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Contents

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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 Switched Bearer Services in a 3G mobile network (UMTS) operating in UTRAN or GERAN Iu mode. Handover to GERAN A/Gb mode is also considered.

NOTE: The Gb interface does not play any role in the scope of the present document although the term "A/Gb mode" is 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. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document in the same Release as the present document.

[1]   3GPP TS 22.001: "Principles of circuit telecommunication services supported by a PLMN".

[2]   3GPP TR 21.905: "Vocabulary for 3GPP Specifications ".

[3]   3GPP TS 22.003: "Circuit Teleservices supported by a PLMN".

[4]   3GPP TS 22.002: "Circuit Bearer Services (BS) supported by a Public Land Mobile Network (PLMN)".

[5]   3GPP TS 22.101: "Service principles".

[6]   3GPP TS 22.105: "Services and service capabilities".

[7]   3GPP TS 23.002: "Network architecture".

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

[9]   3GPP TS 23.101: "General UMTS architecture".

[10]   3GPP TS 23.107: "Quality of Service (QoS), concept and architecture".

[11]   3GPP TS 24.022: "Radio Link Protocol (RLP) for circuit switched bearer and teleservices ".

[12]   3GPP TS 25.322: "Radio Link Control (RLC) protocol specification".

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

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

[15]   3GPP TS 29.007: "General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (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]   3GPP TS 44.021: " Rate adaption on the Mobile Station - Base Station System (MS - BSS) interface".

[19]   3GPP TS 48.020: " 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)".

[22]   3GPP TS 43.051: "GSM/EDGE Radio Access Network (GERAN) overall description, stage 2"

[23]   3GPP TS 43.010: "GSM Public Land Mobile Network (PLMN) connection types"

[24]   3GPP TS 29.415: " Core Network Nb Interface User Plane Protocols".

[25]   ITU-T Recommendation I.363.2: "B-ISDN ATM Adaptation Layer specification : Type 2 AAL".

[26]   ITU-T Recommendation I.460: "Multiplexing, rate adaption and support of existing interfaces".

[27]   ITU-T Recommendation I.366.2: "AAL type 2 service specific convergence sublayer for narrow-band services".

3   Definitions and abbreviations

3.1   Definitions

The term 'Mobile Station' (MS) in the present document is synonymous with the term 'User Equipment' (UE) as defined in 3GPP TR 21.905 [2].

For the purposes of the present document the following terms and definitions given in 3GPP TS 21.905 [2] and the following apply:

A/Gb mode: indicates that the text applies only to a system or sub-system which operate in A/Gb mode of operation, i.e. with a functional division that is in accordance with the use of an A or a Gb interface between the radio access network and the core network

Iu mode: indicates that the text applies only to a system or a sub-system which operates in Iu mode of operation, i.e. with a functional division that is in accordance with the use of an Iu-CS or Iu-PS interface between the radio access network and the core network

3.2   Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TS 21.905 [2] and the following apply.

BC	Bearer Capability
CE	Connection Element
CT	Circuit
GBR	Guaranteed Bitrate
MBR	Maximum Bitrate
RA	Rate Adaptation Functions
RNL	Radio Network Layer
S/C	Split/Combine Function
WAIUR	Wanted Air Interface User Rate

