3GPP TSG_CN **Tdoc NP-000229**
Plenary Meeting #8, Düsseldorf, Germany
21st – 23rd June 2000.

Source: **TSG_N WG 3**

Title: **CRs to 3G Work Item TEI**

Agenda item: **6.6.3**

Document for: **APPROVAL**

Introduction:

This document contains **9** CRs on **Work Item TEI** that have been agreed by **TSG_N WG 3,** and are forwarded to **TSG_N Plenary** meeting #8 for approval.

Spec	CR	Doc-2nd-	Phas	Subject	Cat	Version-	Version-
23.910	005	N3-000261	R99	Clarification of IuUP in Transparent	F	3.0.0	3.1.0
23.910	008	N3-000250	R99	Clarification of IuUP PDU Type for NT	F	3.0.0	3.1.0
24.022	004	N3-000193	R99	RLP timer T4 in UMTS	F	3.2.0	3.3.0
27.001	021	N3-000264	R99	Adaptations for UMTS	C	3.4.0	3.5.0
27.002	004	N3-000265	R99	Adaptations for UMTS	C	3.3.0	3.4.0
27.003	005	N3-000266	R99	Adaptations for UMTS	C	3.3.0	3.4.0
29.007	017	N3-000136	R99	Fax	F	3.4.0	3.5.0
29.007	018	N3-000268	R99	Clarification of the VMSC behavior in case	C	3.4.0	3.5.0
29.007	020	N3-000213	R99	ISDN TA function in case of bit	F	3.4.0	3.5.0

3GPP N3/SMG3 WPD Meeting #10
Oahu, Hawaii, 22nd – 26th May 2000

Document N3-000261
e.g. for 3GPP use the format TP-99xxx
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23.910	CR	005	Current Version:	3.0.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

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Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [ ] UTRAN / Radio [ ] Core Network [X]

Source: TSG_N3 **Date:** 2000-05-25

Subject: Clarification of IuUP in Transparent services

Work item: UMTS maintenance

Category: *(only one category shall be marked with an X)*

F	Correction	X	**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change:
Following two points should be clarified.
1. SDU size does not always correspond to 10ms.
2. CPS packet payload size could be equal to half a SDU size.

Clauses affected: Section 2 and 6.2

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other GSM core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments:

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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] ~~[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)".

~~6~~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 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).~~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.

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 ~~10 ms~~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 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.

3GPP N3/SMG3 WPD Meeting #10
Oahu, Hawaii, 22nd – 26th May 2000

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23.910	CR	008	Current Version:	3.0.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	TSG CN#8	for approval	X	strategic		(for SMG use only)
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Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [ ] UTRAN / Radio [ ] Core Network [X]

Source: TSG_N3 **Date:** 2000-05-23

Subject: Clarification of IuUP PDU Type for NT data

Work item: UMTS maintenance

Category: *(only one category shall be marked with an X)*

F	Correction	X	**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change: Clarification of IuUP PDU Type for NT data

Clauses affected: Section 6.2

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other GSM core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments:

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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, 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.

3GPP TSG-N3/SMG3 WPD Meeting #9
Berlin, Germany, 10-14 Apr 2000

***Document* N3-000193**
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24.022	CR	004	Current Version:	3.2.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	TSG-N#08	for approval	X	strategic		(for SMG use only)
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Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)*

(U)SIM		ME	X	UTRAN / Radio		Core Network	X

Source: TSG-CN3 **Date:** 2000-04-12

Subject: RLP timer T4 in UMTS

Work item: 7.5 UMTS maintenance

Category: *(only one category shall be marked with an X)*

F	Correction	X	**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change: Timer T4 is not required in when UTRAN is used because there is no multilink configuration in the traffic channel with UTRAN.

Clauses affected: 5.5

Other specs affected:

Other 3G core specifications		→ List of CRs:	
Other GSM core specifications		→ List of CRs:	
MS test specifications		→ List of CRs:	
BSS test specifications		→ List of CRs:	
O&M specifications		→ List of CRs:	

Other comments:


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5.5 List of system parameters

The system parameters are as follows:

Table 2: RLP parameter values

Name	Range of values	Default value	Recommended value
Version N°	0 – 2	0	2
k MS ⇒ IWF (for N° = 0/1)	0 – 61	61	61
k MS ⇒ IWF (for N° = 2)	0 - k_{max} (note 3)	480	240 (note 2)
k IWF ⇒ MS (for N° = 0/1)	0 – 61	61	61
k IWF ⇒ MS (for N° = 2)	0 - k_{max} (note 3)	480	240 (note 2)
T1 (note 1)	> 420 ms (version2) > 380 ms > 440 ms > 600 ms	520 ms (fullrate on 14.5, 29.0 or 43.5 kbit/s) 480 ms (fullrate on 12 kbit/s) 540 ms (fullrate on 6 kbit/s) 780 ms (halfrate)	520 ms (fullrate on 14.5, 29.0 or 43.5 kbit/s) 480 ms (fullrate on 12 kbit/s) 540 ms (fullrate on 6 kbit/s) 780 ms (halfrate)
T2 (note 1)		< 80 ms (fullrate on 14.5, 29.0 or 43.5 kbit/s) < 80 ms (fulrate on 12 kbit/s) < 80 ms (fullrate on 6 kbit/s) < 80 ms (halfrate)	< 80 ms (fullrate on 14.5, 29.0 or 43.5 kbit/s) < 80 ms (fullrate on 12 kbit/s) < 80 ms (fullrate on 6 kbit/s) < 80 ms (halfrate)
N2	> 0	6	6
P_T	0	0	0
P_0	0 – 3	0	3
P_1	512 – 65535	512	2048
P_2	6 – 250	6	20
T4 (note 1)	> 25 ms	30 ms 50 ms (fullrate on 14.5, 29.0 or 43.5 kbit/s)	30 ms 50 ms (fullrate on 14.5, 29.0 or 43.5 kbit/s)
Optional feature, Up signalling	0 – 1	0	1

NOTE 1: The timer values shall fulfil the formula:
T1 > T2 + T4 + (2 * transmission delay) for multi-link operation
T1 > T2 + (2 * transmission delay) for single link operation
For GSM the values apply according to indicated channel types, for UMTS the values apply according to "fullrate on 14.5". Timer T4 is ignored in UMTS.

NOTE 2: This value is recommended in the case of 4 physical links.

NOTE 3: The maximum window size shall fulfil the formula
kmax < 496 - n * (1 + T4 / 20 ms), where n denotes the number of channels.
Any value k within the given range may be chosen.
However, to avoid transmission delay the value k should be
k > n * (2 * transmission delay) / 20 ms.

3GPP TSG-N3 #10
Oahu, Hawaii 22nd-26th May 2000

N3-000264

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27.001	CR	021	Current Version:	3.4.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

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Proposed change affects: (U)SIM [ ] ME [X] UTRAN / Radio [ ] Core Network [X]
(at least one should be marked with an X)

Source: TSG_N3 **Date:** 2000-05-23

Subject: Adaptations for UMTS

Work item: TEI

Category: *(only one category shall be marked with an X)*

F	Correction		**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature	X		Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change: This specification has been transferred from SMG to 3GPP. Therefore, adaptations for UMTS are required.

Clauses affected:

Other specs affected:

Other 3G core specifications		→ List of CRs:
Other GSM core specifications		→ List of CRs:
MS test specifications		→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

Other comments:

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3G TS 27.001 V3.4.0 (2000-03)

Technical Specification

3rd Generation Partnership Project; Technical Specification Group Core Network; General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS) (Release 1999)

Keywords
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3GPP

Postal address

3GPP support office address
650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet
http://www.3gpp.org

Contents

Foreword

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

The present document specifies the functions needed for terminal adaptation within the 3GPP system.

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:

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater 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 document.

1 Scope

The present document is based on the principles of terminal adaptor functions presented in the ITU-T I-series of recommendations (I.460 to I.463).

The PLMN supports a wide range of voice and non-voice services in the same network. In order to enable non-voice traffic in the PLMN there is a need to connect various kinds of terminal equipments to the Mobile Termination (MT). The target of the present document is to outline the functions needed for the terminal adaptation.

In the 3G TS 22.002 the bearer services are described. The general network configuration is described in TS 23.002 and the GSM PLMN access reference configuration is defined in GSM 04.02. The various connection types used in the GSM PLMN are presented in GSM 03.10. Terminology used in the present document is presented in GSM 01.04 (ETR 350), 3G 21.905 and 3G TS 29.990. For support of data services between a PLMN and other networks see TS 29.007.

The present document is valid for a 2nd generation PLMN (GSM) as well as for a 3rd generation PLMN (UMTS). If text applies only for one of these systems it is explicitly mentioned by using the terms "GSM" and "UMTS". If text applies to both of the systems, but a distinction between the ISDN/PSTN and the PLMN is necessary, the term "PLMN" is used.

NOTE: From R99 onwards the following services are no longer more required to be provided by a PLMN:

- the dual Bearer Services "alternate speech/data" and "speech followed by data";
- the dedicated services for PAD and Packet access;
- BS 21 ... 26 and BS 31 ... 34.

The support of these services is still optional. The specification of these services is not within the scope of the present document. For that, the reader is referred to GSM Release 98.

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 01.04: "Digital cellular telecommunication system (Phase 2+); Abbreviations and acronyms".

[2] 3G TS 22.002: "Digital cellular telecommunication system (Phase 2+); Bearer Services (BS) supported by a GSM Public Land Mobile Network (PLMN)".

[3] GSM 02.03: "Digital cellular telecommunication system (Phase 2+); Teleservices supported by a GSM Public Land Mobile Network (PLMN)".

[4] 3G TS 23.002: "Network architecture".

[5] GSM 03.10: "Digital cellular telecommunication system (Phase 2+); GSM Public Land Mobile Network (PLMN) connection types".

[6] GSM 04.02: "Digital cellular telecommunication system (Phase 2+); GSM Public Land Mobile Network (PLMN) access reference configuration".

[7] 3G TS 24.008: "Mobile radio interface layer 3 specification; Core Network Protocols -Stage 3".

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

[9] 3G TS 24.022: "Radio Link Protocol (RLP) for Circuit Switched Bearer and Teleservices".

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

[11] 3G TS 27.002: "Terminal Adaptation Functions (TAF) for services using asynchronous bearer capabilities".

[12] 3G TS 27.003: "Terminal Adaptation Functions (TAF) for services using synchronous bearer capabilities".

[13] 3G TS 27.005: "Use of Data Terminal Equipment - Data Circuit terminating Equipment (DTE - DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)".

[14] 3G TS 27.007: "AT command set for ~~GSM Mobile Equipment (ME)~~3GPP User Equipment (UE)".

[15] Void.

[16] 3G TS 29.002: "Mobile Application Part (MAP) specification".

[17] Void.

[18] Void.

[19] Void.

[20] GSM 09.06: "Digital cellular telecommunication system (Phase 2+); Interworking between a Public Land Mobile Network (PLMN) and a Packet Switched Public Data Network/Integrated Services Digital Network (PSPDN/ISDN) for the support of packet switched data transmission services".

[21] 3G 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)".

[22] GSM 09.08: "Digital cellular telecommunication system (Phase 2+); Application of the Base Station System management Application Part (BSSMAP) on the E-interface".

[23] 3G TS 29.010: "Information element mapping between Mobile Station - Base Station System and BSS - Mobile-services Switching Centre (MS - BSS - MSC) Signalling procedures and the Mobile Application Part (MAP)".

[24] 3G TS 29.011: "Signalling interworking for supplementary services".

[25] GSM 09.90: "Digital cellular telecommunication system (Phase 2+); Interworking between Phase 1 infrastructure and Phase 2+ Mobile Stations (MS)".

[26] ITU-T Series V Recommendations: "Data communication over the Telephone network".

[27] ITU-T Series V.42bis: "Data Compression for Data Circuit Terminating Equipment (DCE) using Error Correction Procedures".

[28] ITU-T Series X Recommendations: "Data Communication networks".

[29] ITU-T Recommendation X.25: "Interface between data terminal equipment (DTE) and data circuit - terminating equipment (DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuit".

[30] ITU-T Recommendation X.150: "Data Communication Networks: Transmission, Signalling and Switching, Network Aspects, Maintenance and Administrative Arrangements".

[31] ITU-T Recommendation V.25bis: "Automatic Calling and/or Answering Equipment on the General Switched Telephone Network (GSTN) using the 100-Series Interchange Circuits".

[32] ITU-T Recommendation V.250~~ter~~: "Serial asynchronous automatic dialling and control".

[33] ITU-T Recommendation V.54: "Loop Test Devices for Modems".

[34] ITU-T Recommendation V.110: "Support of data terminal equipments (DTEs) with V-Series interfaces by an integrated services digital network".

[35] ITU-T Recommendation I.460-I.464: "ISDN Overall Network Aspects and Functions, User Network Interfaces".

[36] ITU-T Recommendation Q.931 (05/98): "DSS 1 - ISDN user network interface layer 3 specification for basic call control".

[37] ETR 018: "Integrated Services Digital Network (ISDN), Application of the BC-, HLC-, LLC-Information elements by terminals supporting ISDN services".

[38] ISO/IEC 6429: "Information technology - Control functions for coded character sets".

[39] Personal Computer Memory Card Association: "PCMCIA 2.1 or PC-Card 3.0 electrical specification or later revisions".

[40] IrDA "IrPHY Physical signalling standard".

[41] TIA-617: "Data Transmission Systems and Equipment - In-Band DCE Control".

[42] ITU-T Recommendation V.120: "Support by an ISDN of data terminal equipment with V-Series type interfaces with provision for statistical multiplexing".

[43] GSM 03.34:"Digital cellular telecommunication system (Phase 2+); High Speed Circuit Switched Data (HSCSD); Stage 2 Service description".

[44] ISO/IEC 3309: "Telecommunications and information exchange between systems - High-level data link control (HDLC) procedures - Frame structure".

[45] IETF RFC 1662: "PPP in HDLC-like framing".

[46] 3G TS 21.905: "3G Vocabulary".

[47] 3G TS 25.990: "Vocabulary for UTRAN".

[48] 3G TS 25.322: "Radio Link Control (RLC) Protocol Specification".

[49] 3G TS 25.415: "UTRAN Iu interface user plane protocols".

[50] Mobile Internet Access Forum: "PIAFS Specification Ver. 1.1, 2.1".

3 Definitions and ~~A~~abbreviations

3.1 Definitions

The term ‘mobile station’ (MS) in the present document is synonymous with the term ‘user equipment’ (UE) in 3G terminology as defined in 3G TR 21.905.

The term ‘TE2’ in the present document is synonymous with the term ‘TE’ in 3G terminology as defined in 3G TR 21.905.

The term ‘MT2’ in the present document is synonymous with the term ‘MT’ in 3G terminology as defined in 3G TR 21.905.

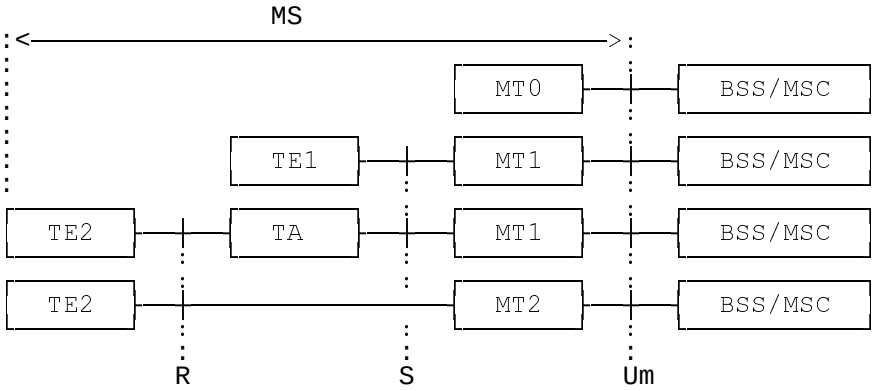
3.2 Abbreviations

In addition to those below, abbreviations used in the present document are listed in GSM 01.04, 3G TS 21.905 or 3G TS 25.990.

CALL PROC	CALL PROCEEDING
CALL CONF	CALL CONFIRMED
CONNACK	CONNECT ACKNOWLEDGEMENT
EDGE channel	A general term referring to channels based on 8PSK modulation; i.e. TCH/F28.8, TCH/F32.0, and TCH/F43.2.
FTM	Frame Tunnelling Mode
PIAFS	PHS Internet Access Forum Standard
PHS	Personal Handyphone System

4 Access reference configuration

Figure 1 presents the reference configuration for access to a GSM PLMN (see GSM 04.02).



= reference point

TE1 = ISDN terminal

TE2 = V- or X-type terminal

TA = Terminal Adaptor

BSS = Base Station System

MSC = Mobile Switching Centre

Figure 1: GSM PLMN Access Reference Configuration

Within the scope of the present document the Mobile Termination MT0 means a fully integrated MS including data terminal and its adaptation functions. MT1 includes ISDN terminal adaptation functions and MT2 includes ITU-T V- or X-series terminal adaptation functions among other MT functions.

Figure 2 presents the access reference configuration for UMTS. There is no reference point identified for the TAF. The TAF is considered as a part of the Mobile Termination.

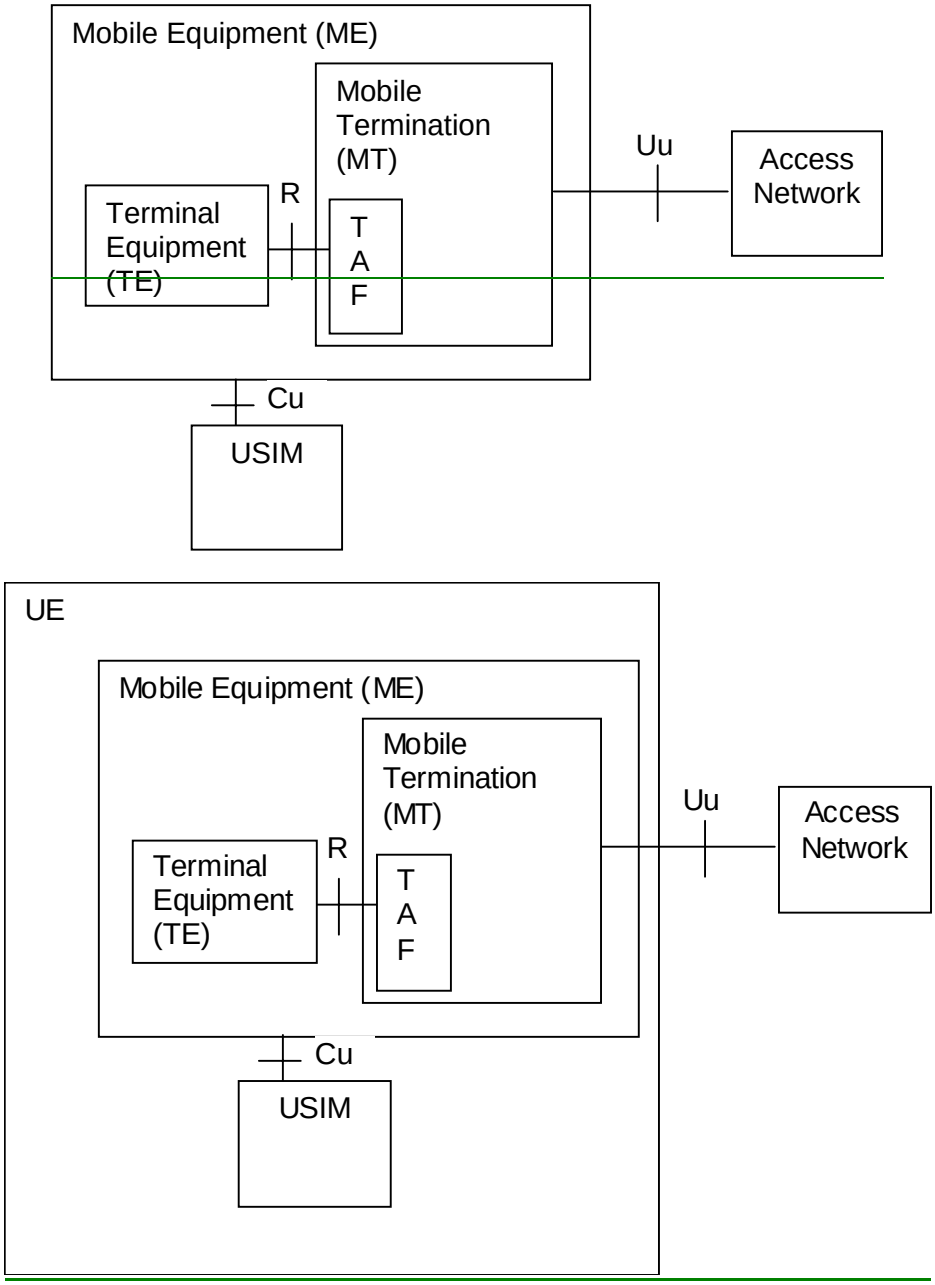


Figure 2: ~~Reference Configuration for access to a~~ UMTS PLMN Access Reference Configuration

5 Functions to support data services

The main functions of the MT to support data services are:

- functions to ensure conformity of terminal service requests to network capability;
- physical connection of the reference points R and S;
- flow control of signalling and mapping of user signalling to/from GSM PLMN access signalling;
- rate adaptation of user data (see GSM 04.21) and data formatting for the transmission SAP (3G TS 25.322);
- flow control of non-transparent user data and mapping of flow control for asynchronous data services;
- support of data integrity between the MS and the interworking function in the GSM PLMN;
- end-to-end synchronization between terminals;

- filtering of status information;
- functions to support non-transparent bearer services e.g. termination of the Radio Link Protocol (RLP) and the Layer 2 Relay function (L2R) including optional data compression function (where applicable);
- terminal compatibility checking;
- optional support of local test loops.

