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This attached document is an updated specification on circuit switched data bearer services (TR 23.910).

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*Technical Report*

**3rd Generation Partnership Project;**
**Technical Specification Group Core Network;**
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**(3G TR 23.910 version 2.0.0)**

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# Contents

# Foreword

This Technical Report has been produced by the 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 this TS, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version 3.y.z

where:

x the first digit:

1 presented to TSG for information;

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3 Indicates TSG approved document under change control.

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 specification;

# 1 Scope

The present document provides an overview of the architecture and issues related to the provision of Circuit Switch Bearer Services in a 3G mobile network.

# 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] GSM TS 03.10: "GSM Public Land Mobile Network (PLMN) connection types"

[2] 3G TS 21.905: "3G Vocabulary"

[3] 3G TS 22.100: "UMTS Phase 1"

[4] 3G TS 22.002: "Bearer Services Supported by a GSM PLMN"

[5] 3G TS 22.101: "Service Principles"

[6] 3G TS 22.105: "Services and Service Capabilities"

[7] 3G TS 23.002: "Network Architecture"

[8] 3G TS 23.034: "High Speed Circuit Switched Data (HSCSD) -Stage 2"

[9] 3G TS 23.101: "General UMTS Architecture"

[10] 3G TS 23.107: "Quality of Service, Concept and Architecture"

[11] 3G TS 24.022: "Radio Link Protocol (RLP) for Data and Telematic Services on the Mobile Station - Base Station System (MS-BSS) Interface and the Base Station System - Moile-services Switching Centre (BSS-MSC) Interface"

[12] 3G TS 25.322: "Radio Link Control (RLC) Protocol Specification".

[13] 3G TS 25.415: "UTRAN Iu Interface user plane protocols"

[14] 3G TS 27.001: "General on Terminal Adaption Functions (TAF) for Mobile Station (MS)"

[15] 3G TS 29.007: "General Requirements on Interworking between the PLMN and the ISDN or PSTN"

[16] ITU-T Recommendation V.90 " A digital modem and analogue modem pair for use on the Public Switched Telephone Network (PSTN) at data signalling rates of up to 56 000 bit/s downstream and up to 33 600 bit/s upstream "

[17] ITU-T Recommendation T.30 " Procedures for document facsimile transmission in the general switched telephone network "

[18] GSM 04.21: "Digital cellular telecommunications system (Phase 2+); Rate adaption on the Mobile Station - Base Station System (MS - BSS) interface".

[19] GSM 08.20: "Digital cellular telecommunication system (Phase 2+); Rate adaption on the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface".

# 3 Definitions and abbreviations

## 3.1 Definitions

For the purposes of the present document, terms and definitions given in 3G TS 21.905 [2] apply.

## 3.2 Abbreviations

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

| | |
|---|---|
| AAL2 | ATM Adaptation Layer 2 |
| AIUR | Air Interface User Rate |
| ATM | Asynchronous Transmission Mode |
| BC | Bearer Capability |
| BS | Bearer Service |
| BSSMAP | Base Station System Mobile Application Protocol |
| CE | Connection Element |
| CN | Core Network |
| CS | Circuit Switched |
| CT | Circuit |
| DCE | Data Communication Equipment |
| DTE | Data Terminal Equipment |
| DTX | Discontinuous Transmission |
| IE | Information Element |
| ITC | Information Transfer Capability |
| IWF | Interworking Function |
| MAP | Mobile Application Protocol |
| MSC | Mobile Services Switching Centre |
| MT | Mobile Termination |
| NT | Non-transparent |
| QoS | Quality of Service |
| RAB | Radio Access Bearer |
| RDI | Restricted Digital Information |
| RLC | Radio link control |
| RLP | Radio link protocol |
| RNL | Radio Network Layer |
| SAP | Service Access Point |
| SSCS | Service Specific Convergence Sublayer |
| SDU | Service Data Unit |
| T | Transparent |
| TAF | Terminal Adaption Function |
| TE | Terminal |
| UDI | Unrestricted Digital Information |
| UE | User Equipment |
| UP | User Plane |
| VLR | Visiting Location Register |
| WAIUR | Wanted Air Interface User Rate |

# 4 General

CS data services in UMTS (UMTS Bearer Services) are build on services provided by the Access Network. These Radio Access Bearer Services are invoked through the RNL-SAP provided by the Iu User Plane to the Non-access stratum on the Core Network side, and the corresponding SAP provided by the RLC to the Non-access stratum on the Terminal side. Transport within the CN (the CN Bearer services) is outside the scope of this document. Interworking with External Bearer services is within the scope of this document. See Figure 1.