4   General

CS data services in UMTS are divided according to 3GPP TS 22.001 [1] into Bearer Services (3GPP TS 22.002 [4]) and end-to-end Teleservices (3GPP TS 22.003 [3]). These services are build on services provided by the Access Network. The 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. Figure 1 shows the service architecture.
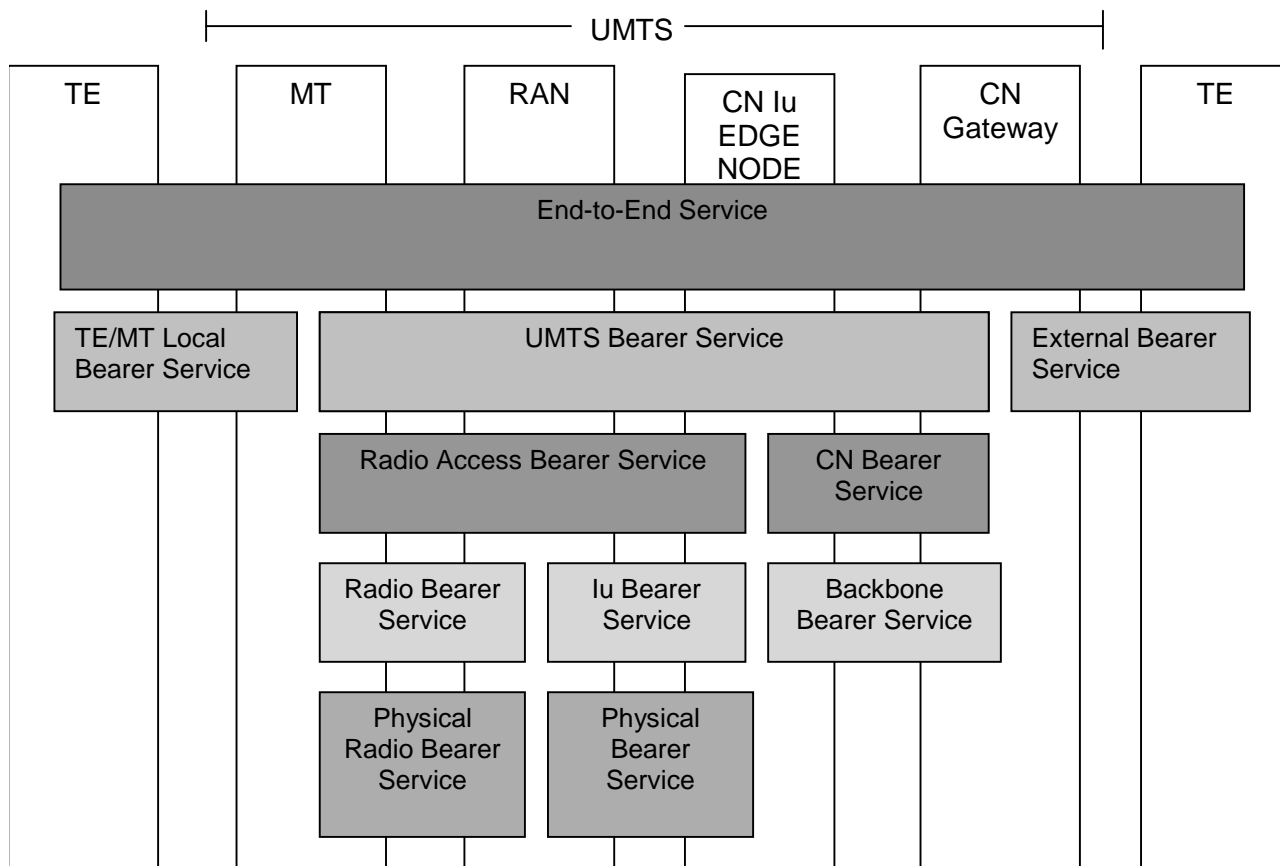

Figure 1: Service architecture

4.1 Limited set of UTRAN Iu mode PLMN connection models

4.1.1 Transparent data

Figure 2 shows the connection model for synchronous transparent CS data. In general all the user data bits are conveyed between the MT and the IWF as they are received from the TE. This implies that the RLC SDU/ Iu UP frame is transparent.