In addition, functions to support autocalling and autoanswering are optionally specified in accordance with ITU-T Rec. V.25 bis or with ITU-T Recommendation. V.250 ~~ter~~ (although the use of other autocalling/auto-answering procedures are not prohibited provided that mapping in a functionally equivalent way to TS 24.008 call control is also provided).

Editor's note: V.25bis is outdated. References to V.25 bis procedures need to replaced by corresponding procedures based on V.250 and 3G TS 27.007.

Other functional entities can be envisaged apart from the TAF. One of the physical interface to all these functions is the DTE/DCE interface to the MT. Normally, this DTE/DCE interface is associated with the TAF, if available. Therefore the access to any of these other functional entities, if implemented, via the DCE/DTE interface must be triggered by appropriate command sequences which are described in the applicable specifications (although the use of other procedures is not prohibited provided that mapping in a functionally equivalent way is also provided). These command sequences can be issued by the DTE only when the MT is in the appropriate command status and there is no data connection pending. They are interpreted by an MT internal control function and result in an association of the DTE/DCE interface with the addressed function, if available.

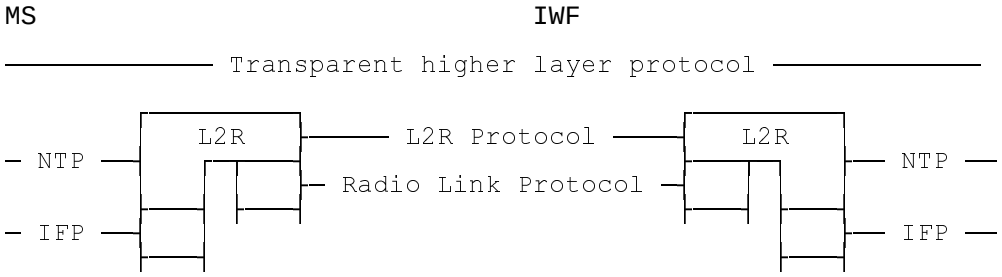
6 Support of non transparent Bearer Services

In order to support non transparent bearer services a Layer 2 Relay (L2R) function is included in the mobile termination. The details of the particular L2R function for the different non transparent bearer services are contained in the appropriate 3G 27-series Specification. This section describes the general aspects of the L2R function.

The Layer 2 Relay (L2R) function provides for the reliable transportation of known, i.e. non transparent, user protocols across the radio interface of a GSM PLMN. The L2R functions are located in the Mobile Termination (MT) and the Interworking Function (IWF) associated with a Mobile Switching Centre (MSC). The L2R uses the services provided by the Radio Link Protocol (RLP) to transport the non transparent protocol information between the MS and the IWF.

6.1 Functions of the Layer 2 Relay

The complete protocol reference models for data and telematic services are described in GSM 03.10. The subset of those protocol reference models relating to the L2R function is reproduced in figure 2A.



NTP Non Transparent Protocol
IFP Interface Protocol

Figure 2A

The Non Transparent Protocol (NTP) will normally be a layer 2 protocol for OSI conformant protocols or an equivalent in the case of non OSI protocols. The Interface Protocol (IFP) will normally be a layer 1 protocol for OSI conformant systems or equivalent for non OSI systems.

The L2R can be considered to consist of 3 sub-functions, see figure 3.

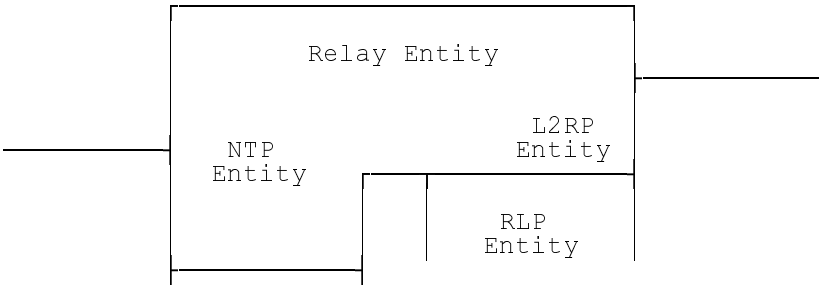


Figure 3

The 3 sub-functions are:

- A Non Transparent Protocol Entity;
- A L2R Protocol Entity;
- A Relay Entity.

The NTP-entity interfaces the L2R to the IFP-entity and provides an interface to the particular NTP.

The L2RP-entity interfaces the L2R to the RLP-entity and provides an interface to the appropriate L2R protocol.

The Relay-entity provides the mapping between the NTP-entity and the L2R-entity. If applicable, it contains the data compression function. The negotiable parameters are exchanged with the remote Relay-entity by means of the RLP XID frame.

It should be noted that the inter-layer interfaces within the MS and the IWF and within the L2R will not be specified by GSM, any description given is for explanatory purposes only and is not intended to indicate a method of implementation. Therefore, the specification of the L2R is in terms of the peer-peer protocols. Generally, the non transparent and interface protocols will be specified elsewhere, e.g. ITU-T Recommendation X.25 Layer 2 and 1. Thus the main specification for the L2R will consist of the L2R peer-peer protocols.

6.1.1 Layer 2 Relay in Frame Tunneling Mode

L2R is used in FTM to transport asynchronous HDLC (ref. [44]) frames between the MS and the IWF. In this case there is no NTP entity on the IWF side. Instead, the L2R entity interfaces a conversion function that performs a mapping between asynchronous and synchronous HDLC frames, which are transported on a UDI or RDI bearer with X.31 flag stuffing as rate adaptation. Consequently there is no error correction or flow control on the fixed network leg. (The HDLC FCS is used by the higher layer protocol, and error correction and flow control are performed end-to-end between the two DTEs.)

6.2 Radio Link Services Used

The L2R function uses services defined in GSM Specification 3G TS 24.022 (Radio Link Protocol).

6.3 Flow Control - General Description

A flow control active condition can take place under a number of circumstances:

- End to end flow control (DTE to DTE matter);
- Backpressure (buffers filling);
- Receive not ready (RLP condition).

It is possible that there will be an interaction between flow control active and inactive conditions in each circumstance.

6.3.1 End to End Flow Control

A DTE may wish to send a flow control active condition to another DTE.

Provisions exists in the L2R entity to transfer a flow control active condition (sent by its associated DTE) to the other L2R entity as soon as possible. This mechanism in the L2R entities allows such a flow control condition to be put ahead of any queuing which exists in the L2R entities.

Such a mechanism avoids build up of data in buffers which can be undesirable.

The L2R entity, receiving a flow control active condition from its associated DTE, stops sending data to that associated DTE immediately.

6.3.2 Back Pressure

The L2R and RLP entities have buffers which may become full to a predetermined threshold for a number of reasons, e.g. severe radio fading, failure or slowness of DTE to react to end to end flow control, certain RNR conditions. When this predetermined threshold is reached, a flow control active condition is sent to the associated DTE which is then prevented from sending any data, subsequently, the flow control inactive condition is sent to the associated DTE when the L2R or RLP entities have indicated that there is sufficient free capacity in their buffers for data flow from the associated DTE to proceed.

The corresponding peer-layer procedure to assess the respective buffer conditions are a layer management matter and are not dealt with here. It is also considered an implementation matter to ensure that such procedure do not result in loss of data or considerable reduction in throughput.

In FTM, back pressure is not applicable towards the DTE on the fixed network side, because there is no flow control mechanism on the fixed network leg. Consequently buffer overflow may occur leading to loss of data, which is left to the higher layer protocol to handle.

6.3.3 Receive not Ready

When the RNR condition arises, an RLP indication is sent to the other RLP entity which in turn shall send a flow control active condition to its associated L2R entity. That L2R entity shall then send a flow control active condition to its associated DTE.
An RNR condition may result in the Execution of "back pressure" as mentioned under 6.3.2.

6.4 User initiated service level up and down grading (applies to GSM only)

When the value of the negotiated UIMI parameter is greater than 0, the MS may at any time during the call, control, to some extent, the number of traffic channels to be used. This is done by signalling a higher or lower value for the wanted air interface user rate (WAIUR) and maximum number of traffic channels (mTCH). The network will assign an AIUR matching the WAIUR using up to mTCH traffic channels, provided that the resources are available (3G TS 22.034, 23.034 and 24.008).

If the value of the RLP optional feature ‘Up signalling’ is negotiated to 1, the MS may receive a suggestion from the network to initiate an upgrading. This occurs when the following condition holds:

The IWF:

1) is receiving user data from the fixed network side at a higher rate than the current AIUR, or,

2) in symmetrical calls only, can send user data towards the fixed network side at a higher rate than the current AIUR.

The MS can detect the condition stated in 1) and 2) above by examining the value of the UP bit in the received RLP S and I+S frames. When the condition does not hold, the value of the UP bit is continuously 0. If the condition does hold, the number of 1s between two consecutive 0s indicates the number of traffic channels to upgrade by. There is no need to repeat this indication since the FCS protects it. For instance, if the UP bit sequence is ...01100... and the current number of assigned traffic channels is 2, then an upgrading 4 traffic channels is suggested.

NOTE: From MSC/IWF's perspective a TCH/F28.8 or TCH/F43.2 EDGE configuration is identical to a multislot 2×TCH/F14.4 or 3×TCH/F14.4 configuration. Therefore, a factor of 1/2 or 1/3 has to be applied to the suggested increase when the assigned up link channel is TCH/F28.8 or TCH/F43.2 respectively.

The MS may use the information signalled in the UP bit to find out when a service level upgrading may increase the data throughput. In order to initiate a service level upgrading, the value of UIMI must be greater than the number of currently assigned channels.

In order to determine when to downgrade, the MS may compare the rate of received and sent information in the RLP frames to the AIUR. If the rate of received and sent information is less than the current AIUR the MS may initiate a downgrading.

User initiated service level up and down grading mechanism may also be used to modify the asymmetry preference, see subclause 6.5. This is achieved by sending a new value of the asymmetry preference in the BC-IE.

6.5 Asymmetry preference indication (applies to GSM only)

The MS's classmark may restrict the possible number of channels or modulation that may be assigned by the network in one of the directions. This may result in an asymmetric transmission, i.e., different numbers of channels or modulations are assigned in each direction.

Asymmetric transmission may also result from a preference indication. At call set up, the MS may send an asymmetry preference indication in the BC-IE (see GSM TS 04.08). There are three options:

1) no preference;

2) up link biased asymmetry preferred;

3) down link biased asymmetry preferred.

If down or up link asymmetry preference is indicated, the network shall not assign EDGE channels on the unbiased link. If the network assigns EDGE channels on the biased link, it shall assign TCH/F14.4 on the unbiased link. The WAIUR shall then apply to the biased link.

7 Structure of the 3G TS 27-series of Specifications

The structure of the Specifications is as follows:

TS 27.001 General on Terminal Adaptation Functions for Mobile Stations.

TS 27.002 Terminal Adaptation Functions for Services using Asynchronous Bearer Capabilities.

This Specification defines the interfaces and terminal adaption functions integral to a MT which enable the attachment of Asynchronous Terminals to a MT.

TS 27.003 Terminal Adaptation Functions for Services using Synchronous Bearer Capabilities.

This Specification defines the interfaces and terminal adaptation functions integral to a MT which enable the attachment of Synchronous Terminals to a MT.

8 Functions common to all interfaces

8.1 Synchronization of the Traffic Channel

As long as there is no connection between the traffic channel and the interface to the TE this interface must be terminated in the appropriate way.

Prior to exposing the traffic channel of a GSM PLMN connection to transmission of user data, the controlling entities of the connection have to assure of the availability of the traffic channel(s). This is done by the so called synchronization process:

- starting on the indication of "physical connection established" resulting from the PLMN inherent outband signalling procedure. This indication is given on reception of the message CONNECT in case of MO calls, on reception of the message CONNACK in case of MT calls and on reception of the message MODIFY COMPLETE in case of in-call modification;

- ending by indicating the successful execution of this process to the controlling entity, which then takes care of the further use of the inband information (data, status).

It should be noted that during the call control phases (set-up and clear), the procedures at the V.-series and X.-series DTE interfaces can be mapped completely to the out-of-band signalling procedure. The state of the S-bits and X-bits during the call control phases are irrelevant to the DTE interface procedures. However, the "ready for data" condition (i.e. CTs 106 and 109, in the case of V.-series interface, and I-circuit, in the case of X.-series interface) is derived from the status bits received by the TAF once synchronization is complete. Since half duplex operation is not supported by a GSM PLMN, status bit SB is not needed to signal the turn around of the connection.

8.1.1 Transparent services

8.1.1.1 Initial procedure for traffic channel types TCH/F4.8 and TCH/F9.6

With respect to the TAF for the transparent bearer capability support the synchronization procedure with the channel codings 2.4, 4.8 and 9.6 kbit/s is as follows:

- sending of synchronization pattern 1/OFF (all data bits "1" / all status bits "OFF", all E-bits "1") to the IWF. In multislot transparent operation, the synchronisation pattern sent is 1/OFF with the exception of the bit positions S1, first X, S3, and S4 which contain the substream number and multiframe alignment pattern (Ref. GSM TS 04.21);

- searching for detection of the synchronization pattern received from the IWF, and in multislot operation, also searching for the multiframe alignment pattern "0000 1001 0110 0111 1100 0110 1110 101" (Ref. to GSM 04.21) in bit position S4 and substream numbers in bit positions S1, first X, and S3. The value of the bits E4-E7 shall not be checked.

8.1.1.2 Initial procedure for traffic channel types TCH/F14.4 and TCH/F28.8

With respect to the TAF for the transparent bearer capability support the procedure with the TCH/F14.4 or TCH/F28.8 is as follows:

- sending of synchronization pattern 1/OFF (all data bits "1" / status bits in M2 "OFF") to the network in the multiframe structure with the multiframe alignment pattern "0000 1001 0110 0111 1100 0110 1110 101" in the M1 (Ref. to GSM TS 4.21) and, in a multislot or TCH/F28.8 case, sending substream numbers in the bit M2;

- searching for the detection of the multiframe alignment pattern "0000 1001 0110 0111 1100 0110 1110 101" (Ref. to GSM 04.21) in the bit M1 originating from the network, and, in a multislot or TCH/F28.8 case, searching for substream numbers in the bit M2. (Any 5 bit sequence in the multiframe alignment pattern is unique, i.e. the multiframe alignment can take place by the recognition of five successive S1 bits.).

8.1.1.3 Subsequent procedures for traffic channel types TCH/F4.8, TCH/F9.6, TCH/F14.4, and TCH/F28.8

When the synchronisation pattern and, in case of multislot, TCH/F14.4 or TCH/F28.8 operation the multiframe alignment pattern from the IWF have been recognized as a steady state (see note) the TAF continues sending the synchronization patterns to the IWF until a timer T (=500ms) expires.

NOTE: An idle frame sent by the BSS and received by the MS has the same pattern as the synchronization pattern 1/OFF.

At the moment when the message CONNECT (MO) or CONNACK (MT) is received at the MS, it is guaranteed that this pattern is received from the MSC/IWF with the exception of a loss of frame synchronization on the Abis interface.

The handling of frame stealing in case of 2400 bit/s full rate data channels is implementation dependent.

8.1.1.3.1 V.-series interface

During the synchronization process described above, i.e. while the synchronization pattern is being sent by the MT, CT106, 107 and 109 remain in the OFF condition.

After the expiration of the timer T of each allocated traffic channel for the call, the X and SB bits received from the IWF are mapped on to CT 106 and CT 109, respectively, at the MT/DTE interface according to the filtering process described in subclause 8.2. The received SA bit, if available, is ignored. The condition on CT107 is changed from "OFF" to "ON", the data bits received from the IWF are mapped to CT104, and CT103 is mapped to the data bits sent towards the IWF. The transmitted SA (if available), SB and X bits shall be set to "ON".

8.1.1.3.2 X.-series interface

~~The procedure is described in TS 27.003, "X.21 procedures mapping".~~VOID.

8.1.1.3.3 S interface (I.420)

~~During the synchronization process described above, i.e. while the synchronization pattern is being sent by the MT, the MT will not send the V.110 frame structure to the S interface. Once the timer T of each traffic channel(s) allocated for the call expires the synchronization pattern will continue to be transmitted from the MT to the IWF, however, the MT will start sending the frames received from the IWF to the S interface. The MT will start looking for the V.110 frame alignment to be received from the S interface. On recognizing frame alignment the MT will cease sending its synchronization pattern to the IWF and connect the S interface through to the IWF. In case of multislot, TCH/14.4, or TCH/F28.8 operation the MT shall adapt the data stream as defined in GSM TS 04.21.~~ VOID.

8.1.1.4 Procedures for RLC

With respect to the TAF for T bearer support, the procedure is as follows:

- no access stratum SDUs are transmitted until an access stratum SDU is received.

8.1.1.4.1 V-series interface

Until the first access stratum SDU is received at the transmission SAP, 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 received in each SDU are mapped to CT 104 and data on CT 103 are mapped to SDUs sent toward the RNC.

8.1.2 Non-transparent services

With respect to the TAF for non-transparent bearer capability support the synchronization procedure in GSM is as follows:

- firstly, receiving frames on all allocated traffic channels for the call;
- secondly, initiating the RLP link establishment by sending a RLP-SABM across the radio interface.

In UMTS, the TAF shall initiate the RLP after the physical connection has been established.

8.1.2.1 V.-series interface

During the synchronization process described above, i.e. while the synchronization pattern is being sent by the MT, CT106, 107 and 109 remain in the OFF condition.

When the RLP link has been established, CT107 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 applicable to the particular bearer capability (3G TS 27.002, 27.003 "L2R functionality").

8.1.2.2 X.-series interface

~~The procedure is described in 3G TS 27.003, "X.21 procedures mapping".~~VOID.