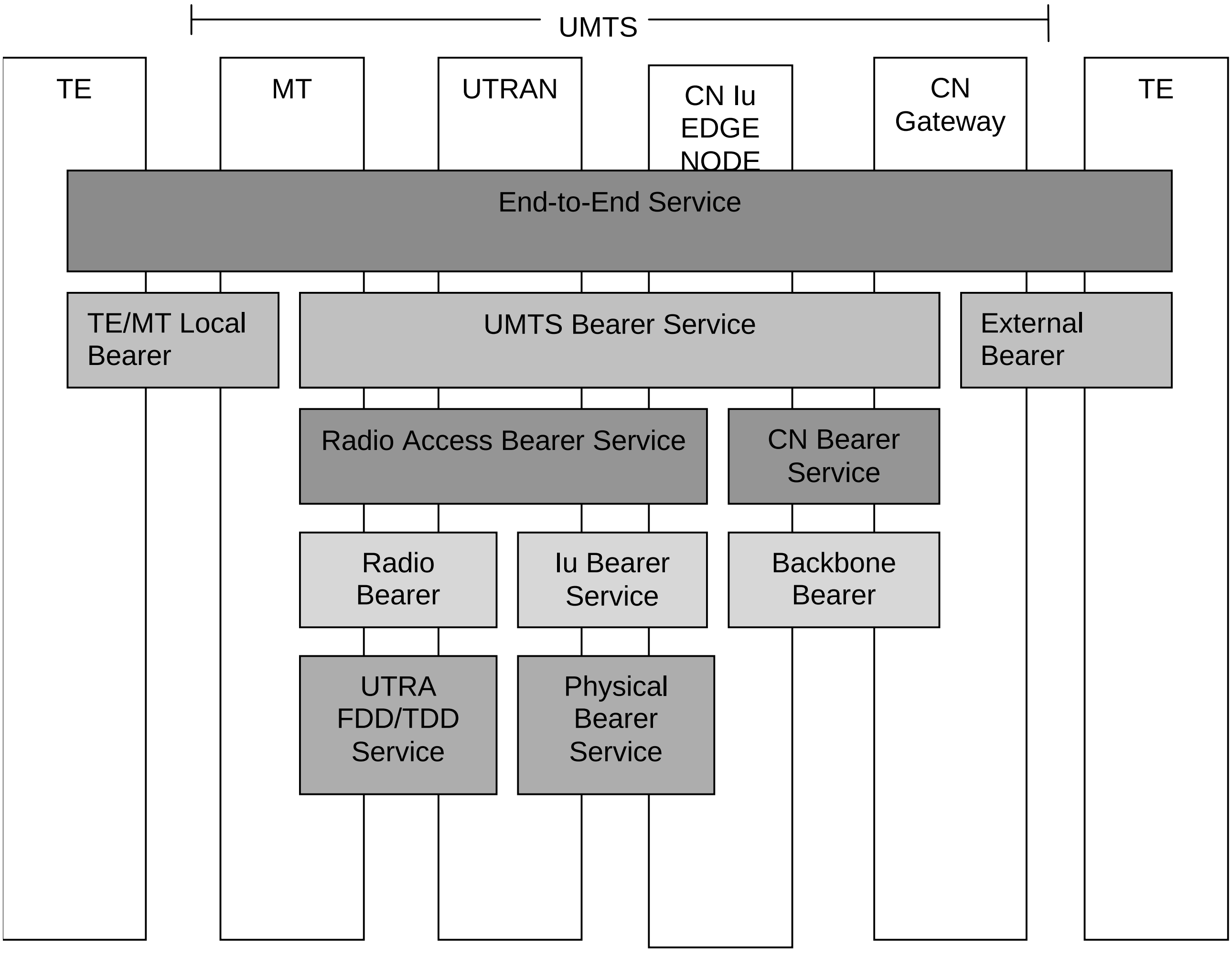


**Figure 1**

# 5 UMTS Bearer Services

The UMTS bearer services are described by the UMTS BC-IE. Five services (or services categories) are currently distinguishable from the UMTS BC-IE:

- Speech
- Transparent Data for support of Multimedia
- Transparent Data
- Non-transparent Fax
- Non-transparent data

Speech is currently not in the scope of this document.

Each UMTS bearer service is supported by a Radio Access Bearers (RAB). The RABs in turn are described by the QoS parameters. There may be one or several RAB candidates for supporting a UMTS bearer service. The possible candidates are described by a mapping of the BC-IE to RAB QoS described in Section 5.2.

# 5.1 UMTS Bearer Services in Release 99

## 5.1.1 Transparent Data

This service is distinguished by the following BC-IE parameters:

- ITC = UDI or 3.1 kHz audio or Other ITC = RDI
- CE = transparent

This service may also be used for multimedia, in which case

- Other rate adaptation = H.223 and H.245

For this service the FNUR is restricted to:

- 64 kbit/s, in case ITC = UDI
- 56 kbit/s in case Other ITC = UDI or RDI
- 33.6 kbit/s, in case ITC = 3.1 kHz audio
- 28.8 kbit/s, in case ITC = 3.1 kHz audio
- 32 kbit/s, in case ITC=UDI

Note: ITU-T V.90 [16] is not supported in transparent mode, because asymmetric user rates are not supported in transparent mode.

## 5.1.2 Non-Transparent Fax

This service is distinguished by the following BC-IE parameters:

- ITC = Fax Group 3 (ITU-T T.30 [17])

WAIUR shall not be more than 28.8 kbit/s. The possible AIURs are limited to 14.4 and 28.8 kbit/s.

## 5.1.3 NT Data

This service is distinguished by the following BC-IE parameters:

- ITC = UDI or 3.1 kHz audio or Other ITC = RDI
- CE = non-transparent

The possible AIURs are limited to 14.4, 28.8, and 57.6 kbit/s.

# 5.2 BC-IE to RAB QoS Mapping

Since UMTS bearer services are described by BC-IEs and RABs by QoS parameters, this section provides implicitly a mapping between the UMTS bearer services and the possible RABs that support them. The QoS mapping is based on TS 23.107

## 5.2.1 Non-transparent services, including Fax

| **Service identified by the BC IE** | **Non-transparent data** | **Comments** |
|---|---|---|
| | | |
| **Traffic Class** | Streaming | Subject to operator tuning |

| | | |
|---|---|---|
| **RAB Asymmetry Indicator** | Symmetric | |
| **Maximum bit rate (1)** | 14.4, 28.8, 57.6 kbit/s | Maximum bit rate is set to the highest value ≤ WAIUR (note 1) |
| **Guaranteed bit rate** | 14.4 kbit/s | |
| **Delivery Order** | Yes | |
| **Maximum SDU size** | 576 bits | |
| **Transfer Delay** | < 250 ms | Subject to operator tuning |
| **Traffic Handling Priority** | - | Not applicable to the streaming traffic class |
| **Source statistics descriptor** | Unknown | |
| **SDU Parameters** | | |
| **SDU error ratio** | < 10 % | Subject to operator tuning |
| **Residual bit error ratio** | $10^{-3}$ | Subject to operator tuning. |
| **Delivery of erroneous SDUs** | No | |
| **SDU format information** | | |
| **RAB Subflow Combination bit rate** | 57.6 kbit/s | |
| **RAB Subflow Combination bit rate** | 28.8 kbit/s | |
| **RAB Subflow Combination bit rate** | 14.4 kbit/s | |

Note 1: In case the WAIUR is less than 14.4 kbit/s, the maximum bit rate is set to 14.4 kbit/s .