Figure 3 shows the connection model for asynchronous transparent CS data. The rate adaptation function RA0 from 3GPP TS 44.021 [18] (adapted to the RLC SDU size) is used for converting between asynchronous data and a synchronous bit stream. End-to-end flow control is not applicable in UTRAN Iu mode, thus no status bits are conveyed over RAN/UTRAN (see 3GPP TS 27.001 [14]).
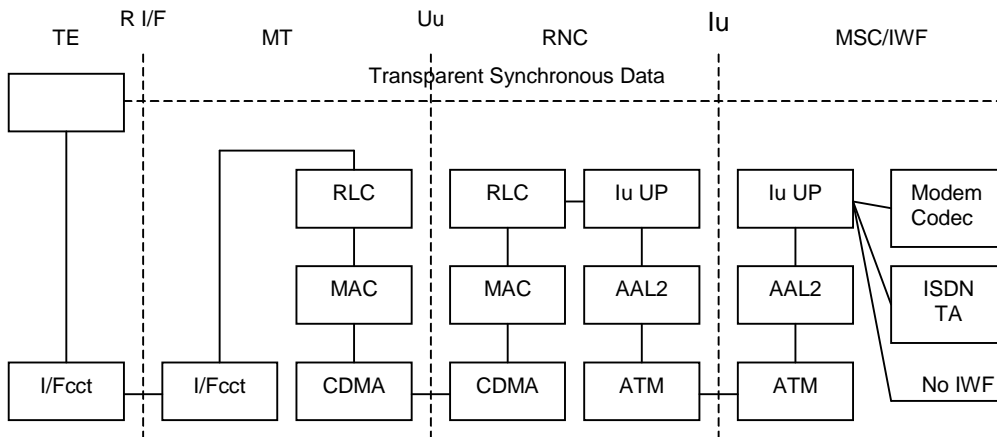
Figure 2: Connection model for Synchronous T CS data
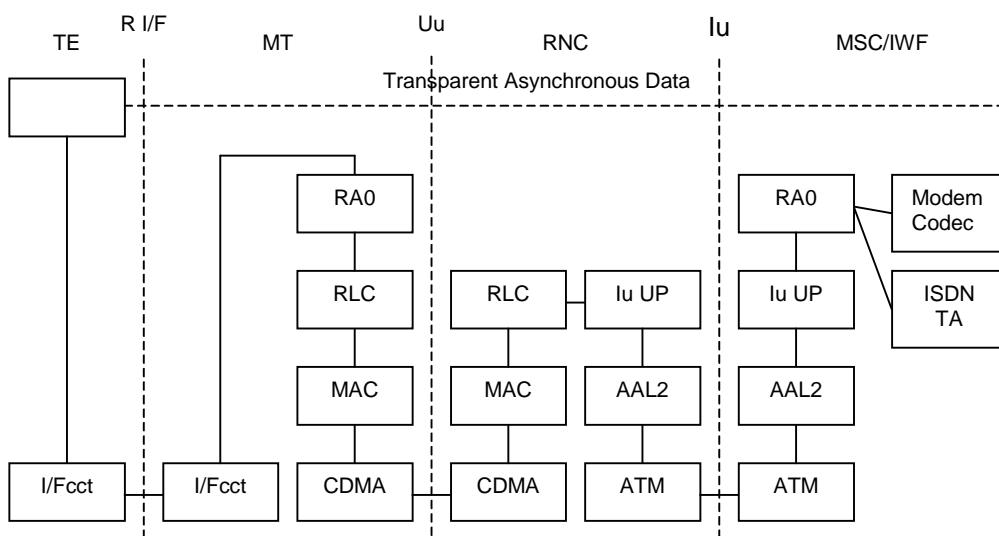
Figure 3: Connection model for Asynchronous T CS data

4.1.2 Non-transparent data

Figure 4 shows the connection model for asynchronous non-transparent CS data.
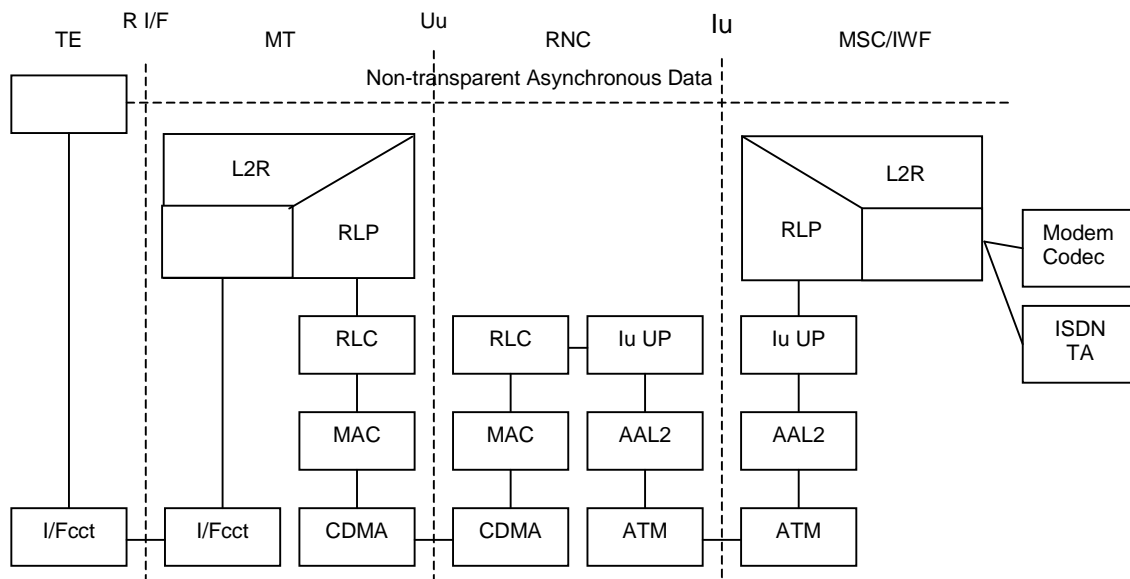
Figure 4: Connection model for Asynchronous NT CS data

4.2 Limited set of GERAN Iu mode PLMN connection models

This subclause gives an overall overview on the PLMN connection models for circuit switched data services in GERAN Iu mode. The stage 2 description is given in 3GPP TS 43.051 [22]. For details concerning the PLMN connection models refer to 3GPP TS 43.010 [23].