8.1.2.3 S interface (I.420) ~~(does not apply to UMTS)~~

~~The MT will not send V.110 frame structure to the S interface and will not start looking for V.110 frame alignment to be received from the S interface unless the RLP link has been established. On recognizing V.110 frame alignment the information from/to the RLP will be mapped by the L2R entity.~~VOID.

8.1.3 Action on loss of synchronization

8.1.3.1 Loss at the TAF-radio interface

In GSM, if the TAF detects a loss of synchronisation on one or more channels, it initiates the re-synchronisation process. The TAF searches for the data frame structure in those channels in which the synchronisation has been lost according to the initial procedures described in subclauses 8.1.1 and 8.1.2. The information received from the channels shall continue to be processed as if the synchronisation had not been lost, i.e. corrupted data is forwarded towards RLP entity or TE during the re-synchronisation process. No action shall be taken on the frames being transmitted towards the MSC, other than to continue sending them normally.

In UMTS, no action shall be taken.

8.1.3.2 Loss at the TAF-terminal interface ~~(applies to GSM only)~~

~~This section is applicable only to terminals attached by means of an S interface (I.420).~~
~~If the TAF detects a loss of frame synchronisation on the TAF-TE interface, the TAF initiates a re-synchronisation on that link in line with the procedures specified in ITU-T V.110. No further action shall be taken by the TAF on the TAF-radio interface or on the V.110 frames being transmitted towards the TE.~~VOID.

8.2 Filtering of Channel Control Information (GSM transparent mode only)

8.2.1 General

The DTEs used at the MS side of the PLMN conform to ITU-T's DTE/DCE interface specifications, which assume basically an error-free environment, i.e.:

- limited distance, point-to-point local interconnection of the interface circuits for data and status;
- steady state signalling.

The envisaged use of these DTEs in the PLMN environment leads to the exposure of these "interconnections" to the PLMN radio channel. To assure proper operation even under these conditions appropriate measures have to be taken. In the non transparent case the RLP satisfies the requirement for both data and status lines.

In the transparent case the:

- data line aspects have to be dealt with end-to-end by the users, while
- status line aspects are of concern to the network, and are dealt with in the following.

8.2.2 Filtering process to be applied

Filtering of channel control information is relevant only at the MS side and in the transparent mode of operation. By applying filtering measures the condition of a DTE/DCE control interchange circuit, for which the DTE constitutes the information sink, will be preserved until another condition is signalled for an "integration time" period by the channel control information (status bits) of the rate adaptation scheme.

The filtering mechanism is understood to reside between the rate adaptation function (information source) and the DTE (information sink). It receives the unfiltered condition of the respective control interchange circuit set according to the actual sequential appearance of the individual associated status bits and forwards the filtered condition to the DTE.

The filtering process starts when the traffic channel synchronization ends with the expiry of timer T.

8.2.2.1 V.-series interface

CT 106

In the transparent mode the remote inband control of this circuit is needed to support a modem retrain procedure.

OFF-ON transition at the MS will authorize the DTE to send data; if wrongly set, loss of data may occur.

ON-OFF transition at the MS will cause the DTE to cease transmitting data; set wrongly may impair the performance in connection usage.

CT 109

In the transparent mode the remote inband control of this circuit is needed to:

- trigger the interpretation of received data;
- indicate to the DTE the state of the connection.

OFF-ON transition at the MS will authorize the DTE to rely on the condition of the received data interchange circuit, set wrongly may cause receipt of wrong data, while setting late may cause loss of data.

ON-OFF transition at the MS:

- will cause the DTE to cease receiving data;
- may initiate release of the connection during a data phase by the DTE giving an ON-OFF transition on circuit 108/2.

Setting this condition wrongly may cause loss of data and potentially release the connection.

8.2.2.2 X.-series interface

~~**I circuit**~~

~~The OFF-ON transition of this circuit in connection with the appropriate conditions of the other interchange circuit will indicate the "ready for data" status of the connection. As received data may commence immediately following this status change, the delay in conveying this condition shall be kept as short as possible.~~

~~As a clear request/indication will be directly mapped to the PLMN outband signalling the ON-OFF integration time should be rather long.~~VOID

8.2.2.3 Filtering mechanism

8.2.2.3.1 Traffic channel types TCH/F4.8 and TCH/F9.6

A filtering mechanism shall be provided by an integration process on those SB and X bits carrying status information in the V.110 frame or in the multiframe structure. The integration periods applied are:

V-series	Transition	Integration period	Status stream
CT 106	Off-On	1 s	X
CT 106	On-Off	1 s	X
CT 109	Off-On	200 ms	SB
CT 109	On-Off	5 s	SB
X-series	**Transition**	**Integration period**	**Status stream**
I-circuit	Off-On	40 ms	SB
I-circuit	On-Off	5 s	SB

The integration process shall ensure that the interchange circuits do not change state in response to spurious transitions of the status bits during the integration period.

The integration process shall operate reliably with error characteristics as specified in GSM 05.05.

8.2.2.3.2 Traffic channel type TCH/F14.4

To change the state of CT 109 (or I-circuit) or CT 106, it is required that at least two consecutive SB-bits or X-bits, respectively, carry the same value.

8.3 Terminal Compatibility Decision

The establishment of a mobile terminated connection depends on a positive decision on the terminal compatibility. The Mobile Station (MS) contributes to this process by performing (depending on the individual call set-up condition):

- a compatibility check;
- the selection of the appropriate terminal function; and
- the indication of compatibility requirements to the PLMN;

initiated by a call set-up request from the PLMN. The aforementioned functions shall be carried out as follows.

8.3.1 Compatibility Check

Annex B of 3G TS 24.008 applies, particularly paragraphs B.3, B.3.1 and B.3.2. As regards the therein mentioned user-to-user compatibility checking the following applies:

When the calling user requests a service with user-to-user compatibility significance indicated by the presence of HLC and LLC information element in the call set-up request, the MS shall check that the service supported by the called user matches concerning the contents of the HLC/LLC information element. If a mismatch is detected, then the MS shall reject the offered call using the cause No.88 "Incompatible Destination".

8.3.2 Selection of Appropriate Terminal Function

The MS shall select the appropriate terminal functions following a positive result of the compatibility check and/or forwarding the indication of compatibility requirements to the PLMN.

8.3.3 Indication of Compatibility Requirements to the PLMN

8.3.3.1 Indication in case of Mobile terminating calls

In support of:

- PSTN originated calls, and

- ISDN originated calls using 3.1 kHz audio Bearer Capability (BC), as well as
- ISDN originated calls using unrestricted digital Bearer Capability but not specifying all parameters for deducing a Bearer Service.

Mobile specific requirements to be dealt with in the Bearer Capability information element the call confirmed message has been introduced in the call control protocol (3G TS 24.008). This also allows for renegotiation of specific parameters at the beginning of the connection set-up process. The specific parameters are:

a) mobile specific requirements:

- Connection element (transparent/non transparent);
- Structure (note 1);
- Synchronous/Asynchronous (note 8);
- Rate adaptation/other rate adaptation (note 9);
- User information layer 2 protocol (note 1);
- Intermediate rate (note 2), (note 3);
- Modem Type (note 1), (note 3);
- User Rate (note 3);
- Compression ,
- Fixed network user rate, (note 3) (note 4);
- Other modem type, (note 3) (note 4);
- User initiated modification indication (note 4).

The following parameters are indicated by the MS to the network, only:

- Acceptable channel codings (note 5);
- Maximum number of traffic channels, (note 5);
- Wanted air interface user rate (note 6) (note 7);
- Asymmetry preference indication (note 7).

NOTE 1: This parameter is correlated with the value of the parameter connection element.

NOTE 2: For non-transparent services this parameter is correlated with the value of the parameter negotiation of intermediate rate requested.

NOTE 3: Modification of these parameters may be proposed by the MS. The Network may accept it or not.

NOTE 4: This parameter shall be included by the MS only in case it was received from the network.

NOTE 5: This parameter shall be included only in case the parameter ‘fixed network user rate’ is included.

NOTE 6: This parameter shall be included only for non-transparent services and in case the parameter ‘fixed network user rate’ is included.

NOTE 7: This parameter has to be included if EDGE channel coding(s) are included in Acceptable channel codings. In cases where this parameter would not otherwise be included, the value is set to 'Air interface user rate not applicable' or 'User initiated modification not requested' or "No preference".

NOTE 8: For FTM and PIAFS, this parameter may be negotiated as in Table B.4e. How the subscription for BS20 is assured, is an operator matter.

NOTE 9: For FTM, PIAFS or Multimedia, this parameter may be negotiated as in Table B.4f.

b) requirements with effects at the partner terminal:

- Number of data bits;
- Number of stop bits;
- Parity.

The MS indicates the radio channel requirement in the call confirmed message. If the MS indicates the support of "dual" (HR and FR channels) the final decision, which radio channel is chosen, is done by the network in an RR message. The radio channel requirement is ignored in UMTS, see Table B.5a in Annex B.

If the network proposes optional support of both transparent and non transparent connection elements but does not indicate a user information layer 2 protocol, the MS shall set the appropriate value, if choosing non transparent in the call confirmed message and out-band flow control is not requested, see B.1.1.2.

Additionally the values of the parameters structure, modem type and intermediate rate have to be set in conformance with the values of the parameters radio channel requirements, negotiation of intermediate rate requested and connection element.

Subclause B.1.1.2 and table B.1 in the annex B describe the negotiation procedure. Annex B table B.4 describes the selection of the modem type and the dependence on the value of the parameter connection element. Annex B table B.4 describes the selection of the intermediate rate and user rate and their dependence upon the value of the NIRR parameter and the equipment capabilities.

The following MT cases can be deduced from the individual call set-up request conditions:

a) If the set-up does not contain a BC information element, the MS in the call confirmed message shall include any BC information (single or multiple BC-IE). In case of multiple BC-IEs one BC-IE must indicate the information transfer capability "speech". A speech BC-IE together with a 3.1kHz multimedia BC-IE indicates the support of a fallback to speech (ref. to TS 29.007 and TS 24.008).

b) If the set-up message contains a single BC-IE, the MS in the call confirm message shall use either a single BC-IE, if it wants to negotiate mobile specific parameter values, or, unless otherwise specified in annex B, no BC-IE, if it agrees with the requested ones.

c) If the set-up contains a multiple BC-IE, the MS in the call confirmed message shall use either a multiple BC-IE, if it wants to negotiate mobile specific parameter values, or, unless otherwise specified in annex B, no BC-IE, if it agrees with the requested ones. In case of a 3.1kHz multimedia setup the MS can either accept the possibility of a fallback to speech by responding with two BC-IEs or with no BC-IEs or turn the call to a speech call by sending only a speech BC-IE in the call confirm message or turn the call to a multimedia only call (i.e. no fallback to speech allowed) by sending only a multimedia BC-IE in the call confirm message. Alternatively a single BC-IE containing fax group 3 only shall be used if a multiple BC-IE requesting speech alternate fax group 3 is received and the MS is not able to support the speech capability. Annex B, table B.7, describes the negotiation rules.

If the BC-IE contains 3.1 kHz ex PLMN, the MS is allowed to negotiate all mobile specific parameter values listed above. If the BC-IE contains facsimile group 3, the MS is allowed to negotiate the connection element (transparent/non transparent) only. In any case, if the set-up message requests a "single service", the MS must not answer in the call confirmed message requesting a "dual service" and vice versa.

However, for dual services with repeat indicator set to circular (alternate) the MS may change the sequence of dual BC-IEs within the call confirmed message (preceded by the same value of the repeat indicator), if it wants to start with a different Bearer Capability than proposed by the network as the initial one.

In addition, the MS may propose to the network to modify User Rate, Modem Type and Intermediate Rate in the CALL CONFIRMED message. The network may accept or release the call.

If the BC-IE received from the network contains the parameters ‘fixed network user rate’, ‘other modem type’ and possibly the ‘user initiated modification’, the MS can either:

a) if in GSM, discard these parameters, or

b) include the possibly modified values for the ‘fixed network user rate’ and ‘other modem type’ in the BC-IE of the call confirmed message. The network might accept or reject the modified values. In this case the MS shall

also include the parameters ‘maximum number of traffic channels’ and ‘acceptable channel codings’. Additionally for non-transparent services, the MS shall also include the parameters ‘wanted air interface user rate’ and the ‘user initiated modification indication‘.

In case a),The MS shall use the fall-back bearer service indicated by the remaining parameters of the BC-IE on a single slot configuration (reference GSM 04.21).

In GSM case b), a single slot configuration shall be used by the MS, in case the ‘maximum number of traffic channels’ is set to "1 TCH" and the ‘user initiated modification indication’ is set either to "user initiated modification not required" or to "user initiated modification up to 1TCH may be requested"; other wise the MS shall use a multislot configuration (reference GSM 04.21).

In case the ‘acceptable channel codings’ is indicated by the MS, the decision which channel coding is used is done by the network and indicated to the mobile station with an RR message. This RR message may also assign an asymmetric channel coding. The ‘acceptable channel codings’ parameter takes precedence over the ‘negotiation of intermediate rate requested’ parameter for non-transparent services. Also the intermediate rate and user rate per traffic channel in a multislot configuration are not indicated by the ‘intermediate rate’ and ‘user rate’ parameters of the BC-IE, but depend on the chosen channel coding only.

If the parameters ‘fixed network user rate’, ‘other modem type’ were not included in the BC-IE received, or no BC-IE was received, the MS shall not include these parameters in the CALL CONFIRMED message (i.e. octets 6d, 6e, 6f, and 6g ref. to 3G TS 24.008).

8.3.3.2 Indication in case of Mobile originating calls

In support of mobile originating calls the values of BC-IE parameters are requested in the set-up message from the MS. If the MS indicates the support of both transparent and non transparent connection elements the network shall return its choice in the call proceeding message. The MS is not allowed to indicate support of both transparent and non transparent, if the MS also requests out-band flow control, i.e. it does not indicate a layer 2 protocol.

Additionally the value of the parameter modem type has to be set depending on the value of the parameter connection element as described in annex B, table B.4a.

The set-up message contains a single or multiple BC-IE. In case of multiple BC-IEs one BC-IE must indicate the information transfer capability "speech".

In case of a multimedia call the setup message contains either a multimedia BC-IE indicating a multimedia only call request (i.e. no fallback to speech allowed) or both a speech BC-IE and a 3.1kHz multimedia BC-IE to indicate the support/request of a fallback to speech (ref. to TS 29.007 and TS 24.008).

If the set-up message requests a "single service", the network must not answer in the call proceeding message requesting a "dual service" and vice versa. Alternatively the network shall answer with a single BC-IE containing fax group 3 if a multiple BC-IE requesting speech alternate fax group 3 is received but the network does not allow the use of this alternate service. Annex B, table B.7, describes the negotiation rules. If the MS requests a "dual service" the network is not allowed to change the sequence of the service.

If the set-up message is indicates that negotiation of intermediate rate is requested then the network shall behave as described in annex B, table B.4b.

Unless otherwise specified in annex B, if no BC-IE parameter needs negotiation it is up to the network if it sends a CALL PROC message (with or without a BC-IE) towards the MS or not.

For multislot, TCH/F14.4, and EDGE operations and in UMTS the MS shall include an appropriate set of the parameters ‘fixed network user rate’, ‘other modem type’, ‘maximum number of TCH’ and ‘acceptable channel codings’ in the BC-IE of the SETUP message. If EDGE channel coding(s) are included in ACC in case of transparent calls, the 'Wanted air interface user rate'-parameter shall be set to 'Air interface user rate not applicable' and the 'User initiated modification indication'-parameter to 'User initiated modification not requested'. In a non-transparent multislot operation, the MS shall also include the parameters ‘wanted air interface user rate’ and ‘user initiated modification indication’ in the BC-IE of the SETUP message. In a non-transparent TCH/F14.4 or EDGE operation or in UMTS the MS shall also include the parameter ‘wanted air interface user rate’. In non-transparent EDGE operation the MS shall also include the parameter ‘asymmetry preference indication’. It shall also set the other parameters of the BC-IE (i.e. ‘user rate’) to values identifying fall-back values. Depending on the network two situations can be distinguished:

a) The network supports the requested operation:

In this case the network must include the parameter ‘fixed network user rate’, ‘other modem type’ and possibly ‘user initiated modification’ in the BC-IE(s) of the CALL PROCEEDING message, irrespective whether or not they contain modified values or just a copy of the received ones.

The ‘acceptable channel codings’ indicated by the MS in the SETUP message takes precedence over the ‘negotiation of intermediate rate requested’ parameter for non-transparent services. The intermediate rate per traffic channel and the user rate per traffic channel is dependent on the chosen channel coding only. The chosen channel coding is indicated to the mobile station by the network with an RR message.

b) The network does not support the requested operation:

In this case, in GSM, the BC-IE of the CALL PROCEEDING message will not contain the parameters fixed network user rate’ and ‘other modem type’ or no BC-IE will be included in the CALL PROCEEDING message at all. The mobile station shall then discard the parameters ‘fixed network user rate’, ‘other modem type’, ‘maximum number of TCH’, ‘acceptable channel codings’ ‘wanted air interface user rate’ and ‘user initiated modification indication’ sent with the SETUP message and apply the fall-back bearer service.

In case a), a single slot configuration shall be used by the MS, in case the ‘maximum number of traffic channels’ is set to "1 TCH" and the ‘user initiated modification indication’ is set either to "user initiated modification not requested" or to "user initiated modification up to 1TCH may be requested".

In case b), The MS shall use the fall-back bearer service indicated by the remaining parameters of the BC-IE on a single slot configuration (reference GSM 04.21).

8.3.3.3 Differences in validity of BC parameter values in GSM and UMTS

The validity of a BC parameter value, either in the SETUP or CALL CONFIRM message, may differ from GSM to UMTS. Certain parameters are irrelevant in UMTS and any value given is valid and ignored. These parameters may be available in the BC IE. For those parameters that are relevant in UMTS and GSM, certain values may be invalid in one of the systems. Invalid parameter values may cause rejection of the BC and subsequent release of the call.

Parameters that are ignored in UMTS may be set to default values, or to specific values in view of an eventual handover to GSM. Parameter values that are invalid in one system may result in unsuccessful handover from the other system.

Table B.5a in Annex B, lists parameters that are ignored in UMTS and parameter values which validity is different in GSM and UMTS.

8.4 Test Loops

In principle, both V.-series and X.-series interfaces allow for an activation of local or remote test loops by the terminal (ref. ITU-T V.54/X.150). A comprehensive solution of such test loops in a PLMN system has to consider the special conditions of the interface between the terminal (part of the MS) and the transmission equipment (part of the modem pool of a particular IWF within the MSC). In addition, the impact of the radiolink is to be taken into account with respect to the test objectives. Due to those special conditions a PLMN system is not capable to support remote test loops. It is an implementation choice to what extent the activation of local test loops by the terminal is supported in the MT.

8.5 Alternate speech/facsimile group 3

Editor’s note: V.25bis is outdated. References to V.25 bis procedures need to replaced by corresponding procedures based on V.250 and 3G TS 27.007.

These alternate services may be initiated by either V.25 bis or manual procedures. In the former case, standard call establishment procedures will apply. In the latter case, CT106, CT107, CT108.2 and CT109 are in the OFF condition.

Selection of the data phase (from the speech phase) will be by manual intervention via the MS causing ICM by means of CT108.2 going to ON condition, refer to GSM 03.45 or 3G TS 23.146. The ensuing data phase shall follow all the operational procedures as described in 3G 27-series.

Selection of the speech phase (from the data phase) will be by manual intervention via the MS causing ICM (phone off-hook condition at the MT and data call end condition at the TE).