### 5.2.2 Transparent Data, including Multimedia

| **Service identified by the BC IE** | **Transparent data and BS for support of multimedia service** | **Comments** |
|---|---|---|
| | | |
| **Traffic Class** | Conversational | Subject to operator tuning |
| **Maximum bit rate** | = guaranteed bit rate | |
| **Guaranteed bit rate** | FNUR = 64 .. 28.8 kbit/s | GBR for FNUR=56 kbit/s is 64 kbit/s (Note 1) |
| **Delivery Order** | Yes | |
| **Maximum SDU size** | 640 .. 280 bits (depending on the FNUR) | Maximum SDU size for FNUR=56 kbit/s is 640 bits |
| **Transfer Delay** | < 200 ms | Subject to operator tuning |
| **Traffic Handling Priority** | - | Not applicable for the conversational traffic class |
| **Source statistics descriptor** | Unknown | |

| SDU Parameters | | | |
|---|---|---|---|
| | **SDU error ratio** | - | Not applicable |
| | **Residual bit error ratio** | $10^{-4}$ | Subject to operator tuning. |
| | **Delivery of erroneous SDUs** | - | No error detection in the core network |

Note 1: In case the FNUR = 56 kbit/s, the GBR is set to 64 kbit/s. Last bit in each data octet is set to 1.

# 6 Iu User Plane

## 6.1 NT services

The Iu user plane is used in support mode, see 25.415. Each SDU corresponds to one RLP frame and, consequently, is 576 bits long. The range of AIUR values is 14.4, 28.8. 57.6, limited by the maximum bit rate, and varies with the transmission period on the Uu interface, which is 10, 20, or 40 ms. The Iu UP signals to the CN when the transmission period changes. The Iu UP primitive Iu-UP -DATA-REQUEST is invoked each time an RLP frame is ready to be sent from the CN towards the UE. DTX indication is not used.

## 6.2 T services

The Iu UP is used in transparent mode, see 25.415. The payload of the Iu frame will consist of user data bits only-

The payload (SDU) size is fixed, determined by the bit rate. The SDU size is determined by the number of user data bits transmitted in 10 ms, except when the FNUR =56 kbit/s in which case the SDU contains 640 bits. AAL2 is used. The AAL2 SSCS layer must be supported for segmentation and re-assembly.

The primitive Iu-UP_UNIT-DATA-REQUEST is invoked at regular intervals in order to have a constant bit rate (every 10 ms) .

### 6.2.1 Avoidance of delay at RNC

The TTI-to-CPS Packet packaging delay can be avoided by choosing the length of the CPS packet payload so that the payloads of an integer number of CPS Packets fill one TTI. The contents of the whole TTI can be sent further towards the MSC immediately after the reception without waiting for the next TTI.

### 6.2.2 Recovery from the loss of ATM cells

The ATM cell loss rate is estimated to be very small (less than $10^{-6}$ … $10^{-8}$), the quality of transmission being comparable to that of a high quality ISDN.

The following happens if a cell is lost (ref. to I.363.2):

- At least one CPS packet is distorted.
- The distorted CPS packet(s) is/are discarded by the receiver.
- If only one CPS packet is discarded, the upper layer can identify the event by the UUI/SSSAR sequence number, and consequently insert a fill sequence of the length of a CPS payload field to the correct place in the bit stream.
- If more than one CPS packets are discarded, the upper layer can identify the event by monitoring the buffer level at the ATM/TDM interface or by monitoring the reception of CPS packets with a timer. (The modulo 2 sequence number cannot indicate the loss of two consecutive CPS packets). The following figures apply for the 40 octet payload field:

  - Worst case: 2 packets lost => 2 * 40 octets * 8 bits/octet : 64kbit/s = 10 ms, i.e. buffer level decreased by 80 octets.

- Consequently, recovery with fill inserted in the correct place is possible, if the ATM cell jitter (i.e. transmission delay variation) is less than 5 ms. With a bigger jitter fill may be inserted in a wrong place in the TDM bit stream.

# 7 RLC

The RLC shall be used in transparent mode for T and NT services.