4.2.1 Transparent data

Figure 5 shows the connection model for synchronous transparent CS data. In general all the user data bits are conveyed between the MT and the IWF as they are received from the TE. This implies that the RLC SDU/ Iu UP frame is transparent.

Figure 6 shows the connection model for asynchronous transparent CS data. The rate adaptation function RA0 from 3GPP TS 44.021 [18] (adapted to the RLC SDU size) is used for converting between asynchronous data and a synchronous bit stream. End-to-end flow control is not applicable in GERAN Iu mode, thus no status bits are conveyed over RAN/GERAN (see 3GPP TS 27.001 [14]).

TE   R I/F   MT   Um   BSS   Iu   MSC/IWF

Transparent Synchronous Data

S/C	S/C		
RA	RA		
RLC	RLC	Iu UP	Iu UP
MAC	MAC	AAL2	AAL2
TDMA	TDMA	ATM	ATM

Modem Codec

ISDN TA

No IWF

I/Fcct   I/Fcct
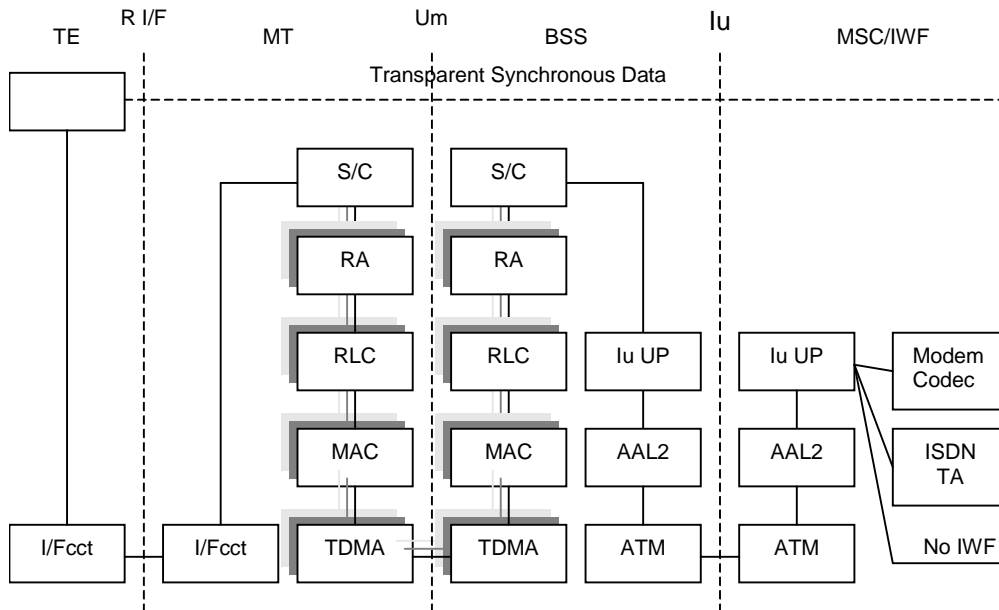
Figure 5: Connection model for Synchronous T CS data