During the ensuing speech phases, CT107, CT106 and CT109 will be maintained in the OFF condition.

Subsequent re-selection of the data phase will be by manual intervention via the MS causing CT108.2 going to ON condition initiating ICM. At this point, re-synchronization will take place as described in subclause 8.1 above.

8.6 Multislot configuration split/combine function

In multislot configurations using multiple parallel channels the data flow is split into substreams between the Spit/Combine-function in the TAF and the network.

8.6.1 Non-transparent data

In non-transparent data operations the N(S)-numbering in the RLP-header is used for controlling the order of the data in the substreames (reference 3G TS 24.022).

8.6.2 Transparent data

In transparent multislot configurations (TCH/F9.6 or TCH/F4.8) status bits S1, S3 and the X-bit between the D12 and D13 are used for transferring substream numbering information. This S4-bit is used for frame synchronization between the parallel substreames (reference GSM 04.21).

In case of a transparent multislot configuration using TCH/F14.4 channel coding, bit M1 in the 290-bit radio interface block is used for frame synchronization between the parallel substreams, whereas bit M2 carries status information, NIC codes and substream numbering as described in GSM 04.21.

In transparent TCH/F28.8 channels, bits M1 and M2 are used as described above for transparent TCH/F14.4 channels.

8.7 EDGE multiplexing function

In EDGE configurations the number of channels across the air interface and that of substreams between BTS and MSC do not necessarily match. In such cases a multiplexing function is included at MS and BTS (GSM 04.21 and GSM 08.20). These functions distribute data between the substreams and radio channels.

Annex A (informative): List of Bearer Capability Elements

This annex lists the PLMN Bearer Capability Elements which need to be provided to support Terminal adaptation function to Interworking control procedures. Some parameters are ignored in UMTS although present in the BC-IE. The validity of parameter values may also differ from GSM to UMTS. The ignored parameters and the difference of parameter value vality in GSM and UMTS are listed in Table B.5a in Annex B.

Elements and their Values:

Information Transfer Capability:

This element is relevant between the IWF and the fixed network

Values:
- Speech
- Unrestricted Digital
- Group 3 Facsimile (note 1)
- 3.1 kHz Ex PLMN (note 2)
- Restricted Digital (note 3)

NOTE 1: Used for facsimile transmission, unrestricted digital between MT and IWF and 3.1 kHz audio from IWF towards the fixed network.

NOTE 2: Unrestricted digital between MT and IWF and 3.1 kHz audio from IWF towards the fixed network.

NOTE 3: Unrestricted digital between MT and IWF and restricted digital information from IWF towards the fixed network; this value is signalled in the "Other ITC" element, due to a lack of further code points in the "ITC" element.

Transfer Mode:

This element is relevant between MT and IWF

Values:
- Circuit
- Packet

Structure:

This element is relevant between MT and IWF.

Values:
- Service Data Unit Integrity (note 4)
- Unstructured (note 5)

NOTE 4: Applicable for connection element "non transparent".

NOTE 5: Applicable for connection element "transparent".

Configuration:

This element is relevant for a PLMN connection.

Values:
- Point to point

Establishment:

This element is relevant for a PLMN connection.

Values:
- Demand

Sync/Async:

This element is relevant between TE/TA and MT and between IWF and the fixed network.

Values:
- Synchronous
- Asynchronous

Negotiation:

This element is relevant between MT and IWF.

Values:
- In band negotiation not possible

User Rate:

This element is relevant between TE/TA and MT and between IWF and the fixed network, except in case the parameter FNUR is present.

Values:
- 0.3 kbit/s
- 1.2 kbit/s
- 2.4 kbit/s
- 4.8 kbit/s
- 9.6 kbit/s
- 19.2 kbit/s (see note 6)

NOTE 6: This value cannot be signalled between MT and IWF, but it can be used according to the rules in 3G TS 29.007 (Table 7A, 7B) for such connections.

Intermediate Rate:

This element is relevant between MT and BSS and BSS and IWF

Values:
- 8 kbit/s
- 16 kbit/s

Network Independent Clock on Tx:

This element is relevant between TE/TA and MT in the transmit direction.

Values:
- Not required
- Required

Network Independent Clock on Rx:

This element is relevant between TE/TA and MT in the receive direction.

Values:
- Not accepted
- accepted

Number of Stop Bits:

This element is relevant between the TE/TA and MT and between IWF and fixed network in case of asynchronous transmission.

Values:
- 1 bit
- 2 bit

Number of Data Bits Excluding Parity If Present:

This element is relevant between TE/TA and MT and between IWF and the fixed network in case of a character oriented mode of transmission.

Values:
- 7 bit
- 8 bit

Parity Information:

This element is relevant between TE/TA and MT and between IWF and the fixed network for a character oriented mode of transmission.

Values:
- Odd
- Even
- None
- Forced to 0
- Forced to 1

Duplex Mode:

This element is relevant between MT and IWF.

Values:
- Full Duplex

Modem Type:

This element is relevant between the IWF and the fixed network in case of 3.1 kHz audio ex-PLMN information transfer capability.

Values:
- V.21
- V.22
- V.22 bis
- V.26 ter
- V.32
- autobauding type 1
- none

Radio Channel Requirement:

This element is relevant between MT and BSS

Values:
- Full Rate support only Mobile Station
- Dual Rate support Mobile Station/Half Rate preferred
- Dual Rate support Mobile Station/Full Rate preferred

Connection Element:

This element is relevant between MT and IWF

Values:
- Transparent
- Non Transparent
- both, Transparent preferred
- both, Non transparent preferred

User Information Layer 2 Protocol:

This element is relevant between TE/TA and MT and between IWF and the fixed network.

Values:
- ISO 6429
- X.25
- X.75 layer 2 modified (CAPI)
- Character oriented Protocol with no Flow Control mechanism

Signalling Access Protocol:

This element is relevant between TE/TA and MT.

Values: - I.440/450
~~- X.21~~
~~- X.28, non dedicated PAD~~
- X.32

Rate Adaptation:

This element is relevant between IWF and the fixed network.

Values: - V.110/X.30
- X.31 flagstuffing
- no rate adaptation
- V.120 (note 7)
- PIAFS (note 7) - H.223 and H.245 (note 7)

NOTE 7: This value is signalled in the "Other Rate Adaption" element, due to a lack of further code points in the "Rate Adaption" element.

Coding Standard:

This element refers to the structure of the BC-IE defined in 3G TS 24.008.

Values: - GSM

User Information Layer 1 Protocol:

This element characterize the layer 1 protocol to be used between MT and BSS (Um interface) according to GSM 05.01, or between the MT and the RNC (Uu interface).

Values: - default

Negotiation of Intermediate Rate requested:

This element is relevant between MT and BSS and BSS and IWF.

Values: - no meaning associated
- 6 kbit/s radio interface is requested for a full rate channel with a user rate up to and including 4.8 kbit/s, non transparent service

Compression:

This element is relevant between MT and IWF.

Values: - compression possible/allowed
- compression not possible/allowed

Rate adaption header / no header:

This element is relevant between IWF and the fixed network. It is only applicable for V.120 rate adaptation.

Values: - Rate adaption header not included
- Rate adaption header included

Multiple frame establishment support in data link:

This element is relevant between IWF and the fixed network. It is only applicable for V.120 rate adaptation.

Values: - Multiple frame establishment not supported. Only UI frames allowed.
- Multiple frame establishment supported.

Mode of operation:

This element is relevant between IWF and the fixed network. It is only applicable for V.120 rate adaptation.

Values: - Bit transparent mode of operation
- Protocol sensitive mode of operation

Logical link identifier negotiation:

This element is relevant between IWF and the fixed network. It is only applicable for V.120 rate adaptation.

Values: - Default, LLI=256 only
- Full protocol negotiation (note 8)

NOTE 8: A connection over which protocol negotiation will be executed is indicated in the „In-band / out-band negotiation" parameter.

Assignor / assignee:

This element is relevant between IWF and the fixed network. It is only applicable for V.120 rate adaptation.

Values: - Message originator is „default assignee"
- Message originator is „assignor only"

In-band / out-band negotiation:

This element is relevant between IWF and the fixed network. It is only applicable for V.120 rate adaptation.

Values: - Negotiation is done with USER INFORMATION messages on a temporary signalling connection
- Negotiation is done in-band using logical link zero.

Fixed network user rate, FNUR (Note 12)

This element is relevant between the IWF and the fixed network.

Values - Fixed network user rate not applicable (note 9)
- 9.6 kbit/s
- 14.4 kbit/s
- 19.2 kbit/s
- 28.8 kbit/s
- 32.0 kbit/s
- 38.4 kbit/s
- 48.0 kbit/s
- 56.0 kbit/s
- 64.0 kbit/s

NOTE 9: Not used by currently specified services.

Wanted air interface user rate, WAIUR (note 12)

This element is relevant between the MT and the IWF

Values - Air interface user rate not applicable
- 9.6 kbit/s
- 14.4 kbit/s
- 19.2 kbit/s
- 28.8 kbit/s
- 38.4 kbit/s
- 43.2 kbit/s
- 57.6 kbit/s

- interpreted by the network as 38.4 kbit/s (note 10)

NOTE 10: Certain code points, if used, will be interpreted by the network as 38.4 kbit/s in this version of the protocol, ref TS 24.008.

Acceptable channel codings, ACC (note 12)

This element is relevant between the MT and the IWF.

Value: - TCH/F4.8 acceptable
- TCH/F9.6 acceptable
- TCH/F14.4 acceptable
- TCH/F28.8 acceptable
- TCH/F32.0 acceptable (Applicable to bit transparent 56 and 64 kbit/s services only)
- TCH/F43.2 acceptable (Applicable to non-transparent services only.)

Maximum number of traffic channels, MaxNumTCH (Note 12)

This element is relevant between the MT and the IWF.

Value: - 1 TCH
- 2 TCH
- 3 TCH
- 4 TCH
- 5 TCH
- 6 TCH
- 7 TCH (note11)
- 8 TCH (note11)

NOTE11: Not used by currently specified services.

Other modem type, OMT (Note 12)

This element is relevant between the IWF and the fixed network in case of 3.1 kHz audio ex-PLMN

Values: - no other modem type specified in this field
- V.34

User initiated modification indication, UIMI (Note 12)

This element is relevant between the MT and the IWF.

Values: - user initiated modification not requested
- user initiated modification upto 1 TCH requested
- user initiated modification upto 2 TCH requested
- user initiated modification upto 3 TCH requested
- user initiated modification upto 4 TCH requested

Asymmetry preference indication (Note 12)

This element is relevant between the MT and the BSS.

Value: no preference
up link biased asymmetry preference
down link biased asymmetry preference

NOTE 12: These GBS-related parameters are optional.

For a multislot configuration, the following applies to the parameters contained in the BC-IE:

- Half rate channels are not supported. The MS shall code the radio channel requirement as "Full rate support only MS" or "Dual rate support MS, full rate preferred'. In the second case, the network shall assign full rate channel(s) only.

- The 'fixed network user rate' and 'other modem type' (ref. table B.4a) takes precedence over the 'user rate' and 'modem type'.

- The ACC indicates which channel coding is acceptable and supported by the MS. In case of CE:NT the TCH/F4.8 and TCH/F9.6 acceptable is equivalent to the support of NIRR. If TCH/F4.8 acceptable only or TCH/F9.6 acceptable only or TCH/F14.4 acceptable only is indicated, the assigned channel type which can be chosen by the network is TCH/F4.8 or TCH/F9.6 or TCH/F14.4, respectively.

- The 'intermediate rate' parameter is overridden. The intermediate rate used per each TCH/F is derived from the chosen channel type:

channel type	**IR per TCH/F**
TCH/F4.8	8 kbit/s
TCH/F9.6	16 kbit/s
TCH/F14.4	intermediate rate is to be defined

- The user rate per TCH is derived from the chosen channel type:

channel type	**user rate per TCH**
TCH/F4.8	4.8 kbit/s
TCH/F9.6	9.6 kbit/s

For CE:T, the padding procedure described in GSM 04.21 can be applied.

Annex B (normative): Setting of Bearer Capability, Low Layer Compatibility and High Layer Compatibility Information Element for PLMN Bearer Services and PLMN TeleServices

B.0 Scope

This annex describes the relationship between the various parameters of the PLMN Bearer Capability Information Element (BC-IE), their validity and the possible settings with reference to each PLMN Bearer service/Teleservice defined in GSM 02.02 and GSM 02.03 as well as the various occurrences during the connection control (clause B.1). Furthermore, the contents of the Low Layer (LLC) and the High Layer (HLC) Compatibility Information Elements are described (clause B.2).

B.1 Bearer Capability Information Element

B.1.1 Introduction

B.1.1.1 General Consideration

In general, the purpose of the bearer capability information element (BC-IE) is to request a particular bearer service to be provided by the network. This indication is carried by certain connection control messages which for the subject matter of this document may be categorized into those messages:

- related to the call set-up phase; and
- those used during the established connection.

During the call set-up phase the PLMN BC-IE (single or multiple) is included in:

- the SETUP message generated by the requesting entity (either MS or MSC) to establish a mobile-originated or mobile-terminated call, respectively, and in
- the CALL CONFIRMED or CALL PROCEEDING messages, respectively, generated by the responding entity (either MS or MSC) in order to negotiate certain parameter values. If no BC-IE is contained in the SETUP message (PSTN-originated call with single-numbering scheme) the CALL CONFIRMED message indicates the complete applicable BC-IE. In this case neither the value "unrestricted digital" for the information transfer capability nor the multislot for TCH/14 related parameters shall be used.

During the established connection the PLMN BC-IE is included in the MODIFY, MODIFY COMPLETE, and MODIFY REJECT messages in order to change the service (bearer capability) or to change the maximum number of traffic channels and/or wanted air interface user rate when a non-transparent multislot data service is in use.

If the maximum number of traffic channels and/or wanted air interface user rate is to be changed, the BC-IE included in the MODIFY message shall not indicate a different bearer service than the one used at this stage of the connection - the values of the parameters ‘maximum number of traffic channels’ and/or ‘wanted air interface user rate’ may be changed, only.

The subsequent tables and subsections of clause B.1 deal with the representation of the individual contents of the PLMN BC-IE during the call set-up phase. For the use during the established connection refer to 3G TS 24.008.

With respect to the individual parameter settings at the MS the following cases may be distinguished (ref. 3G TS 27.002 and 3G TS 27.003):

- Mobile-originated call set up by a MS consisting of a MT with R interface:

  - The setting results from respective MMI actions and/or MT internal settings.

- Mobile-originated call set up by a MS consisting of a MT with S interface:

  - The setting of the PLMN BC is derived from the ISDN BC and LLC/HLC elements contained in the ISDN SETUP message received from the terminal. It is complemented by information resulting from respective MMI actions and/or MT internal settings.

- Mobile-terminated call set up to a MS consisting of a MT with R interface:

  - The BC related part of the compatibility check is carried out according to the knowledge of the MT concerning its implemented functions (i.e. answering the call). The requested field values of the non-negotiable parameters and the selected field values of the negotiable parameters determine the selection of the terminal function to be used for the intended connection.

- Mobile-terminated call set up to a MS consisting of a MT with S interface:

  - The PLMN BC received from the MSC is mapped by the MT onto an applicable ISDN BC. In some cases a HLC may be generated, if it is not otherwise available (e.g. for group 3 facsimile). The BC related part of the compatibility check is up to the terminal connected to the S interface of the MT, as is the selection of the terminal function (i.e. answering the call) to be used for the intended connection.

B.1.1.2 Interpretation of the Diagrams

The purpose of the subsequent diagrams is to achieve unambiguous representation of the individual contents of the PLMN BC-IE for the various occurrences during the call set-up phase, covering all bearer services and teleservices according to 3G TS 22.002 and 3G TS 22.003.

The basic principle adopted is a graphic scheme, or mask, wherein the ordinate designates the individual parameters of the PLMN BC-IE and the abscissa gives the possible field values of these parameters. The abbreviations used in these sections are defined in table B.5. The allowed content of any PLMN BC-IE is represented by a number of graphs connecting parameter values (abscissa points) of all parameters (ordinate points). Each graphic scheme is subdivided into two independent parts:

- "Layer/Protocol related" part; and

- "Radio Channel related" part.

The generation of all PLMN BC-IEs in all call set-up messages shall be in accordance with these graphs. Subclauses B.1.2 through B.1.11 show individual sets of graphs for each service group (BS/TS) and for each type of applicable Information Transfer Capability.

In addition, the following rules apply:

- Those parameters which have only one possible field value for all recognized services are shown in table B.5, where they are marked accordingly in the column "common setting of field values". They are not represented in the graphic scheme.

- Not all parameters of the PLMN BC-IE are relevant for each service (BS/TS). This is represented by specific abscissa points with a value of "NA" (Not Applicable) allocated to these parameters. The graphs pass through these points for each such parameter. The actual field value to be used in the PLMN BC-IE is marked in the column "default setting of field values (NA)" of table B.5. An abscissa point with a value of "NAV" (Not AVailable) indicates that the entire octet carrying this parameter (ref. table B.2 "General Structure of the PLMN BC-Information Element") shall be omitted.

- Unless FTM is applied, there is a particular dependency of the parameters "User Information Layer 2 Protocol (UIL2P)" and "Connection Element (CE)":

  - If the MS sends a PLMN BC-IE with a CE value other than "Transparent (T)", the parameter UIL2P is essential. Its field value must be set as indicated in the applicable graph.

  - If the MSC sends a PLMN BC-IE in the SETUP message, the parameter UIL2P may also be absent in the case of the CE parameter value being other than "Transparent (T)".

- In case FTM is applied, the PLMN BC-IE shows a CE value "non-transparent", SA value "asynchronous", and RA value X.31 flag stuffing. The UIL2P is not available.
- Certain parameters of the PLMN BC-IE may be negotiated during the connection establishment phase. Table B.1 shows these parameters and the relations of their values in the SETUP message and in the CALL CONFIRMED/CALL PROCEEDING message, respectively, both for the mobile-originated and mobile-terminated case. A parameter may indicate a field value of one of the following types:
  - "requested value" indicating a request which cannot be changed by the responding entity;
  - "offered value" indicating a proposal which may be changed by the responding entity;
  - a particular choice value leaving it up to the responding entity which value ultimately applies;
  - "as requested" indicating that the requested value applies and is confirmed (by returning it);
  - "selected value" indicating that a particular value applies either out of the offered set or as a free choice out of the defined set of values;
  - "supported value" indicating a value supported by the responding entity.

