 | 259 | 125 | 369 | 197 | 97 | 194 | 286 | 211 | 281 |
| 280 | 183 | 372 | 87 | 155 | 283 | 59 | 348 | 327 | 184 |
| 76 | 111 | 330 | 203 | 349 | 69 | 98 | 152 | 145 | 189 |
| 66 | 320 | 337 | 173 | 358 | 251 | 198 | 174 | 263 | 262 |
| 126 | 241 | 193 | 88 | 388 | 117 | 95 | 387 | 112 | 359 |
| 287 | 244 | 103 | 272 | 301 | 171 | 162 | 234 | 273 | 127 |
| 373 | 181 | 292 | 85 | 378 | 302 | 121 | 107 | 364 | 346 |
| 356 | 212 | 278 | 213 | 65 | 382 | 288 | 207 | 113 | 175 |
| 99 | 296 | 374 | 368 | 199 | 260 | 185 | 336 | 331 | 161 |
| 270 | 264 | 250 | 240 | 75 | 350 | 151 | 60 | 89 | 321 |
| 156 | 274 | 360 | 326 | 70 | 282 | 167 | 146 | 352 | 81 |
| 91 | 389 | 266 | 245 | 177 | 235 | 190 | 256 | 204 | 342 |
| 128 | 118 | 303 | 104 | 379 | 182 | 114 | 375 | 200 | 96 |
| 293 | 172 | 214 | 365 | 279 | 86 | 289 | 351 | 347 | 357 |
| 261 | 186 | 176 | 271 | 90 | 100 | 147 | 322 | 275 | 361 |
| 71 | 332 | 61 | 265 | 157 | 246 | 236 |  |  |  |

Table B.8: Ordering of the speech encoder bits for the 23.05 kbit/s mode: *table*7(*j*)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 4 | 6 | 145 | 247 | 352 | 454 | 7 | 5 | 3 |
| 47 | 48 | 49 | 50 | 51 | 254 | 255 | 256 | 257 | 258 |
| 146 | 248 | 353 | 455 | 151 | 253 | 358 | 460 | 148 | 250 |
| 355 | 457 | 149 | 251 | 356 | 458 | 152 | 359 | 150 | 252 |
| 357 | 459 | 147 | 249 | 354 | 456 | 52 | 2 | 1 | 153 |
| 360 | 259 | 19 | 21 | 12 | 17 | 18 | 20 | 16 | 25 |
| 13 | 10 | 14 | 24 | 23 | 22 | 26 | 8 | 15 | 53 |
| 260 | 31 | 154 | 361 | 9 | 33 | 11 | 155 | 362 | 54 |
| 261 | 28 | 27 | 156 | 363 | 34 | 35 | 29 | 46 | 32 |
| 30 | 55 | 262 | 37 | 36 | 39 | 38 | 40 | 157 | 364 |
| 41 | 42 | 43 | 44 | 45 | 56 | 158 | 263 | 365 | 181 |
| 192 | 170 | 79 | 57 | 399 | 90 | 159 | 297 | 377 | 366 |
| 275 | 68 | 183 | 388 | 286 | 194 | 299 | 92 | 70 | 182 |
| 401 | 172 | 59 | 91 | 58 | 400 | 368 | 161 | 81 | 160 |
| 264 | 171 | 80 | 389 | 390 | 378 | 379 | 193 | 298 | 69 |
| 266 | 265 | 367 | 277 | 288 | 276 | 287 | 184 | 60 | 195 |
| 82 | 93 | 71 | 369 | 402 | 173 | 162 | 444 | 300 | 391 |
| 98 | 76 | 278 | 61 | 267 | 374 | 135 | 411 | 167 | 102 |
| 380 | 200 | 87 | 178 | 65 | 94 | 204 | 124 | 72 | 342 |
| 189 | 305 | 381 | 396 | 433 | 301 | 226 | 407 | 289 | 237 |
| 113 | 215 | 185 | 128 | 309 | 403 | 116 | 320 | 196 | 331 |
| 370 | 422 | 174 | 64 | 392 | 83 | 425 | 219 | 134 | 188 |
| 432 | 112 | 427 | 139 | 279 | 163 | 436 | 208 | 447 | 218 |
| 236 | 229 | 97 | 294 | 385 | 230 | 166 | 268 | 177 | 443 |
| 225 | 426 | 101 | 272 | 138 | 127 | 290 | 117 | 347 | 199 |
| 414 | 95 | 140 | 240 | 410 | 395 | 209 | 129 | 283 | 346 |
| 105 | 241 | 437 | 86 | 308 | 448 | 203 | 345 | 186 | 107 |
| 220 | 415 | 334 | 319 | 106 | 313 | 118 | 123 | 73 | 207 |