TE   R I/F   MT   Um   BSS   Iu   MSC/IWF

Transparent Asynchronous Data

RA0			RA0
S/C	S/C		
RA	RA		
RLC	RLC	Iu UP	Iu UP
MAC	MAC	AAL2	AAL2
TDMA	TDMA	ATM	ATM

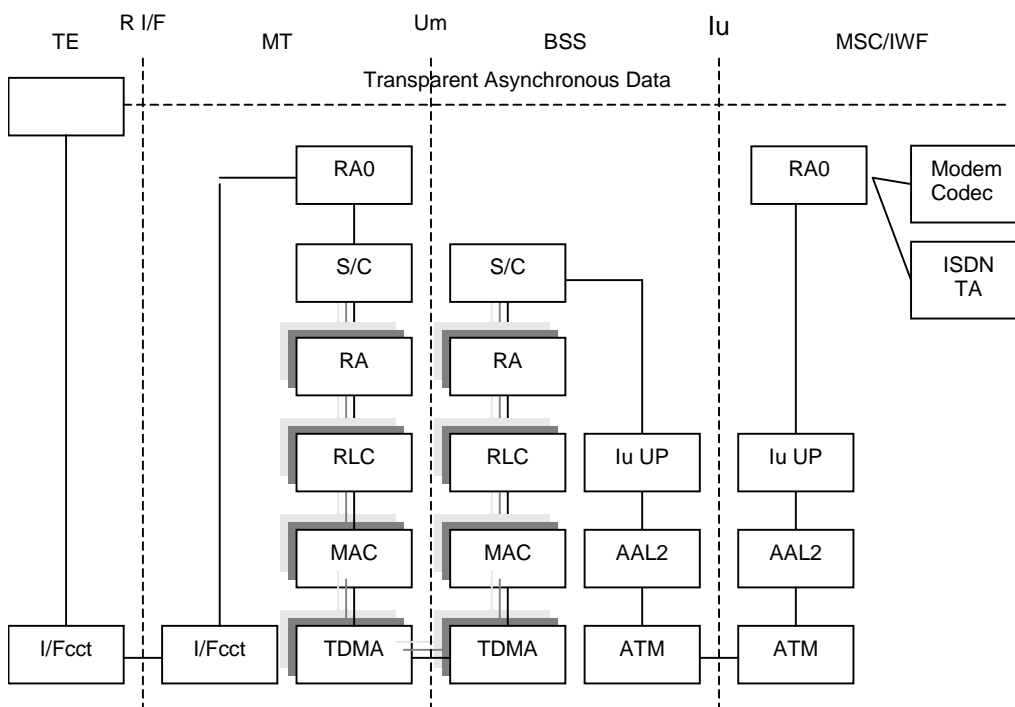Modem Codec

ISDN TA

I/Fcct   I/Fcct

Figure 6: Connection model for Asynchronous T CS data

4.2.2　Non-transparent data

Figure 7 shows the connection model for asynchronous non-transparent CS data.
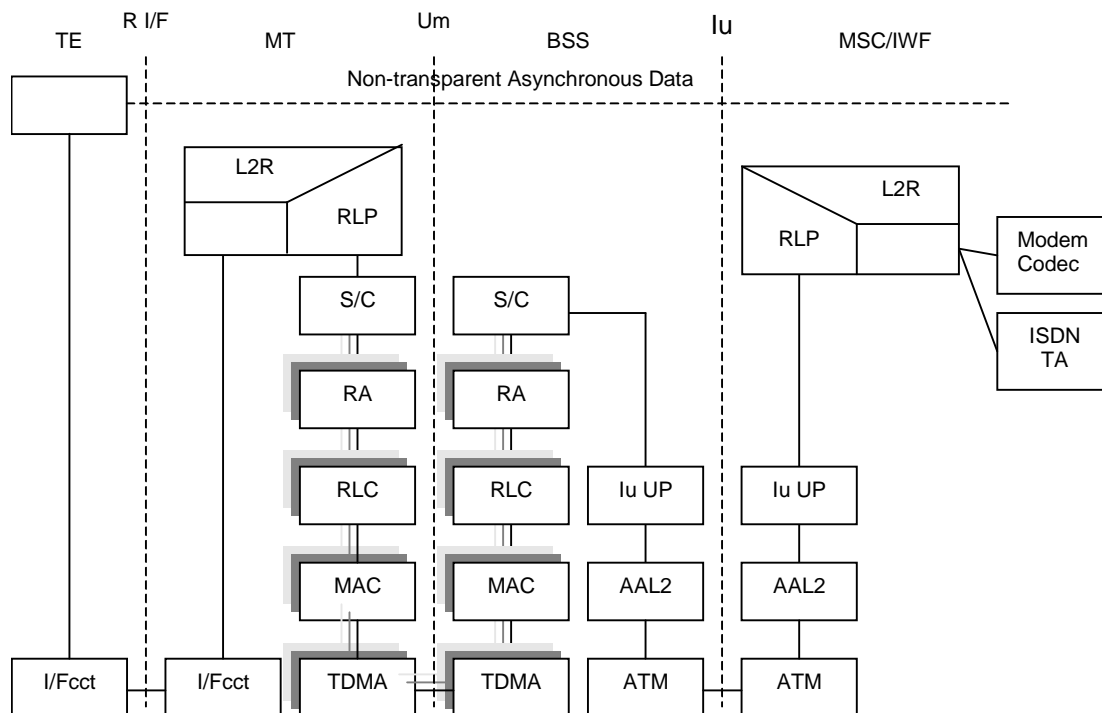

Figure 7: Connection model for Asynchronous NT CS data

5　Bearer Capabilities for UMTS Data Services

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

- Speech.