Table B.1: BC-Parameters subject to negotiation procedure

Mobile Originated Call:

	Message	
BC-parameter	SETUP	CALL PROC
NDB	Requested value	as requested
NPB	Requested value	as requested
NSB	Requested value	as requested
CE	Requested value (T/NT)	as requested
	"both" with the preferred value indicated (e.g. both NT)	selected value (T/NT)
UIL2P	Requested value [9] or NAV [1]	as requested or NAV [4]
User Rate	Requested value	as requested
DC	Requested value [2]	as requested or "NO" [7]
FNUR	Requested value	supported value
Other MT	Requested value	supported value
UIMI	Requested value	supported value

Mobile Terminated Call:

	Message	
BC-parameter	SETUP	CALL CONF
NDB	Offered value	selected value (free choice)
NPB	offered value	selected value (free choice)
NSB	offered value	selected value (free choice)
CE	requested value (T/NT)	as requested or selected value (T/NT) (free choice) [3]
	"both" with the preferred value indicated (e.g. both NT)	selected value (T/NT)
Sync/ Asynchronous	requested value	as requested or selected value[10]
Rate adaptation/Other rate adaptation	requested value	as requested or selected value[11]
UIL2P	offered value [2] or NAV [4]	selected or NAV [1]
User Rate	offered value	selected value [5]
DC	requested value [2]	as requested or "NO" [7]
FNUR	offered value	selected value [6]

	Message	
Other MT	offered value	selected value [6]
UIMI	offered value	selected value [8]

1) For CE:T only, out-band flow control, or RA:X.31 flag stuffing requested by the MS.
2) Not for CE:T.
3) When the SETUP message contains no BC-IE (single numbering scheme).
4) "NAV" shall not be interpreted as an out-band flow control request by the MS.
5) The modification of User Rate must be in conjunction with Modem Type and Intermediate Rate.
6) The modification of the Fixed Network User Rate shall be in conjunction with the Modem Type and/or Other Modem Type.
7) In case of a Mobile Terminated Call, if the SETUP message does not contain a BC-IE, the MS shall behave as if the DC is set to "data compression not possible".
In case of a MO CALL or a MT CALL where no BC-IE is included in the CALL PROCEEDING or CALL CONFIRMED message, respectively, the MS or the network shall behave as if the DC was set to "data compression not possible" or "data compression not allowed", respectively.
8) Less or equal to the offered value.
9) Not for CT:T or FTM (i.e., CE:NT, SA:A, RA:X.31 flag stuffing).
10) For FTM and PIAFS, this parameter may be negotiated. See Table B.4e for details.
11) For FTM, PIAFS and Multimedia, this parameter may be negotiated. See Table B.4f for details.

Table B.2: General Structure of the BC-Information Element

OCTET	INFORMATION ELEMENT FIELD	
3	Radio channel requirements Coding standard Transfer mode Information Transfer Capability	
4	Structure Duplex mode Configuration Establishment Negotiation of Intermediate Rate Requested Compression	2)
5	Rate adaption Signalling access protocol	2)
5a	Other ITC Other rate adaption	2) 7)
5b	Rate adaption header / no header Multiple frame establishment support in data link Mode of operation Logical link identifier negotiation Assignor / assignee In-band / out-band negotiation	2) 3)
6	User information layer 1 protocol Synchronous / asynchronous	2)
6a	Number of stop bits Negotiation Number of data bits User rate	2)
6b	Intermediate rate NIC on transmission NIC on reception Parity information	2)
6c	Connection element Modem type	2)
6d	Fixed network user rate Other modem type	4)
6e	Maximum number of traffic channels Acceptable channel codings	4)
6f	Wanted air interface user rate User initiated modification indication	4)
6g	Acceptable Channel codings Asymmetry preference indication	5) 6)
7	User information layer 2 protocol	1) 2)

1) Octets optional.
2) Octets only available if the parameter "Information Transfer Capability" does not indicate "Speech".
3) For V.120 rate adaption only.
4) Optional octets available only if the parameter "Information Transfer Capability" does not indicate "Speech".
5) Extension of the 'Acceptable channel codings' field in octet 6e in case EDGE channel codings are supported.
6) Only used if EDGE channels are among the 'Acceptable channel codings'. The value shall be set to 'no preference' in case the connection element is T.
7) For ITC=RDI or UIL1P=V.120, PIAFS, and 'H.223 and H.245' only.

Table B.3a: Selection of flow control method (for CE:NT with SA:A only)

	flow control method		
information element	in-band	out-band3)	none
number of data bits	7 or 8	7 or 8	7 or 8
user information layer 2 protocol	ISO 64291)	NAV	COPnoFlCt2)

1) ISO6429 stands for "ISO 6429, codeset 0, DC1/DC3" and is applicable for 7 and 8 bit codes.

2) COPnoFlCt stands for a character oriented protocol with no flow control mechanism (no reserved characters for flow control).

3) "out-band" flow control requires V.42 in case of PSTN or V.110 in case of ISDN.
If the V.110 flow control mechanism is not supported, where required, the call pending shall be terminated.
If the V.42 functionality is not supported by the modem in the IWF or in the fixed network, the call will be supported with a fallback to the non-V.42 mode. In this case the IWF will release the call if due to temporary throughput problems on the radio interface or initiation of flow control by the MS and the inability to flow control the fixed network modem an overflow of the L2R buffers occurs.
Note that a phase 1 network may release the call, if the V.42 functionality is not provided by the IWF or the fixed network modem. As V.42 does not apply to V.21 modems, outband flow control can not be supported for these modem types.

Table B.3b: Selection of PLMN Profile (for CE:NT with SA:S only)

Mobile Terminated Call:

BC-parameter	Message SETUP	Message CALL CONF
UIL2P	X.25	X.25 or X.75

Table B.4a: Modem Type subject to negotiation procedure

Mobile Originated Call:

	BC-parameter MT and OMT 6)	
BC-parameter CE	**Message SETUP**	**Message CALL PROC**
T	V-series	V-series
NT	V-series	V-series
	autobauding type 1	autobauding type 1 or V-series 1)
bothT or bothNT	V-series	V-series
	autobauding type 1	autobauding type 1 or V-series 1)2)

Mobile Terminated Call:

	BC-parameter MT and OMT 6)	
BC-parameter CE	**Message SETUP**	**Message CALL CONF**
T	V-series	V-series
NT	V-series	V-series or autobauding type 1 3)
	autobauding type 1	autobauding type 1 or V-series 4)
bothT or bothNT	V-series	V-series
	autobauding type 1	autobauding type 1 or V-series 4)5)

1) No autobauding capability in the IWF:MSC.
2) CE:T selected by IWF/MSC.
3) Free choice if the SETUP contains no BC-IE (single numbering scheme).
If the IWF/MSC has no autobauding capability, a V-series modem type is used.
4) When the MS does not allow the use of autobauding capability.
5) CE:T selected by the MS.
6) When the MT indicates "autobauding" , "modem for undefined interface" or "none", the OMT shall be set to "no other modem type". Any other values of the MT is overridden by the OMT value.

Table B.4b: Intermediate Rate negotiation procedure

If the user rate is 9.6 kbit/s the intermediate rate negotiation procedure is not applicable and NIRR shall be set to "No meaning".

Recipient of SETUP supports full rate, non transparent, 6 kbit/s radio interface rate and the user rate is up to/equal 4.8 kbit/s:

BC-parameter	Message SETUP	Message CALL CONF or CALL PROC
NIRR	6 kbit/s	6 kbit/s
IR	16 kbit/s	8 kbit/s
User Rate	up to/equal 4.8 kbit/s	as requested

NOTE 1: In case of a Mobile Terminated Call, if the SETUP message does not contain a BC-IE, the MS shall behave as if NIRR set to "No meaning".

In case of a MO CALL or a MT CALL where no BC-IE is included in the CALL PROCEEDING or CALL CONFIRMED message, respectively, the MS or the network shall behave as if the NIRR was set to "No meaning".

Recipient of SETUP does support full rate, non transparent, but not in connection with 6 kbit/s radio interface rate:

BC-parameter	Message SETUP	Message CALL CONF or CALL PROC
NIRR	6 kbit/s	No meaning
IR	16 kbit/s	16 kbit/s
User Rate	up to/equal 4.8 kbit/s	as requested

NOTE 2: If no other parameter needs negotiation, the CALL CONF/PROC message need not contain any BC-IE.

In case of a MO CALL or a MT CALL where no BC-IE is included in the CALL PROCEEDING or CALL CONFIRMED message, respectively, the MS or the network shall behave as if the NIRR was set to "No meaning".

NOTE 3: In case a GBS-operation is requested and acknowledged, the MS indicates the acceptable channel codings. The indicated acceptance of TCH/F4.8 is equivalent to the support of 6 kbit/s radio interface rate per TCH/F and therefore overrides the NIRR parameter.

Table B.4c Negotiation of fixed network user rate

BC-parameter	Message SETUP	Message CALL PROC/CONFIRMED
FNUR	requested value	equal or lower than the requested value

The network might accept the modified value or reject the call. The FNUR negotiation is applicable in case of a HSCSD-operation, only.

Table B.4d Negotiation of user initiated modification indication

BC-parameter	Message SETUP	Message CALL PROC/CONFIRMED
UIMI	offered value	equal to or a value indicating a request for modification to a lower number of traffic channels than offered

Table B.4e: Negotiation of Synchronous/Asynchronous

Mobile Terminated Call:

	BC-parameter Synchronous/Asynchronous	
Bearer type	Message SETUP	Message CALL CONF
FTM[1)]	Synchronous	Asynchronous
PIAFS[2)]	Synchronous	Asynchronous

1) This negotiation is possible, only if ITC=UDI or RDI, FNUR=64 or 56 kbit/sand CE=NT or "both" is signalled in the SETUP message. The MS shall signal FTM as specified in B.1.2.3 .

2) This negotiation is possible, only if ITC=UDI, FNUR=32 kbit/s and CE= "both" is signalled in the SETUP message. The UE shall signal PIAFS as specified in B.1.2.4

Table B.4f: Negotiation of Rate adaptation/Other rate adaptation

Mobile Terminated Call:

	BC-parameter Rate adaptation/Other rate adaptation	
Bearer type	Message SETUP	Message CALL CONF
FTM[1)]	V.110, I.460 and X.30	X.31 flag stuffing
PIAFS[2)]	V.110, I.460 and X.30	PIAFS
Multimedia	V.110, I.460 and X.30[3)]	H.223 and H.245
	No rate adaptation[5)]	H.223 and H.245

1) This negotiation is possible, only if ITC=UDI or RDI, FNUR=64 or 56 kbit/s and CE=NT or "both" is signalled in the SETUP message. The MS shall signal FTM as specified in B.1.2.3.

2) This negotiation is possible, only if ITC=UDI, FNUR=32 kbit/s and CE= "both" is signalled in the SETUP message. The UE shall signal PIAFS as specified in B.1.2.4.

3) This negotiation is possible, only if ITC=UDI or RDI, FNUR=32 or 56 kbit/s and CE=T or "both" is signalled in the SETUP message. The MS shall signal 3G-H.324/M as specified in B.1.3.1.7.

5) This negotiation is possible, only if ITC=3.1 kHz, FNUR=28.8 kbit/s, MT=V.34 and CE=T or "both" is signalled in the SETUP message. The MS shall signal 3G-H.324/M as specified in B.1.3.2.3.

Table B.5: BC parameter setting (part 1)?

Abbreviations for Parameters and Values:
common setting of field values
default setting of field values (NA)

		v	v
ITC...Information Transfer Capability:	- Speech		
	- UDI..Unrestricted Digital		
	- FAX3..Group 3 Facsimile		
	- 3.1 kHz..3.1 kHz Ex PLMN		
	- RDI..Restricted Digital		
TM....Transfer Mode:	- ci..Circuit	X	X
S.....Structure:	- SDU..Service Data Unit Integrity		
	- Unstructured	X	
C.....Configuration:	- pp..Point to point	X	X
E.....Establishment:	- de..Demand	X	X
SA....Sync/Async:	- S..Synchronous		
	- A..Asynchronous		
N.....Negotiation	- ibn..in band negotiation not possible	X	X
UR....User Rate:	- 0.3..0.3 kbit/s		
	- 1.2..1.2 kbit/s		
	- 2.4..2.4 kbit/s		
	- 4.8..4.8 kbit/s		
	- 9.6..9.6 kbit/s		
IR....Intermediate Rate:	- 4.. 4 kbit/s		
	- 8.. 8 kbit/s		
	- 16.. 16 kbit/s		
	- not_used..not used	X	
NICT..Network Independent Clock on Tx:	- not_required.. Not required	X	X
	- required		
NICR..Network Independent Clock on Rx:	- not_accepted..not accepted	X	X
	- accepted		
NSB...Number of Stop Bits:	- 1..1 bit	X	
	- 2..2 bit		
NDB...Number of Data Bits Excluding Parity If Present:	- 7.. 7 bit		
	- 8.. 8 bit	X	
NPB...Parity Information:	- Odd		
	- Even		
	- None	X	
	- 0.. Forced to 0		
	- 1.. Forced to 1		
UIL1P.User Information Layer 1 Protocol	- def..default layer 1 protocol	X	X

Table B.5: BC parameter setting (part 2)

Abbreviations for Parameters and Values		common setting of field values	default setting of field values (NA)
			v
DM....Duplex Mode:	-		
	- fd.. Full Duplex		X
MT....Modem Type:	- V.21		
	- V.22		
	- V.22 bis		
	- V.26 ter		
	- V.32		
	- auto1.. autobauding type 1		
	- none		X
RCR...Radio Channel Requirement:	- FR Full Rate support only Mobile Station		
	- dual HR Dual Rate support Mobile Station/ Half Rate preferred		
	- dual FR Dual Rate support Mobile Station/ Full Rate preferred		
CE....Connection Element:	- T.. Transparent		
	- NT.. Non Transparent		
	- bothT both transparent preferred		
	- bothNT both non Transparent preferred		
UIL2P.User Information Layer 2 Protocol:	- ISO6429..ISO6429,codeset 0,DC1/DC3		
	- X.25		
	- X.75..X.75 layer 2 modified (CAPI)		
	- COPnoFlCt..Character oriented protocol with no flow control mechanism		
SAP...Signalling Access Protocol:	- I.440.. I.440/450		X
	~~- X.21~~		
	~~- X.28nond.. X.28, non dedicated PAD~~		
	- X.32		
RA....Rate Adaptation:	- V.110.. V.110/X.30		
	- X.31Flag.. X.31 flagstuffing		
	- NO.. no rate adaptation		X
	- V.120		
	- PIAFS		
	- H.223 and H.245		
CS....Coding Standard:	- GSM		X
NIRR..Negotiation of Intermediate Rate Requested:	NM..No Meaning associated with this value 6kbit/s..6kbit/s radio interface rate requested		X
DC....Data Compression	- DC.. compression possible/allowed		
	- NO.. compression not possible/allowed		

Table B.5: BC parameter setting (part 3)

Abbreviations for Parameters and Values

common setting of field values

default setting of field values (NA)

FNUR...Fixed Network User Rate	- FNUR not applicable		
	- 9.6.. 9.6 kbit/s		
	- 14.4.. 14.4 kbit/s		
	- 19.2.. 19.2 kbit/s		
	- 28.8.. 28.8 kbit/s		
	- 32.0.. 32.0 kbit/s		
	- 33.6.. 33.6 kbit/s		
	- 38.4.. 38.4 kbit/s		
	- 48.0.. 48.0 kbit/s		
	- 56.0.. 56.0 kbit/s		
	- 64.0.. 64.0 kbit/s		
WAIUR...Wanted Air Interface User Rate	- WAIUR not applicable		
	- 9.6.. 9.6 kbit/s		
	- 14.4.. 14.4 kbit/s		
	- 19.2.. 19.2 kbit/s		
	- 28.8.. 28.8 kbit/s		
	- 38.4.. 38.4 kbit/s		
	- 43.2.. 43.2 kbit/s		
	- 57.6.. 57.6 kbit/s		
	- int 38.4.. interpreted by the network as 38.4 kbit/s		
ACC.....Acceptable channel codings	- 4.8.. TCH/F4.8 acceptable		
	- 9.6.. TCH/F9.6 acceptable		
	- 14.4..TCH/F14.4 acceptable		
	- 28.8..TCH/F28.8 acceptable		
	- 32.0..TCH/F32.0 acceptable		
	- 43.2..TCH/F28.8 acceptable		
	- none..No channel coding (defined by selecting none of the above		
MaxNumTCH...Maximum Number of Traffic Channels			
	- 1.. 1 TCH		
	- 2.. 2 TCH		
	- 3.. 3 TCH		
	- 4.. 4 TCH		
	- 5.. 5 TCH		
	- 6.. 6 TCH		
	- 7.. 7 TCH		
	- 8.. 8 TCH		
OMT...Other modem type	- no other MT.. no other modem type		
	- V.34.. V.34		
User initiated modification indication	- not req.. user initiated modification not required		
	- upto 1 TCH.. user initiated modification upto 1 TCH may be requested		
	- upto 2 TCH.. user initiated modification upto 2 TCH may be requested		
	- upto 3 TCH.. user initiated modification upto 3 TCH may be requested		
	- upto 4 TCH.. user initiated modification upto 4 TCH may be requested		
Asymmetry preference indication	- 00 no preference		
	- 01 up link biased asymmetry preferred		
	- 10 down link biased asymmetry preferred		

Table B.5a: Differences in parameter value validity in GSM and UMTS

Parameter / *value*	GSM	UMTS
Radio Channel Requirements / *any*	valid	ignored
User rate / *any*	valid	ignored
Intermediate Rate / *any*	valid	ignored
NIC on transmission / *any*	valid	ignored
NIC on reception / *any*	valid	ignored
Negotiation of IR requested / *any*	valid	ignored
Acceptable Channel Codings / *any*	valid	ignored
Maximum number of traffic channels / *any*	valid	ignored
User initiated modification indication / *any*	valid	ignored
Modem type /		
V.21, V.22, V.22bis, V.26ter	valid	invalid
V.32	valid	invalid for CE=T
Fixed Network User Rate /		
32, 33.6 kbit/s	invalid	valid
9.6, 14.4, 19.2, 38.4	valid	invalid for CE=T
48.0	valid	invalid
Other Rate adaptation /		
H.223 and H.245	valid (note)	valid
PIAFS	invalid	valid
NOTE: This parameter is interpreted as "No rate adaptation" in GSM.		

NOTE: Although a parameter value is marked as "valid", the validity may be restricted by rules given elsewhere in this specification.

