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Foreword

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Contents

Foreword

This Technical Report (TR) 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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- 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 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".

[20] ITU-T Recommendation I.366.1: "Segmentation and Reassembly Service Specific Convergence Sublayer for the AAL type 2".

[21] ITU-T Recommendation Q.2630.1: "AAL Type 2 Signalling Protocol (Capability Set 1)".

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.

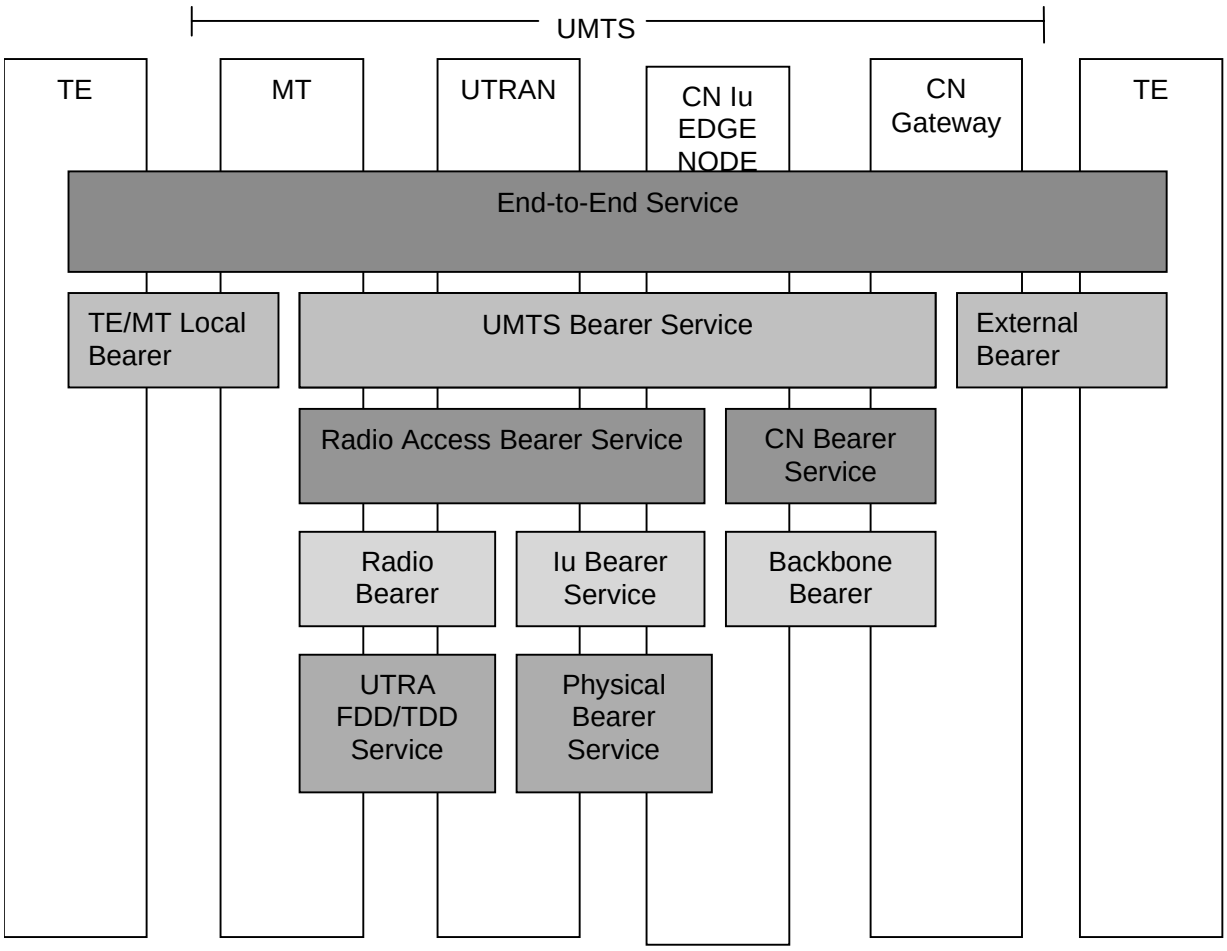

Figure 1

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 the present 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 subclause 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 = 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 kbit/s 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 kbit/s, 28,8 kbit/s 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 kbit/s, 28,8 kbit/s, 57.6 kbit/s	Maximum bit rate is set to the highest value ≤ WAIUR (note)
Guaranteed bit rate	14,4 kbit/s	Operator can choose 14,4 kbit/s, 28,8 kbit/s or 57,6 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	
RAB Subflow Combination bit rate	0 kbit/s	indicates DTX, RFCI is not assigned
NOTE: In case the WAIUR is less than Guaranteed bit rate, the Maximum bit rate is set to the Guaranteed bit rate.		