- Transparent Data for support of Multimedia.

- Transparent Data.

- Non-transparent Fax.

- Non-transparent data.

Four services (or services categories) are currently distinguishable from the PLMN BC-IE in GERAN Iu mode:

- Speech.

- Transparent Data for support of Multimedia.

- Transparent Data.

- 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 Bearer Capabilities for UMTS Data Services

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.

For this service the FNUR at the setup is restricted to:

- 64 kbit/s, in case ITC = UDI.

- 56 kbit/s in case ITC = UDI or Other ITC = RDI.

- 28,8 kbit/s, in case ITC = 3,1 kHz audio.

 NOTE: ITU-T Recommendation 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 only applicable for UTRAN Iu mode. It is distinguished by the following BC-IE parameters:

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

- CE = non-transparent.

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 in UTRAN Iu mode are limited to 14,4 kbit/s, 28,8 kbit/s and 57,6 kbit/s. For GERAN Iu mode the following AIURs are possible: 9,6 kbit/s, 14,4 kbit/s, 19,2 kbit/s, 28,8 kbit/s, 38,4 kbit/s, 43,2 kbit/s and 57,6 kbit/s.

5.1.4 Transparent Data for Support of Multimedia

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

- ITC = UDI or 3.1 kHz audio or Other ITC = RDI.

- CE = transparent.

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

For this service the FNUR at the setup 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.

- 32 kbit/s, in case ITC = UDI.

- 28,8 kbit/s, in case ITC = 3,1 kHz audio.

NOTE: Transmission rates 31.2 kbit/s and 28.8 kbit/s negotiated by the modems in a 3.1 kHz multimedia call may be used with a rate adaptation to 33.6 kbit/s between the UE and the IWF (see 3GPP TS 27.001 [14] and 3GPP TS 29.007 [15]). The negotiated values shall be provided by the MSC by way of a MODIFY message.

5.2 BC-IE to RAB QoS Mapping

Since UMTS bearer services are described by BC-IEs and RABs by QoS parameters, a mapping between the UMTS bearer services and the possible RABs that support them, has to be specified. The QoS mapping is based on 3GPP TS 23.107 [10] and is specified in detail in 3GPP TS 27.001[14], annex B, subclause B.1.13.

6 Iu and Nb User Plane

6.1 NT services

The Iu and NB User Plane for NT services is described in Clause 11a.2 of 3GPP TS 29.007 [15].

6.2 T services

The Iu and NB User Plane for T services is described in Clause 11a.3 of 3GPP TS 29.007 [15].

7 RLC

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

8 Initial Synchronisation and resynchronisation

The initial synchronisation and actions on loss of synchronisation are specified in 3GPP TS 27.001 [14] and 3GPP TS 29.007 [15].

9 Call Control

BC-IE negotiation procedures and mapping to ISDN are specified in 3GPP TS 27.001 [14] and 3GPP TS 29.007 [15]. BC-IE parameter values shall be restricted as indicated in subclause 5.1. See also 3GPP TS 27.001 [14], annex B, table B.5a for further details on the validity of parameter values in A/Gb mode and Iu mode.

10 Handover Issues

10.1 Signalling issues

The handling of signalling during handover is described in Clause 11.0 of 3GPP TS 29.007 [15].

10.2 User Plane

The handling of the user plane during handover is described in clause 11 of 3GPP TS 29.007 [15].

Annex A (informative):
Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
12-2004	CN#26	NP-040607			'Technical Report' changed to 'Technical Specification' in the foreword	1.0.1	6.0.0
03-2005	CN#27	NP-050110	1		References for Iu and Nb User Plane	6.0.0	6.1.0
06-2007	CT#36				Upgraded to Release 7	6.1.0	7.0.0
12-2008	CT#42				Upgraded to v8.0.0 due to simple upgrade without no technical change	7.0.0	8.0.0

History

Document history		
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