Table B.6: Channel combinations

Single Bearer and Teleservices

MS indication **BC**	**Network selection CT** **CT**
FR dual FR dual HR	FR FR or HR HR or FR

Alternate services

MS indication		**Network selection**				
BC(1)	**BC(2)**	**CT(1)**	**CT(2)**	**Or**	**CT(1)**	**CT(2)**
FR	FR	FR	FR			
FR	dual Rate	FR	FR			
dual Rate	dual Rate	FR	FR	Or	HR	HR
dual Rate	FR	FR	FR			

Followed-by services

MS indication		**Network selection**							
BC(1)	**BC(2)**	**CT(1)**	**CT(2)**	**or**	**CT(1)**	**CT(2)**	**or**	**CT(1)**	**CT(2)**
FR	FR	FR	FR						
FR	dual Rate	FR	FR						
dual Rate	dual Rate	FR	FR	or	HR	HR	or	FR	HR
dual Rate	FR	FR	FR						

BC Bearer Capability
CT Channel Type
dual Rate {dual FR | dual HR}

Table B.7: TS61/TS62 Negotiation rules

Mobile Originating Call

Subscription	SETUP	CALL PROCEED
TS61	TS61 s/f TS61 f/s	TS61 s/f or TS62 TS61 f/s or TS62
	TS62	TS62
TS62	TS61 s/f TS61 f/s	TS62 TS62
	TS62	TS62

Mobile Terminating Call

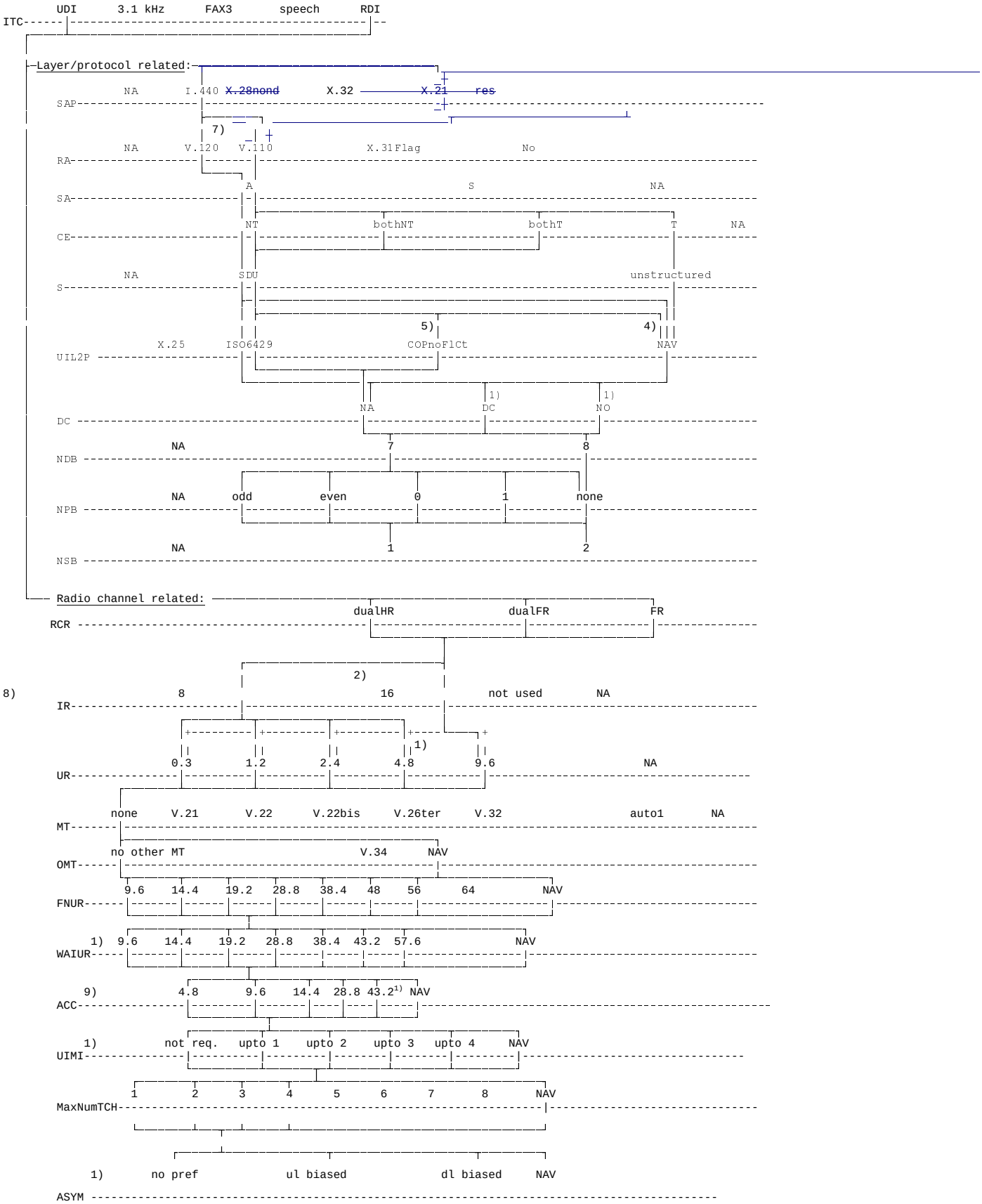
Subscription	SETUP	CALL CONFIRMED
TS61	TS61 s/f	TS61 s/f or TS61 f/s or TS62
	TS61 f/s	TS61 s/f or TS61 f/s or TS62
	TS62	TS62
	no BC	TS61 s/f or TS61 f/s or TS62
TS62	TS62	TS62
	no BC	TS62 (note)

s/f = speech then fax
f/s = fax then speech

NOTE: TS61 is also accepted if the VMSC supports TS61 and does not perform subscription checking on a CALL CONFIRMED message (see GSM 02.01 and 3G TS 29.007).

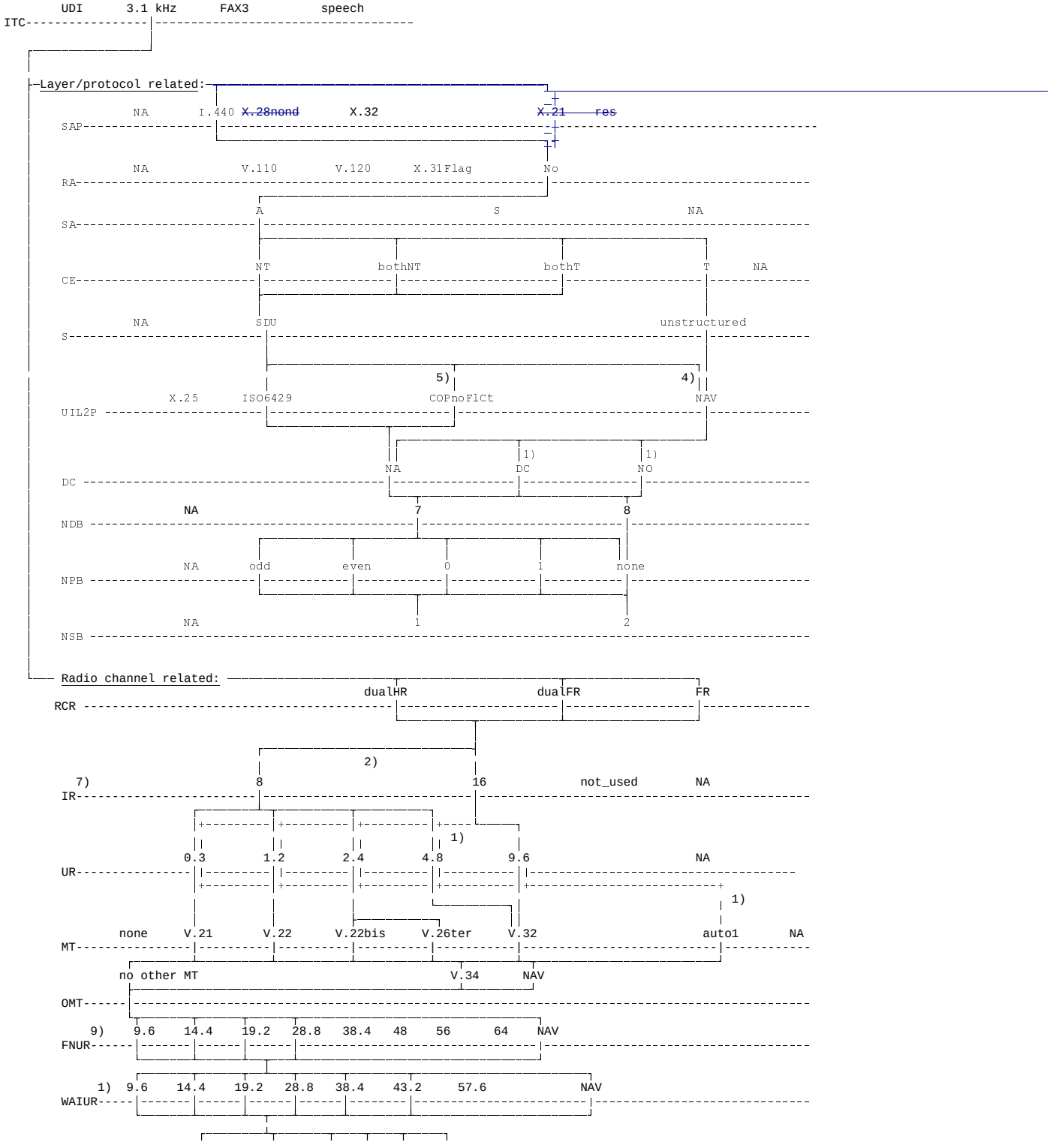
B.1.2 Bearer Service 20, Data Circuit Duplex Asynchronous

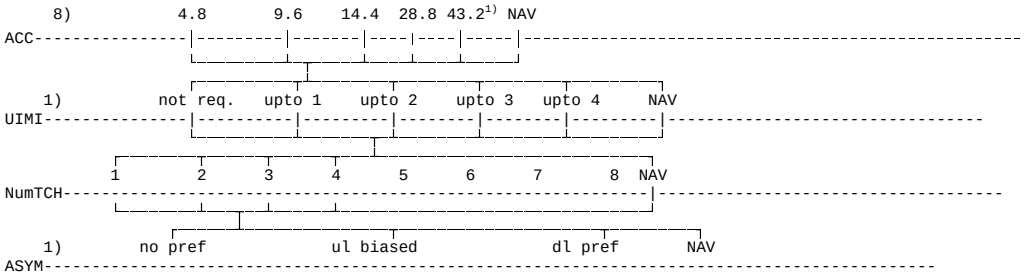
B.1.2.1 Unrestricted / restricted digital information transfer capability



1) for CE:NT or "both";
2) for CE:T only or CE:NT and NIRR:6kb/s (not for the SETUP message);
3) ~~for MO CALLS only;~~Void;
4) for MT CALLS in the SETUP message or MO/MT CALLS with "out-band" flow control requested;
5) for MO/MT CALLS with no flow control requested;
6) Void;
7) the V.120 relevant BC parameters (octet 5b) shall be set according to the LLC (see clause B.2);
8) IR and UR are overridden if FNUR, ACC and MaxNumTCH are available;
9) ACC may have several values simultaneously (bit map coding).

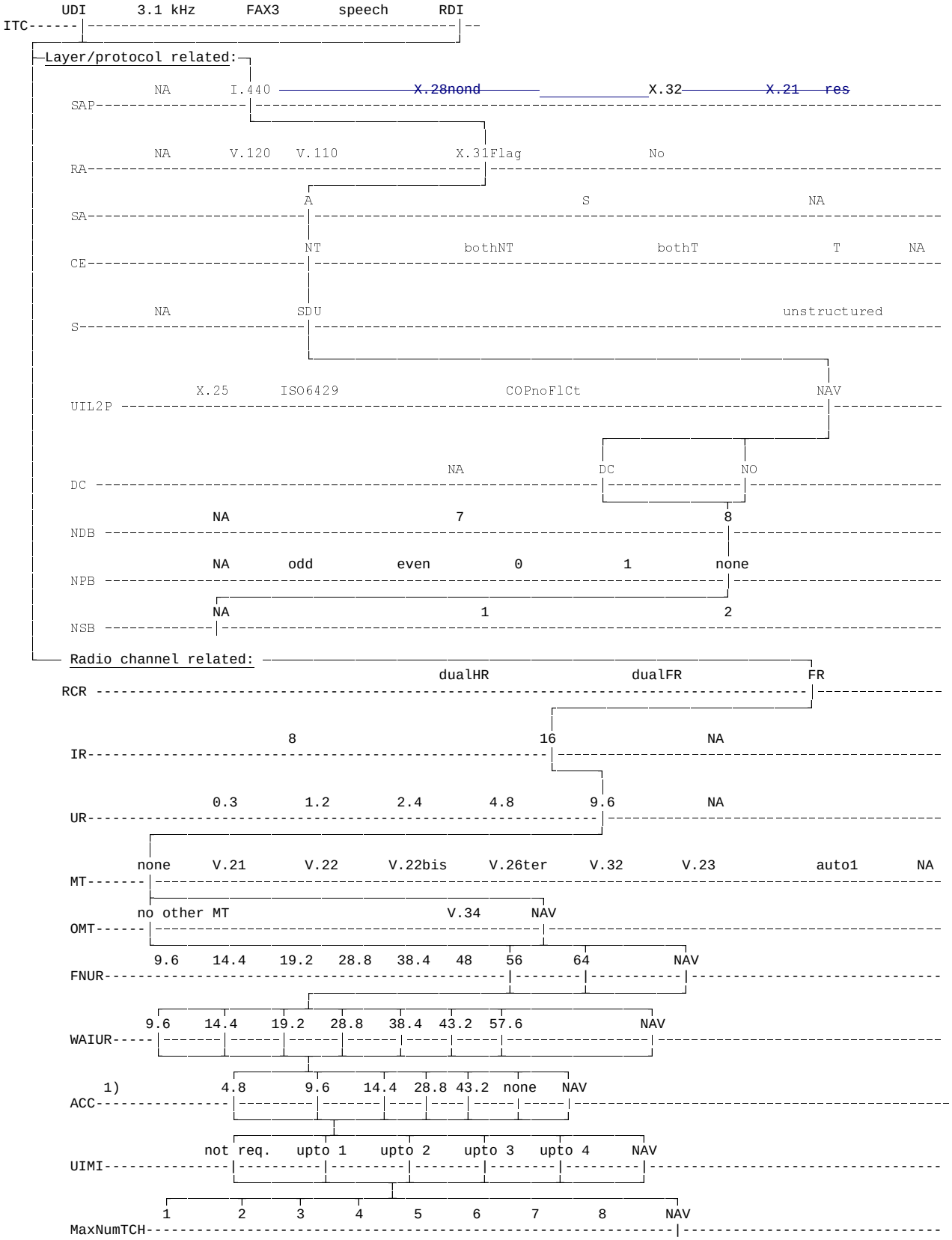
B.1.2.2 3.1 kHz audio ex-PLMN information transfer capability





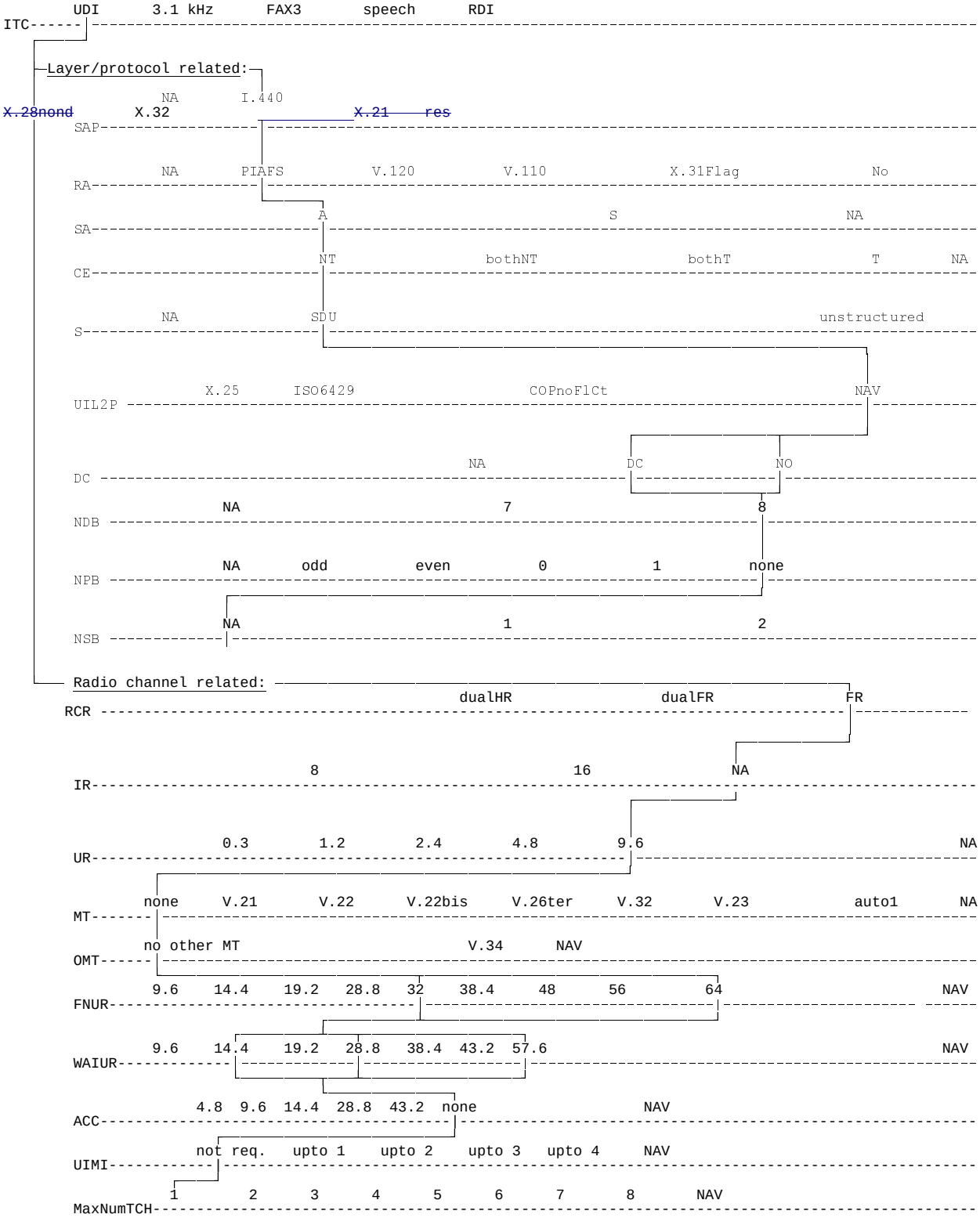
1) for CE:NT or "both";
2) for CE:T only or CE:NT and NIRR:6kb/s (not for the SETUP message);
3) ~~for MO CALLS only~~Void;
4) for MT CALLS in the SETUP message or MO/MT CALLS with "out-band" flow control requested (not for V.21 modem type);
5) for MO/MT CALLS with no flow control requested;
6) Void;
7) IR and UR are overridden if FNUR, ACC and MaxNumTCH are available.
8) ACC may have several values simultaneously (bit map coding).
in case of MT = auto1 the value of FNUR has no meaning.

B.1.2.3 Frame Tunnelling Mode



1) ACC may have several values simultaneously (bit map coding).