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)
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 according to 3G TS 23.107. Operator may also choose different value for Multimedia and other transparent data services.
Delivery of erroneous SDUs	-	No error detection in the core network
NOTE: 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 3G TS 25.415. Each SDU corresponds to one RLP frame and, consequently, is 576 bits long. Each SDU is transported in one Iu UP PDU of Type 1. 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 ms, 20 ms 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 3G TS 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. Following table shows SDU size defined by GSM Association - IMT-2000 Steering Group (Typical Radio Interface Parameter Sets). AAL2 is used. The AAL2 SSCS layer must be supported for segmentation and re-assembly.

Bit rate	SDU size (= RLC PDU payload size)
28.8 kbit/s	[Editor's note] Waiting for decision by GSM Association
33.6 kbit/s	[Editor's note] Waiting for decision by GSM Association
32 kbit/s	640 bits
56/64 kbit/s	640 bits

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

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. I.366.1[20] (SSSAR) describes that UUI takes value between 0 and 26 for final data and value 27 for more data, but UUI should take value 26 for final data considering compatibility with other SSCS specifications. When UUI works as sequence number by repetition of 27 and 26, CPS packet payload size is equal to half a SDU size. This CPS packet payload size also satisfies the requirement described in subclause 6.2.1. CPS packet payload size is set by Q.2630.1[21] over Iu interface.

- 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.

8.2.2 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 subclause 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 Handover carrying the BSSMAP message Handover Request. This message includes the parameter Channel Type, indicating whether radio 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 GSM 04.21 [18] and GSM 08.20 [19].
- up to four 16kbit/s substreams are multiplexed in one 64kbit/s channel (Split/Combine function and Multiplexing function as defined in GSM 04.21 [18] and GSM 08.20 [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 except for FNUR = 56 kbit/s (ITC=RDI) and FNUR = 64 kbit/s (ITC=UDI). For both exceptions a plain 64 kbit/s channel is used between the MSCs.

The A-TRAU' protocol is defined as follows:

- A-TRAU' frames are transmitted in regular intervals of 10 ms;
- an A-TRAU' frame consists of two consecutive A-TRAU frames (as defined in GSM 08.20 [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 3G TS 25.415 [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 clamped 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 GSM08.20 [19] .

10.2.3 Handover within 3G PLMNs

After a handover from a 3G MSC to another 3G MSC the user plane between the anchor MSC and the visited MSC shall comply to

the Iu UP protocol if both MSC are connected via an ATM interface.

the A-TRAU' protocol if both MSC are connected via a TDM interface except for FNUR = 56 kbit/s (ITC=RDI) and FNUR = 64 kbit/s (ITC=UDI). For both exceptions a plain 64 kbit/s channel is used between the MSCs.

Annex A:
Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
03-2000	TSG_N#07	NP-000053			Approved to be placed under TSG Change control	2.0.0	3.0.0
06-2000	TSG_N#08	NP-000223	001		Deletion of T 56 kbit/s for UDI	3.0.0	3.1.0
06-2000	TSG_N#08	NP-000223	002		Residual bit error ratio in Transparent Data	3.0.0	3.1.0
06-2000	TSG_N#08	NP-000223	003		Adding the value of GBR of NT services	3.0.0	3.1.0
06-2000	TSG_N#08	NP-000223	004		Indication of discontinuous transfer for NT data	3.0.0	3.1.0
06-2000	TSG_N#08	NP-000229	005		Clarification of IuUP in Transparent	3.0.0	3.1.0
06-2000	TSG_N#08	NP-000223	006		Clarification for 56 and 64 kbit/s	3.0.0	3.1.0
06-2000	TSG_N#08	NP-000223	007		Alignment with 29.007	3.0.0	3.1.0
06-2000	TSG_N#08	NP-000229	008		Clarification of IuUP PDU Type for NT data	3.0.0	3.1.0

History

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V3.1.0	June 2000	Publication