| 421 | 214 | 384 | 373 | 438 | 62 | 371 | 341 | 75 | 449 |
| 168 | 323 | 164 | 242 | 416 | 324 | 304 | 197 | 335 | 404 |
| 271 | 63 | 191 | 325 | 96 | 169 | 231 | 280 | 312 | 187 |
| 406 | 84 | 201 | 100 | 67 | 382 | 175 | 336 | 202 | 330 |
| 269 | 393 | 376 | 383 | 293 | 307 | 409 | 179 | 285 | 314 |
| 302 | 372 | 398 | 190 | 180 | 89 | 99 | 103 | 232 | 78 |
| 88 | 77 | 136 | 387 | 165 | 198 | 394 | 125 | 176 | 428 |
| 74 | 375 | 238 | 227 | 66 | 273 | 282 | 141 | 306 | 412 |
| 114 | 85 | 130 | 348 | 119 | 291 | 296 | 386 | 233 | 397 |
| 303 | 405 | 284 | 445 | 423 | 221 | 210 | 205 | 450 | 108 |
| 274 | 434 | 216 | 343 | 337 | 142 | 243 | 321 | 408 | 451 |
| 310 | 292 | 120 | 109 | 281 | 439 | 270 | 429 | 332 | 295 |
| 418 | 211 | 315 | 222 | 326 | 131 | 430 | 244 | 327 | 349 |
| 417 | 316 | 143 | 338 | 440 | 234 | 110 | 212 | 452 | 245 |
| 121 | 419 | 350 | 223 | 132 | 441 | 328 | 413 | 317 | 339 |
| 126 | 104 | 137 | 446 | 344 | 239 | 435 | 115 | 333 | 206 |
| 322 | 217 | 228 | 424 | 453 | 311 | 351 | 111 | 442 | 224 |
| 213 | 122 | 431 | 340 | 235 | 246 | 133 | 144 | 420 | 329 |
| 318 |  |  |  |  |  |  |  |  |  |

Table B.9: Ordering of the speech encoder bits for the 23.85 kbit/s mode: *table*8(*j*)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 4 | 6 | 145 | 251 | 360 | 466 | 7 | 5 | 3 |
| 47 | 48 | 49 | 50 | 51 | 262 | 263 | 264 | 265 | 266 |
| 146 | 252 | 361 | 467 | 151 | 257 | 366 | 472 | 148 | 254 |
| 363 | 469 | 149 | 255 | 364 | 470 | 156 | 371 | 150 | 256 |
| 365 | 471 | 147 | 253 | 362 | 468 | 52 | 2 | 1 | 157 |
| 372 | 267 | 19 | 21 | 12 | 17 | 18 | 20 | 16 | 25 |
| 13 | 10 | 14 | 24 | 23 | 22 | 26 | 8 | 15 | 53 |
| 268 | 31 | 152 | 153 | 154 | 155 | 258 | 259 | 260 | 261 |
| 367 | 368 | 369 | 370 | 473 | 474 | 475 | 476 | 158 | 373 |
| 9 | 33 | 11 | 159 | 374 | 54 | 269 | 28 | 27 | 160 |
| 375 | 34 | 35 | 29 | 46 | 32 | 30 | 55 | 270 | 37 |
| 36 | 39 | 38 | 40 | 161 | 376 | 41 | 42 | 43 | 44 |
| 45 | 56 | 162 | 271 | 377 | 185 | 196 | 174 | 79 | 57 |
| 411 | 90 | 163 | 305 | 389 | 378 | 283 | 68 | 187 | 400 |
| 294 | 198 | 307 | 92 | 70 | 186 | 413 | 176 | 59 | 91 |
| 58 | 412 | 380 | 165 | 81 | 164 | 272 | 175 | 80 | 401 |
| 402 | 390 | 391 | 197 | 306 | 69 | 274 | 273 | 379 | 285 |
| 296 | 284 | 295 | 188 | 60 | 199 | 82 | 93 | 71 | 381 |
| 414 | 177 | 166 | 456 | 308 | 403 | 98 | 76 | 286 | 61 |
| 275 | 386 | 135 | 423 | 171 | 102 | 392 | 204 | 87 | 182 |
| 65 | 94 | 208 | 124 | 72 | 350 | 193 | 313 | 393 | 408 |
| 445 | 309 | 230 | 419 | 297 | 241 | 113 | 219 | 189 | 128 |
| 317 | 415 | 116 | 328 | 200 | 339 | 382 | 434 | 178 | 64 |
| 404 | 83 | 437 | 223 | 134 | 192 | 444 | 112 | 439 | 139 |
| 287 | 167 | 448 | 212 | 459 | 222 | 240 | 233 | 97 | 302 |