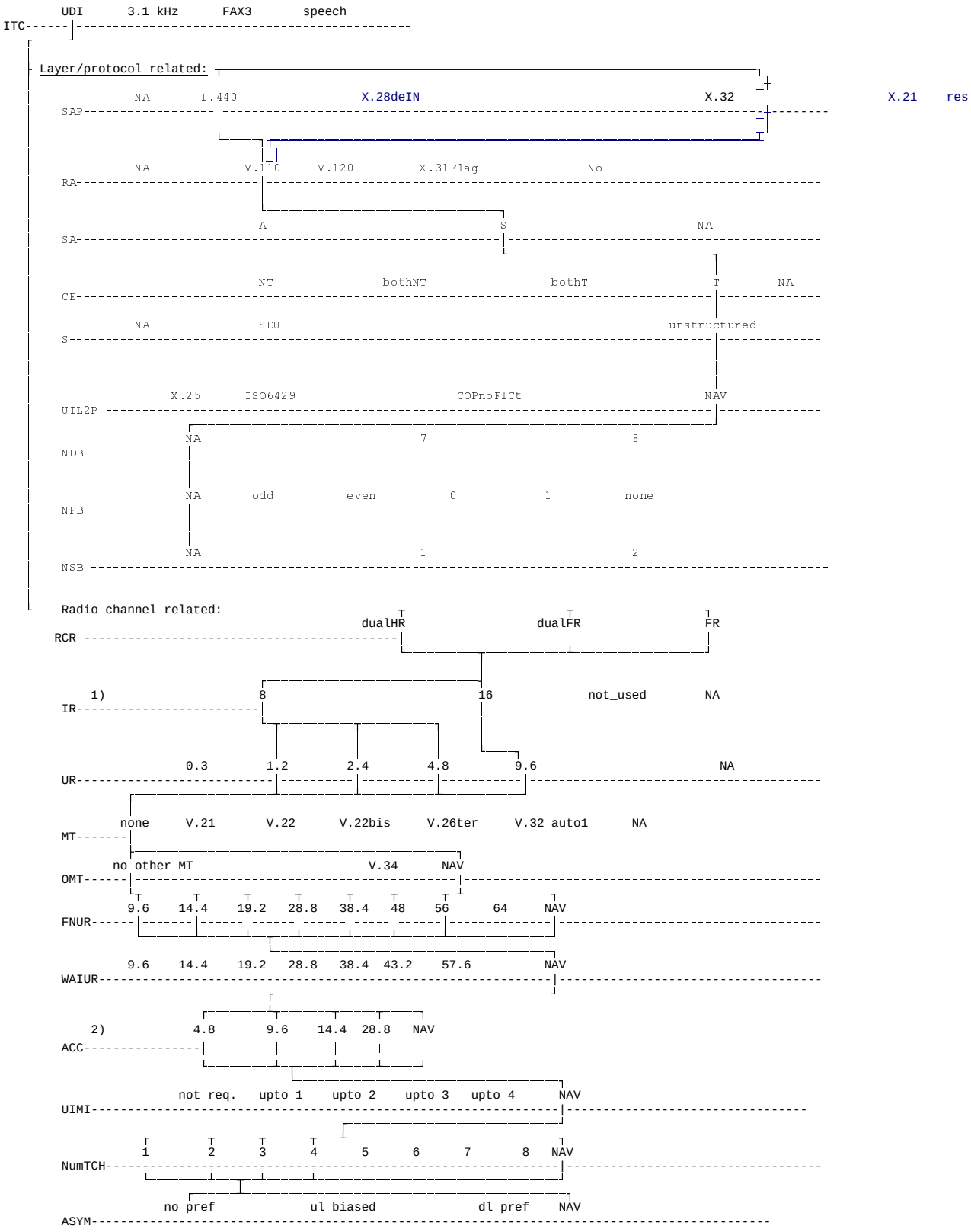
B.1.2.4 PIAFS


ITC
UDI
3.1 kHz
FAX3
speech
RDI
Layer/protocol related:
X.28nond
X.32
NA
I.440
X.21
res
SAP
NA
PIAFS
V.120
V.110
X.31Flag
No
RA
A
S
NA
SA
NT
bothNT
bothT
T
NA
CE
NA
SDU
unstructured
S
X.25
ISO6429
COPnoFlCt
NAV
UIL2P
NA
DC
NO
DC
NA
7
8
NDB
NA
odd
even
0
1
none
NPB
NA
1
2
NSB
Radio channel related:
dualHR
dualFR
FR
RCR
8
16
NA
IR
0.3
1.2
2.4
4.8
9.6
NA
UR
none
V.21
V.22
V.22bis
V.26ter
V.32
V.23
auto1
NA
MT
no other MT
V.34
NAV
OMT
9.6
14.4
19.2
28.8
32
38.4
48
56
64
NAV
FNUR
9.6
14.4
19.2
28.8
38.4
43.2
57.6
NAV
WAIUR
4.8
9.6
14.4
28.8
43.2
none
NAV
ACC
not req.
upto 1
upto 2
upto 3
upto 4
NAV
UIMI
1
2
3
4
5
6
7
8
NAV
MaxNumTCH

B.1.3 Bearer Service 30, Data Circuit Duplex Synchronous

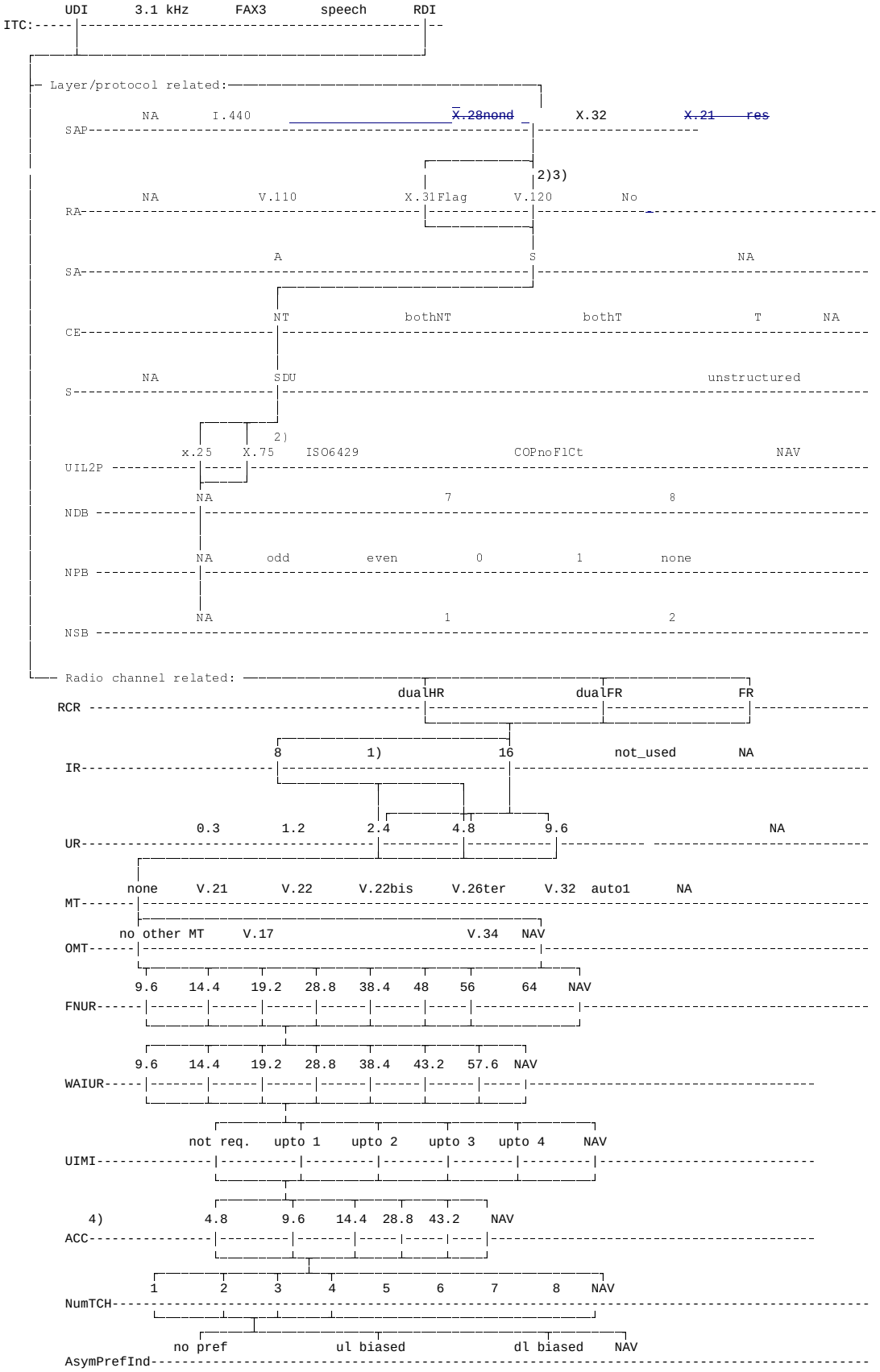
B.1.3.1 Unrestricted/restricted digital information transfer capability

B.1.3.1.1 Non-X.32 Cases



1) IR and UR are overridden if FNUR, ACC and MaxNumTCH are available
2) ACC may have several values simultaneously (bit map coding).

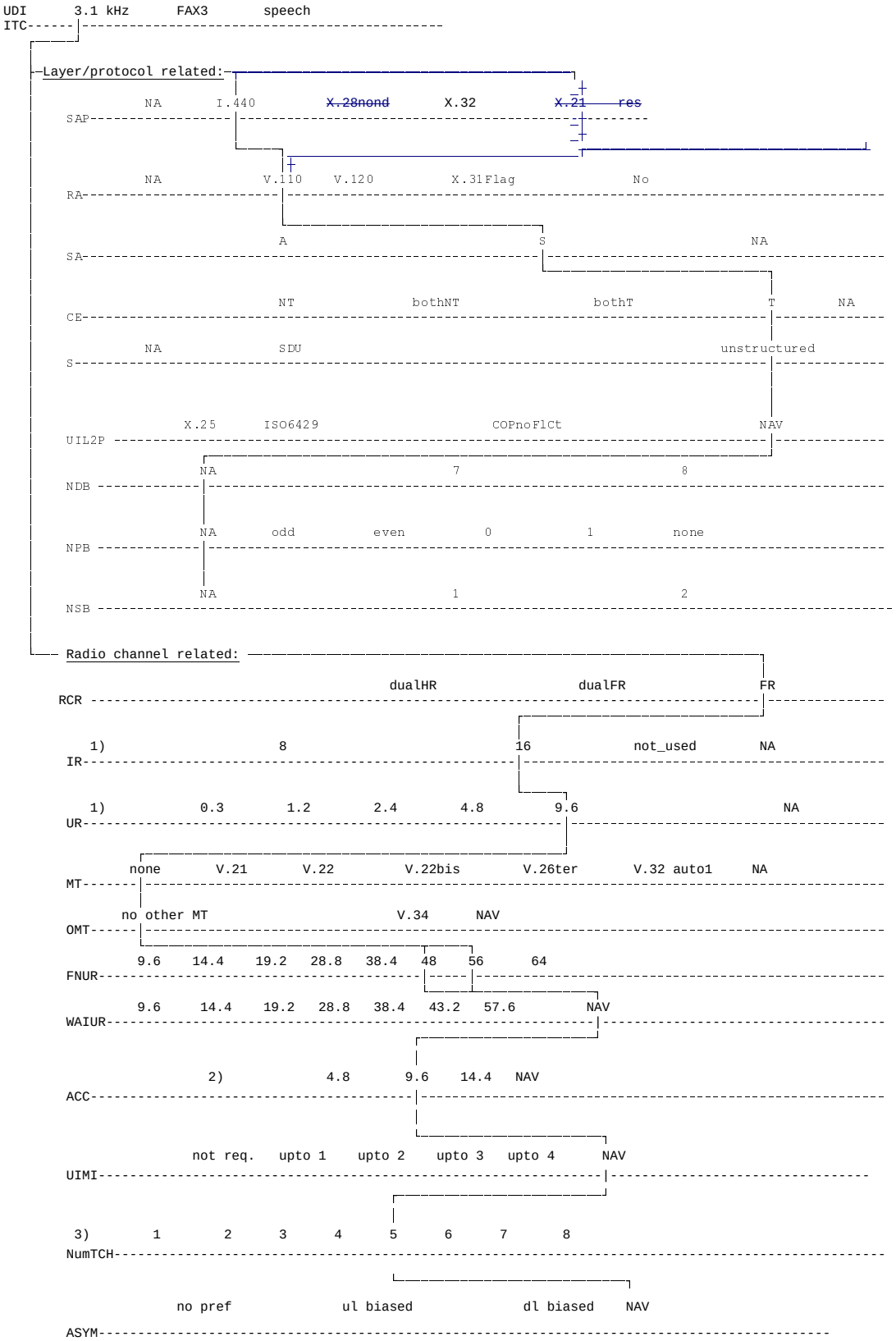
B.1.3.1.2 X.32 Case (Packet Service)



1) for NIRR:6kb/s (not for the SETUP message);
2) not for packet handler access;
3) the V.120 relevant BC parameters (octet 5b) shall be set according to the LLC (see clause B.2);
4) ACC may have several values simultaneously (bit map coding).

B.1.3.1.3 Void

B.1.3.1.4 48kbit/s and 56 kbit/s transparent Case (TCH/F9.6)



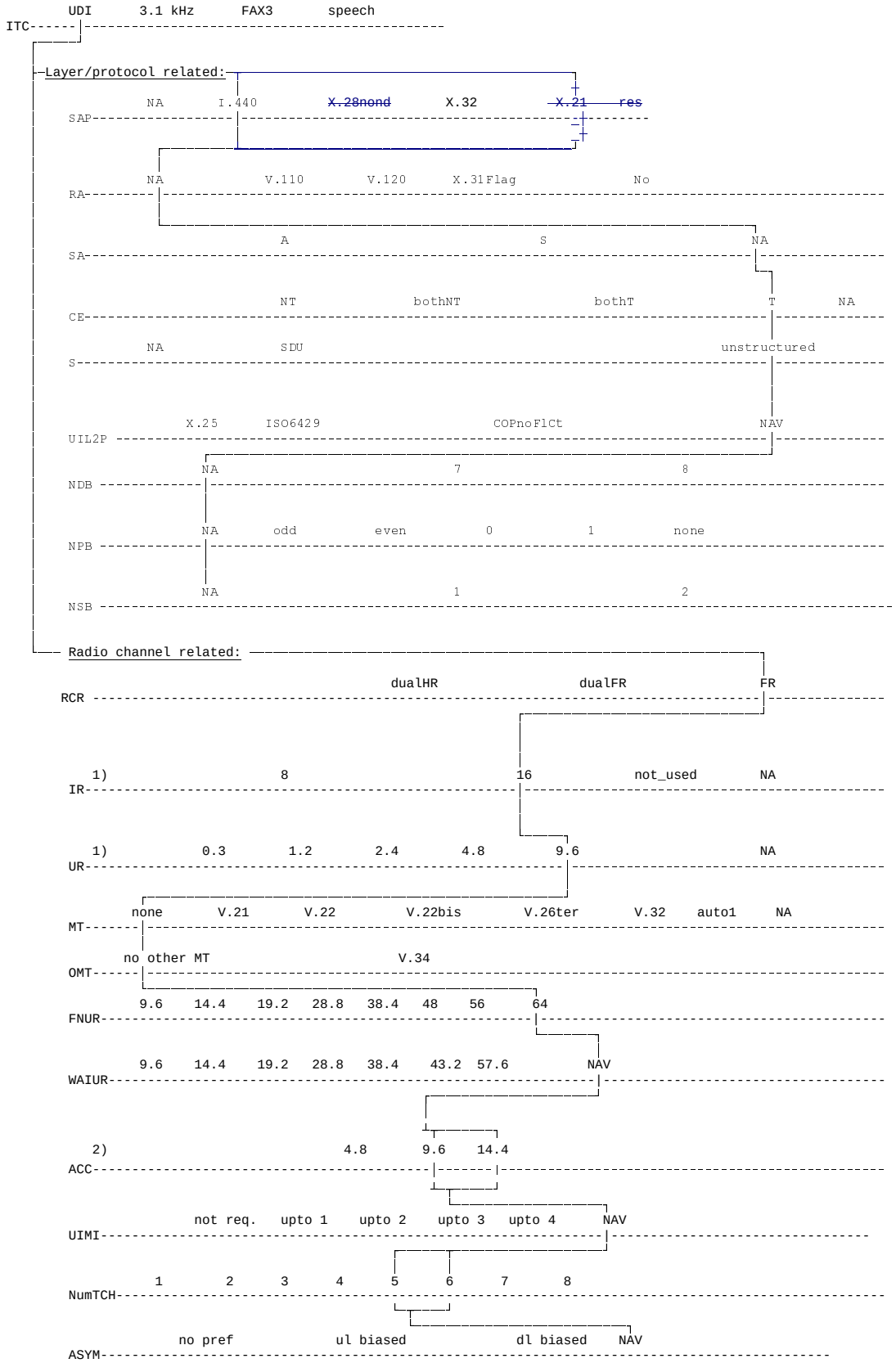
1) IR and UR are overridden by FNUR, ACC and MaxNumTCH are available.

2) ACC may have several values simultaneously (bit map coding).

3) For a 4 channel operation see table in subclause B.1.3.1.1.

NOTE: The parameters FNUR, OMT, ACC and MaxNumTCH are mandatory for this service.

B.1.3.1.5 64kbit/s bit transparent Case (TCH/F9.6 and TCH/F14.4)

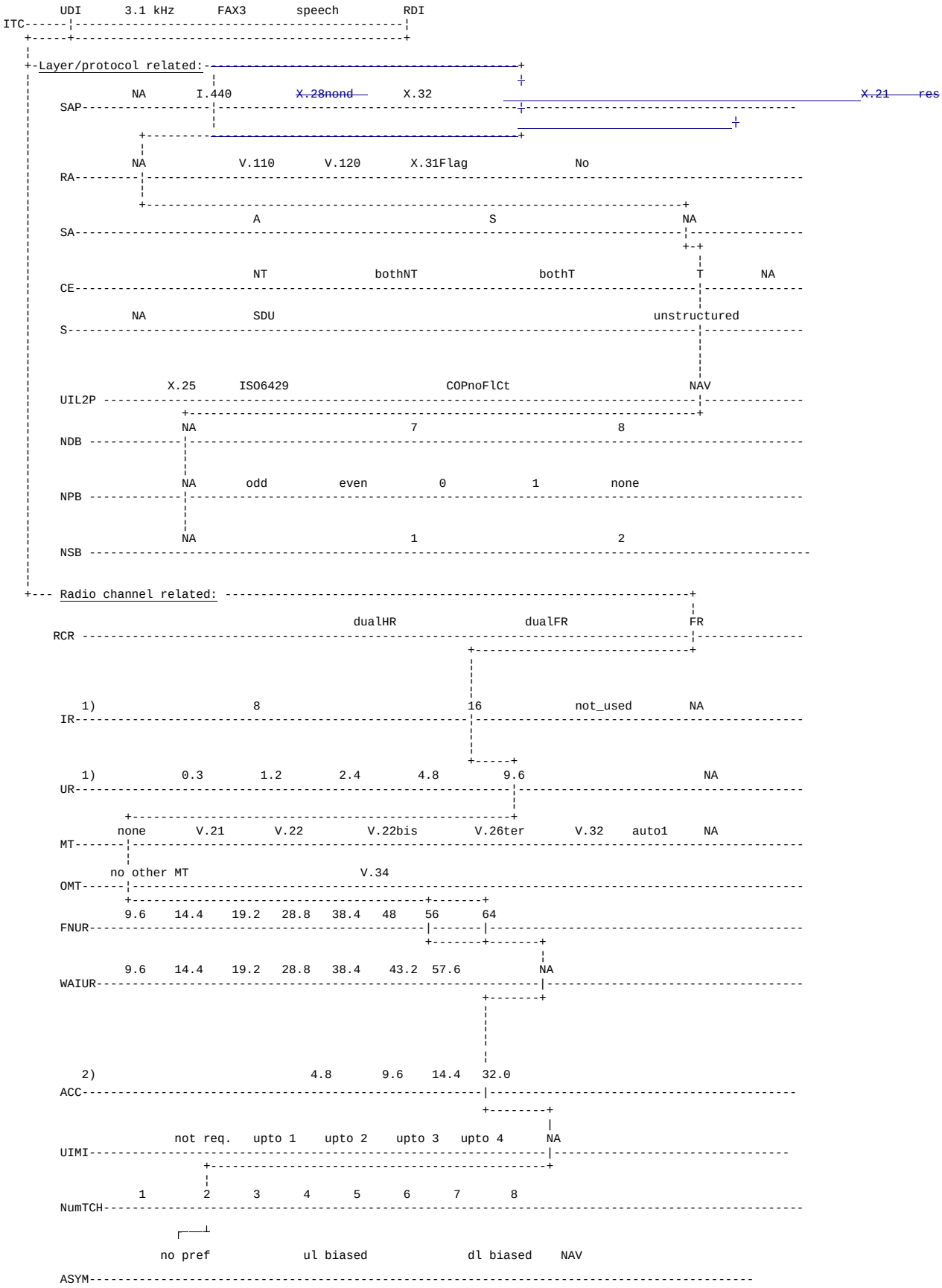


1) IR and UR are overridden by FNUR, ACC and MaxNumTCH are available.

2) ACC may have several values simultaneously (bit map coding).

NOTE: The parameters FNUR, OMT, ACC and MaxNumTCH are mandatory for this service.