# 8 Initial Synchronisation and resynchronisation

## 8.1 Modem services (3.1 kHz audio)

### 8.1.1 Transparent Case

The IWF does not send any SDUs down link until the modem connection has been established and the modems have synchronised. Thereafter the IWF through connects, mapping data from the fixed network side onto SDUs that are sent toward the MS, and mapping data in the received SDUs to the fixed network side. .

The MS sends no SDUs until an SDU is received at the transmission SAP. Until the first access stratum SDU is received, CT 106, 107 and 109 remain in the OFF condition. At the reception of the first SDU, CT 106, CT 107 and CT 109 are changed from OFF to ON at the DCE/DTE (TE/TAF) interface. The data in the received SDUs are mapped to CT 104 and data on CT 103 are mapped to SDUs sent toward the RNC.

### 8.1.2 Non-Transparent Case

At the IWF, the synchronisation of modems on the transit network is performed after establishement of the physical connection. The RLP establishment may be initiated by the IWF, but is normally initiated by the MS. If the modems synchronise before the RLP has been established, the IWF stores the information received from the other modem in the L2R buffers.

The UE initiates the RLP after the physical connection has been established. When the RLP link has been established, CT107 at the DCE/DTE interface will be changed from "OFF" to "ON". From this time the information from/to the RLP, including status changes, will be mapped by the L2R entity.

## 8.2 Digital services

### 8.2.1 Transparent case

The procedures are the same as for the modem case, but, depending on implementation, the IWF may through connect before the fixed network leg has been synchronised.

### 8.2.1 Non-Transparent case

The procedures are the same as for the modem case.

## 8.3 Loss of synchronisation

The PLMN side is not synchronous so loss of synchronisation is not possible. For T services, SDUs may be lost or arrive irregularily, which handling is implementation dependent.

Loss of synchronisation on the fixed network side is handled as in GSM.

# 9 Call Control

BC-IE negotiation procedures and mapping to ISDN are specified in 27.001 and 29.007. BC-IE parameter values shall be restricted as indicated in Section 5.1. See also 3G TS 27.001, Annex B, Table B.5a for further details on the validity of parameter values in GSM.

# 10 Handover Issues

## 10.1 Signalling issues

### 10.1.1 Loss of BC Information during Handover from GSM to UMTS.

In the case of inter-MSC handover from GSM to UMTS, the serving GSM MSC/VLR sends a MAP message Prepare Handov carrying the BSSMAP message Handover Request. This message includes the parameter Channel Type, indicating whether ra resources are to be allocated for speech or data (parameter 'Speech or data indicator') and, among other data, the type of data service (transparent/non transparent) and the user rates (both included in the parameter 'Channel rate and type').

As no other bearer capability related parameters are received, it is not possible to distinguish between any other services than 'speech', 'data transparent' and 'data non-transparent'.

The mapping into QoS radio access parameters would be done as described in Section 5.2 , limited to the services 'speech', 'data, non-transparent' and 'data, transparent'.

### 10.1.2 Handover from UMTS to GSM

In case a UMTS call is set up in the CN, the BC IE parameters are mapped into QoS RAB parameters at call setup.

If the CN has to perform a handover towards GSM, the non-anchor MSC needs to perform an assignment based on GSM traffic channel parameters.
In case of handover from UMTS to GSM, the anchor MSC maps the BC IE parameters into GSM traffic channel parameters. This requires that the BC IE is coded according to GSM protocol requirements, i.e. all those parameters ignored in UMTS should nevertheless be correctly specified by the UE in order to perform a handover to GSM.

## 10.2 User Plane

### 10.2.1 Handover from UMTS to GSM

After a handover from UMTS to GSM the user plane between the anchor MSC and the visited MSC shall comply to the standard GSM A-interface protocols, i.e

- A-TRAU or modified V.110 frames as defined in [18] and [19]
- up to four 16kbit/s substreams are multiplexed in one 64kbit/s channel (Split/Combine function and Multiplexing function as defined in [18] and [19])

### 10.2.2 Handover from GSM to UMTS

After a handover from GSM to UMTS the user plane between the anchor MSC and the visited MSC shall comply to the A-TRAU' protocol.