| 397 | 234 | 170 | 276 | 181 | 455 | 229 | 438 | 101 | 280 |
| 138 | 127 | 298 | 117 | 355 | 203 | 426 | 95 | 140 | 244 |
| 422 | 407 | 213 | 129 | 291 | 354 | 105 | 245 | 449 | 86 |
| 316 | 460 | 207 | 353 | 190 | 107 | 224 | 427 | 342 | 327 |
| 106 | 321 | 118 | 123 | 73 | 211 | 433 | 218 | 396 | 385 |
| 450 | 62 | 383 | 349 | 75 | 461 | 172 | 331 | 168 | 246 |
| 428 | 332 | 312 | 201 | 343 | 416 | 279 | 63 | 195 | 333 |
| 96 | 173 | 235 | 288 | 320 | 191 | 418 | 84 | 205 | 100 |
| 67 | 394 | 179 | 344 | 206 | 338 | 277 | 405 | 388 | 395 |
| 301 | 315 | 421 | 183 | 293 | 322 | 310 | 384 | 410 | 194 |
| 184 | 89 | 99 | 103 | 236 | 78 | 88 | 77 | 136 | 399 |
| 169 | 202 | 406 | 125 | 180 | 440 | 74 | 387 | 242 | 231 |
| 66 | 281 | 290 | 141 | 314 | 424 | 114 | 85 | 130 | 356 |
| 119 | 299 | 304 | 398 | 237 | 409 | 311 | 417 | 292 | 457 |
| 435 | 225 | 214 | 209 | 462 | 108 | 282 | 446 | 220 | 351 |
| 345 | 142 | 247 | 329 | 420 | 463 | 318 | 300 | 120 | 109 |
| 289 | 451 | 278 | 441 | 340 | 303 | 430 | 215 | 323 | 226 |
| 334 | 131 | 442 | 248 | 335 | 357 | 429 | 324 | 143 | 346 |
| 452 | 238 | 110 | 216 | 464 | 249 | 121 | 431 | 358 | 227 |
| 132 | 453 | 336 | 425 | 325 | 347 | 126 | 104 | 137 | 458 |
| 352 | 243 | 447 | 115 | 341 | 210 | 330 | 221 | 232 | 436 |
| 465 | 319 | 359 | 111 | 454 | 228 | 217 | 122 | 443 | 348 |
| 239 | 250 | 133 | 144 | 432 | 337 | 326 |  |  |  |

Annex C (informative):  
Change history

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Change history** | | | | | | | |
| **Date** | **TSG #** | **TSG Doc.** | **CR** | **Rev** | **Subject/Comment** | **Old** | **New** |
| 03-2001 | 11 | SP-010090 |  |  | Presented as version 2.0.0 for approval |  | 5.0.0 |
| 12-2004 | 26 |  |  |  | Version for Release 6 | 5.0.0 | 6.0.0 |
| 06-2007 | 36 |  |  |  | Version for Release 7 | 6.0.0 | 7.0.0 |
| 06-2008 | 38 | SP-080250 | 0001 | 2 | Obsoleteness of class C definition | 7.0.0 | 7.1.0 |
| 12-2008 | 42 |  |  |  | Version for Release 8 | 7.1.0 | 8.0.0 |
| 12-2009 | 46 |  |  |  | Version for Release 9 | 8.0.0 | 9.0.0 |
| 03-2011 | 51 |  |  |  | Version for Release 10 | 9.0.0 | 10.0.0 |
| 09-2012 | 57 |  |  |  | Version for Release 11 | 10.0.0 | 11.0.0 |
| 09-2014 | 65 |  |  |  | Version for Release 12 | 11.0.0 | 12.0.0 |
| 12-2015 | 70 |  |  |  | Version for Release 13 | 12.0.0 | 13.0.0 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Change history** | | | | | | | |
| **Date** | **Meeting** | **TDoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 2017-03 | 75 |  |  |  |  | Version for Release 14 | 14.0.0 |
| 2018-06 | 80 |  |  |  |  | Version for Release 15 | 15.0.0 |
| 2020-07 | - | - | - | - | - | Update to Rel-16 version (MCC) | **16.0.0** |