The A-TRAU' protocol is defined as follows:

- A-TRAU' frames are transmitted in regular intervals of 10ms
- an A-TRAU' frame consists of two consecutive A-TRAU frames (as defined in [19]) each with a length of 320 bit
- the A-TRAU' protocol is used on a plain 64 kbit/s channel without substreams

- the same A-TRAU’ format is used for the transparent and non-transparent transmission mode.
- in transparent mode the number of data bits in an A-TRAU’ frame depend on the user rate only, each user rate corresponds to a fixed number of data bits (see below)
- in non-transparent mode A-TRAU’ frames contain always complete RLP frames, rate adaptation is performed by means of the M2 bit
- the M1-bit is used to identify 1st and 2nd frame in both transmission modes.

### 10.2.2.1 Frame layout for the different transparent user rates:

The number of data bits in an A-TRAU’ frame depend on the user rate only, each user rate corresponds to a fixed number of data bits in an A-TRAU’ frame:

| Date Rate | Number of data bits per A-TRAU’ frame |
|---|---|
| 33.6 kbit/s | 336 |
| 32 kbit/s | 320 |
| 28.8 kbit/s | 288 |

The data bits are inserted in the A-TRAU’ frame starting with D1 of Data field 1 of the first A-TRAU frame. The unused bits are filled with binary ‘1’.

### 10.2.2.2 A-TRAU’ frame format

One A-TRAU’ frame consists of two consecutive A-TRAU frames. The following figure shows the format of one A-TRAU frame:

| Octet number | bit number 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 2 | 1 | **C1** | **C2** | **C3** | **C4** | **C5** | **M1** | **M2** | |
| 3 | **Z1** | D1 | D2 | D3 | D4 | D5 | D6 | D7 | |
| 4 | D8 | D9 | D10 | D11 | D12 | D13 | D14 | D15 | 36 bit data field 1 |
| 5 | D16 | D17 | D18 | D19 | D20 | D21 | D22 | D23 | |
| 6 | D24 | D25 | D26 | D27 | D28 | D29 | D30 | D31 | |
| 7 | D32 | D33 | D34 | D35 | D36 | **Z2** | D1 | D2 | |
| 8 | D3 | D4 | D5 | D6 | D7 | D8 | D9 | D10 | |
| 9 | D11 | D12 | D13 | D14 | D15 | D16 | D17 | D18 | 36 bit data field 2 |
| 10 | D19 | D20 | D21 | D22 | D23 | D24 | D25 | D26 | |
| 11 | D27 | D28 | D29 | D30 | D31 | D32 | D33 | D34 | |
| 12 | D35 | D36 | **Z3** | D1 | D2 | D3 | D4 | D5 | |
| 13 | D6 | D7 | D8 | D9 | D10 | D11 | D12 | D13 | |
| 14 | D14 | D15 | D16 | D17 | D18 | D19 | D20 | D21 | 36 bit data field 3 |
| 15 | D22 | D23 | D24 | D25 | D26 | D27 | D28 | D29 | |
| 16 | D30 | D31 | D32 | D33 | D34 | D35 | D36 | **Z4** | |
| 17 | D1 | D2 | D3 | D4 | D5 | D6 | D7 | D8 | |
| 18 | D9 | D10 | D11 | D12 | D13 | D14 | D15 | D16 | 36 bit data field 4 |
| 19 | D17 | D18 | D19 | D20 | D21 | D22 | D23 | D24 | |
| 20 | D25 | D26 | D27 | D28 | D29 | D30 | D31 | D32 | |
| 21 | D33 | D34 | D35 | D36 | **Z5** | D1 | D2 | D3 | |
| 22 | D4 | D5 | D6 | D7 | D8 | D9 | D10 | D11 | |
| 23 | D12 | D13 | D14 | D15 | D16 | D17 | D18 | D19 | 36 bit data field 5 |
| 24 | D20 | D21 | D22 | D23 | D24 | D25 | D26 | D27 | |
| 25 | D28 | D29 | D30 | D31 | D32 | D33 | D34 | D35 | |
| 26 | D36 | **Z6** | D1 | D2 | D3 | D4 | D5 | D6 | |
| 27 | D7 | D8 | D9 | D10 | D11 | D12 | D13 | D14 | |
| 28 | D15 | D16 | D17 | D18 | D19 | D20 | D21 | D22 | 36 bit data field 6 |
| 29 | D23 | D24 | D25 | D26 | D27 | D28 | D29 | D30 | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 30 | D31 | D32 | D33 | D34 | D35 | D36 | **Z7** | D1 | |
| 31 | D2 | D3 | D4 | D5 | D6 | D7 | D8 | D9 | |
| 32 | D10 | D11 | D12 | D13 | D14 | D15 | D16 | D17 | |
| 33 | D18 | D19 | D20 | D21 | D22 | D23 | D24 | D25 | 36 bit data field 7 |
| 34 | D26 | D27 | D28 | D29 | D30 | D31 | D32 | D33 | |
| 35 | D34 | D35 | D36 | **Z8** | D1 | D2 | D3 | D4 | |
| 36 | D5 | D6 | D7 | D8 | D9 | D10 | D11 | D12 | |
| 37 | D13 | D14 | D15 | D16 | D17 | D18 | D19 | D20 | 36 bit data field 8 |
| 38 | D21 | D22 | D23 | D24 | D25 | D26 | D27 | D28 | |
| 39 | D29 | D30 | D31 | D32 | D33 | D34 | D35 | D36 | |

**Figure 2: A-TRAU 320 bit frame**

**Data Bits (Dxx):**

The 288 data bits of an A-TRAU frame are divided in eight fields of 36 bits.

**Control bits (C Bits):**

**C1 to C4:**

The Control bits C1 to C4 define the used data rate. C1 to C4 in the first A-TRAU frame indicate the data rate in send direction.

C1 to C4 in the second A-TRAU frame indicate the used data rate in backward direction. This is required for Rate Control that is required in uplink direction. For details on rate control see [13].

| C1 | C2 | C3 | C4 | Date Rate |
|---|---|---|---|---|
| 1 | 0 | 1 | 1 | 57.6 kbit/s |
| 1 | 0 | 1 | 0 | 33.6 kbit/s |
| 1 | 0 | 0 | 1 | 32 kbit/s |
| 1 | 0 | 0 | 0 | 28.8 kbit/s |
| 0 | 1 | 1 | 1 | 14.4 kbit/s |

**C5:**

C5 is not used, it is set to binary ‘1’.

**Bit M1:**

An A-TRAU’ frame is made of two consecutive A-TRAU which build the transport container for 576 data bits. Bit M1 is used to determine the order of the A-TRAU frames within an A-TRAU’ frame.

The two M1 bits are referred to as the Frame Start Identifier. The FSI value is 01. These values are assigned to the M1 bit as shown below:

| | M1 bit |
|---|---|
| First A-TRAU frame | 0 |
| Second A-TRAU frame | 1 |

**Bit M2:**

The M2 bit is used to indicate ‘valid’ A-TRAU’ frames. The M2 bit in both of the two consecutive A-TRAU frames relating to an A-TRAU’ frame shall have the same value.

Transparent mode:

In transparent mode M2 is used for synchronization, for details on synchronization see chapter 8. The IWF (downlink direction) sets M2 to binary ‘1’ until synchronization with the fixed netwok is achieved. When synchronized M2 is set to binary ‘0’.

The 3G MSC (uplink direction) sets M2 to binary ‘1’ until it receives valid SDUs. When receiving valid SDUs M2 is set to binary ‘0’.

Non-transparent mode:

In non-transparent mode M2 is used for DTX. If DTX is applied, M2 is set to binary ‘1’. If DTX is not to be applied, M2 bit is set to binary ‘0’. The DTX handling is used in both directions for rate adaptation purpose. This means that the sending entity will insert ‘fill RLP-frames’ with DTX set to binary ‘1’ in case no RLP-frame is available.

**Z bits:**

The bits Zi are used for Framing Pattern Substitution mechanism. This mechanism is defined in [19].