B.1.3.1.6 Bit transparent 56 kbit/s (RDI) and 64kbit/s (UDI) (TCH/F32.0)

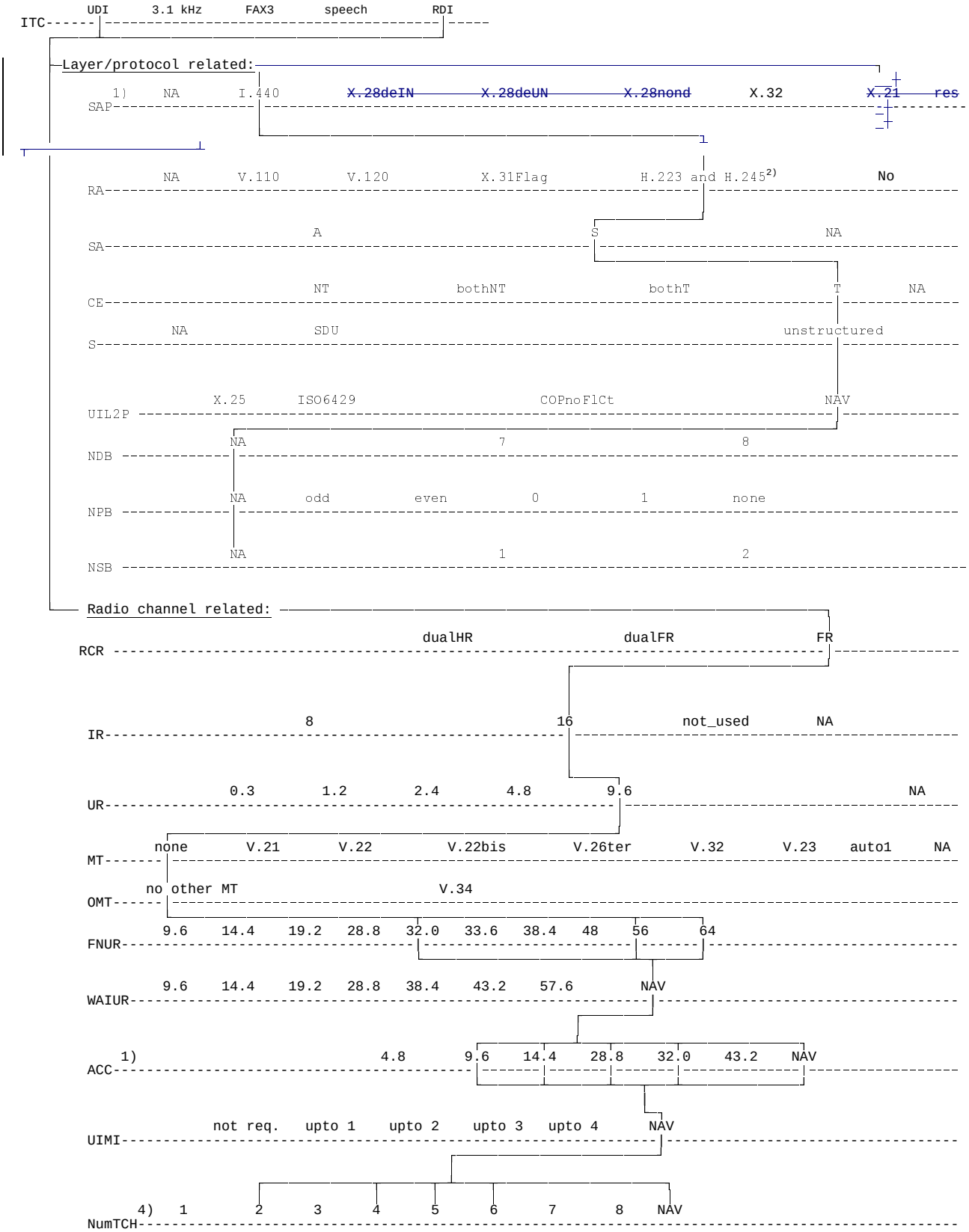


1) IR and UR are overridden by FNUR, ACC and MaxNumTCH are available.

2) ACC may have several values simultaneously (bit map coding).

NOTE: The parameters FNUR, OMT, ACC and MaxNumTCH are mandatory for this service.

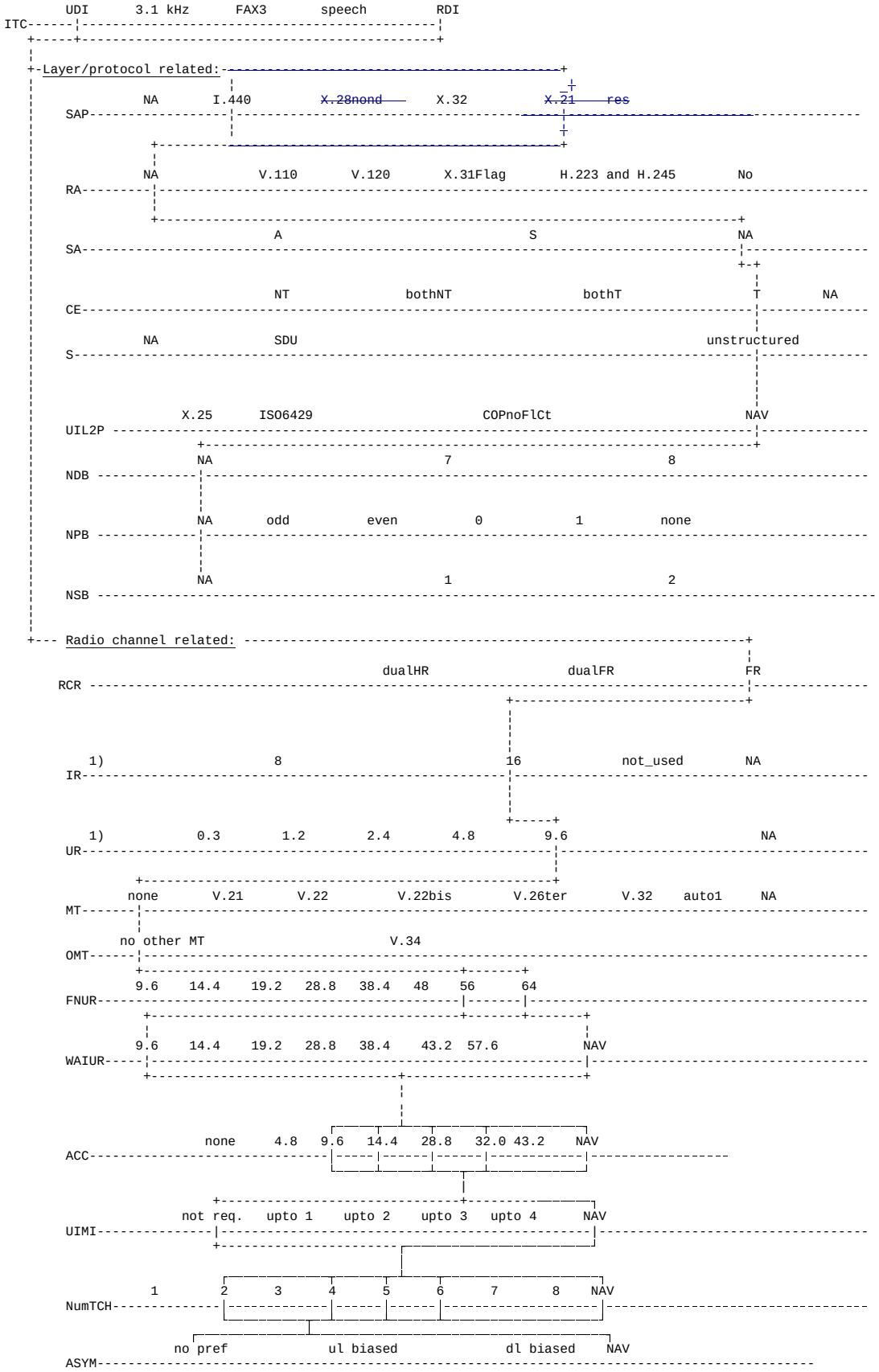
B.1.3.1.7 3G-H.324/M Case



1) ACC may have several values simultaneously (bit map coding).

2) This value is interpreted as "No rate adaptation" in GSM.

B.1.3.1.8 Bit transparent 56 kbit/s (RDI) and 64kbit/s (UDI) (UTRAN)

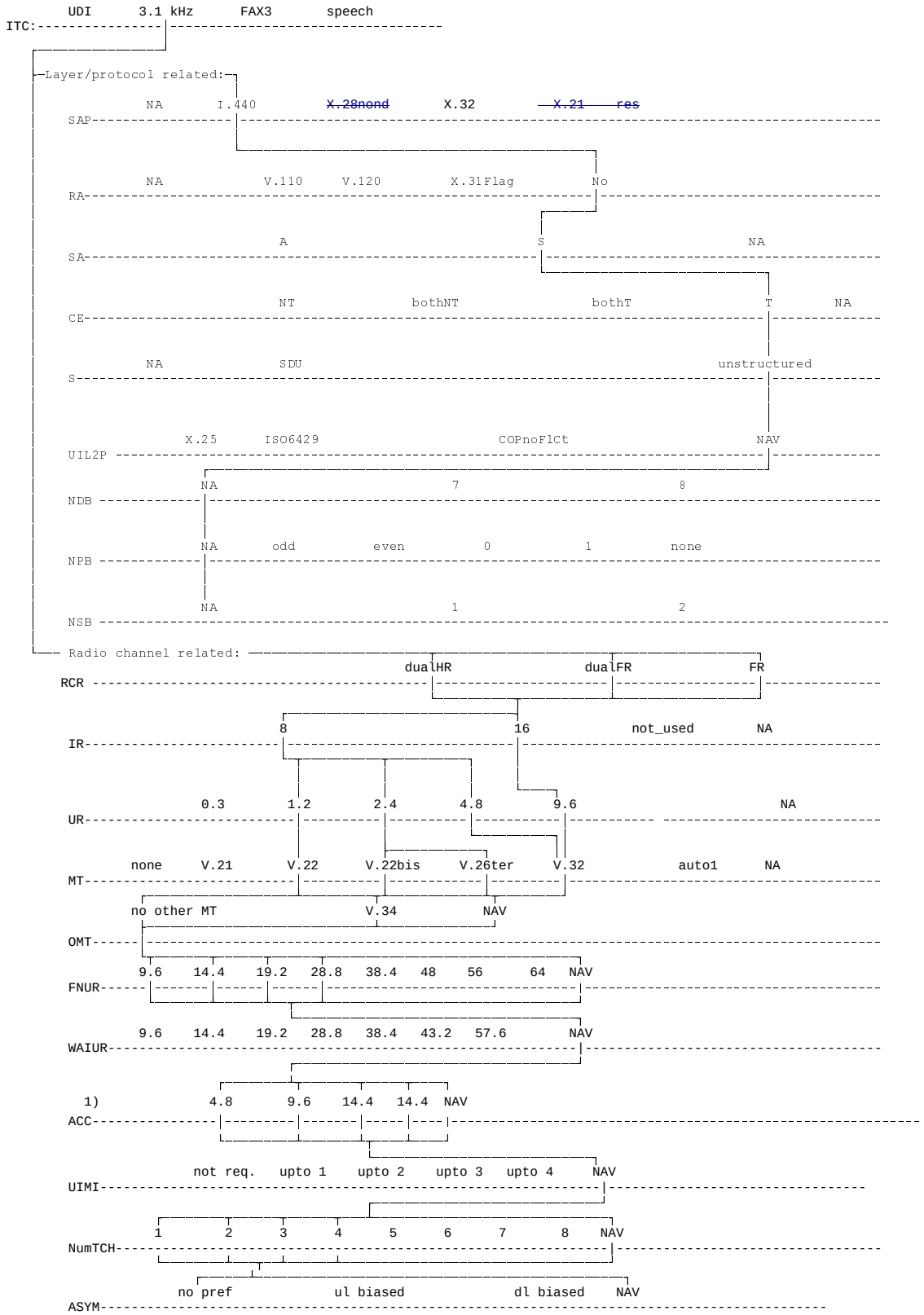


WAIUR, UIMI and ASYM shall be available only if the ACC includes TCH/F32.0.

ACC and NumTCH may be available in order to support handover to GSM.

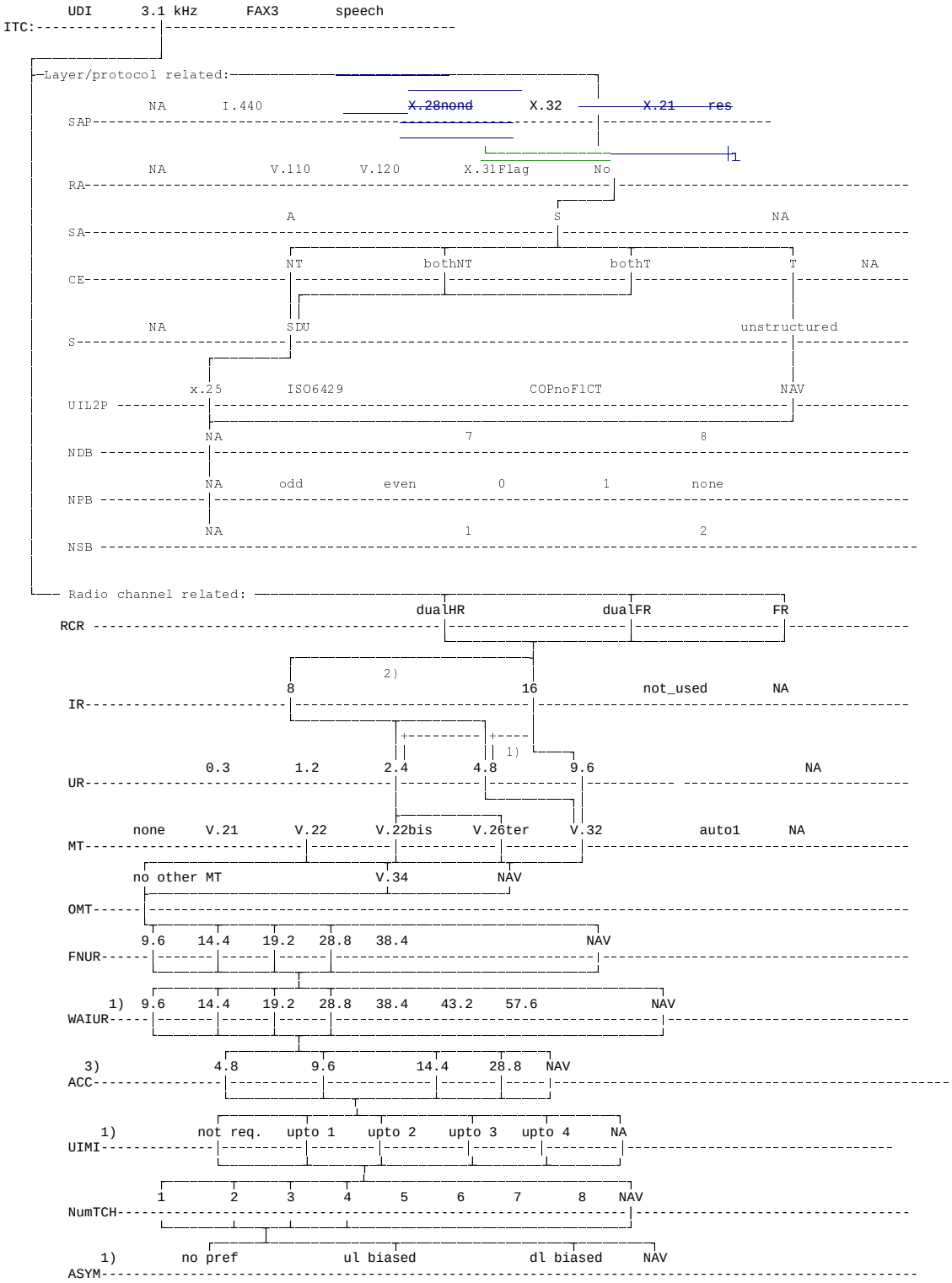
B.1.3.2 3.1 kHz audio ex-PLMN information transfer capability

B.1.3.2.1 Non-X.32 Cases



1) ACC may have several values simultaneously (bit map coding).

B.1.3.2.2 X.32 Case (Packet Service)

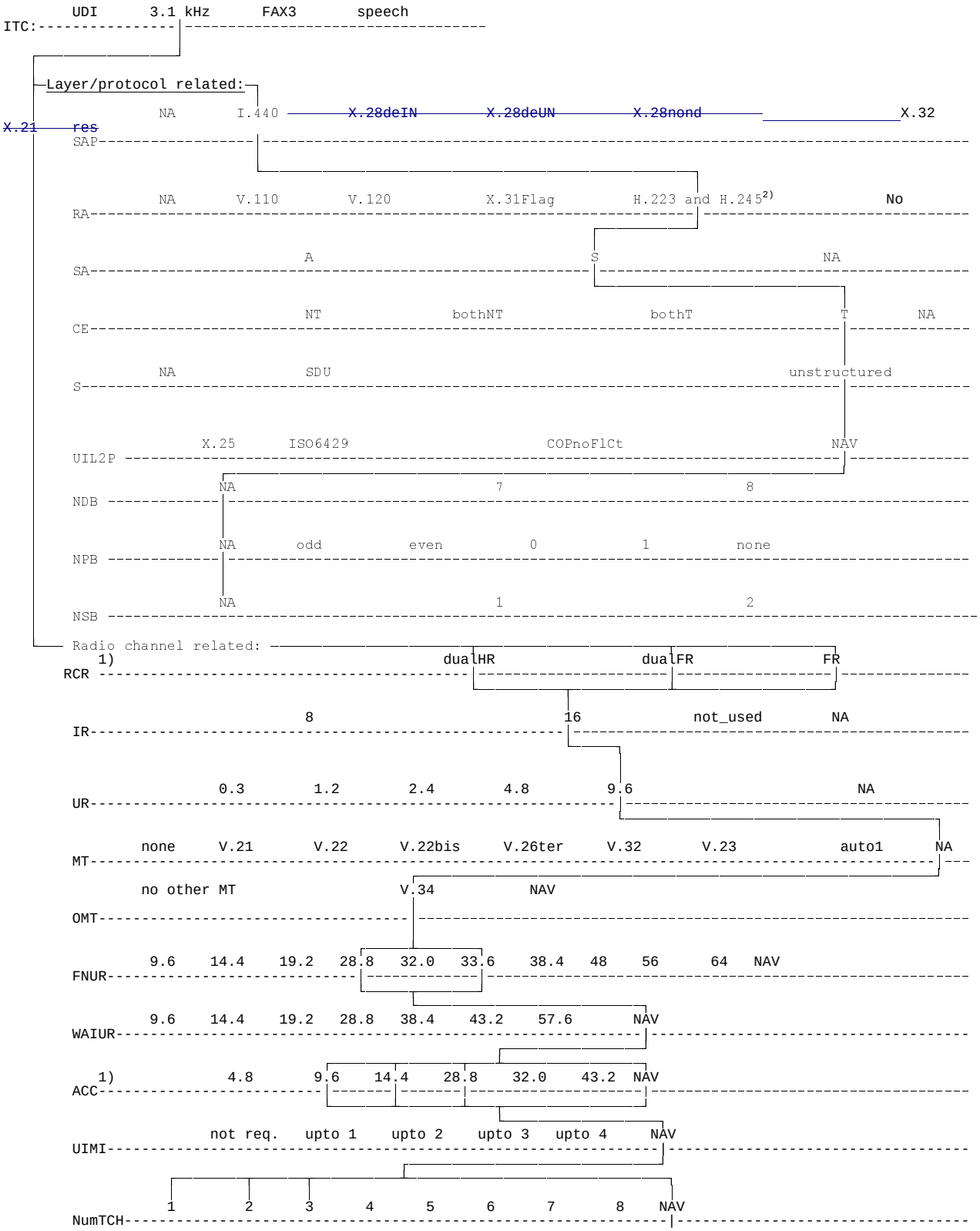


1) for CE:NT or "both".

2) for CE:T or CE:NT and NIRR:6kb/s (not for the SETUP message).

3) ACC may have several values simultaneously (bit map coding).

B.1.3.2.3 3G-H.324/M Case



1) ACC may have several values simultaneously (bit map coding).

2) This value is interpreted as "No rate adaptation" in GSM.

B.1.4 Bearer Service 40 ... 46, PAD Access Asynchronous~~Void~~

void

B.1.5 Bearer Service 50 ... 53 ,Data Packet Duplex Synchronous, Unrestricted digital information transfer capability~~Void~~

void

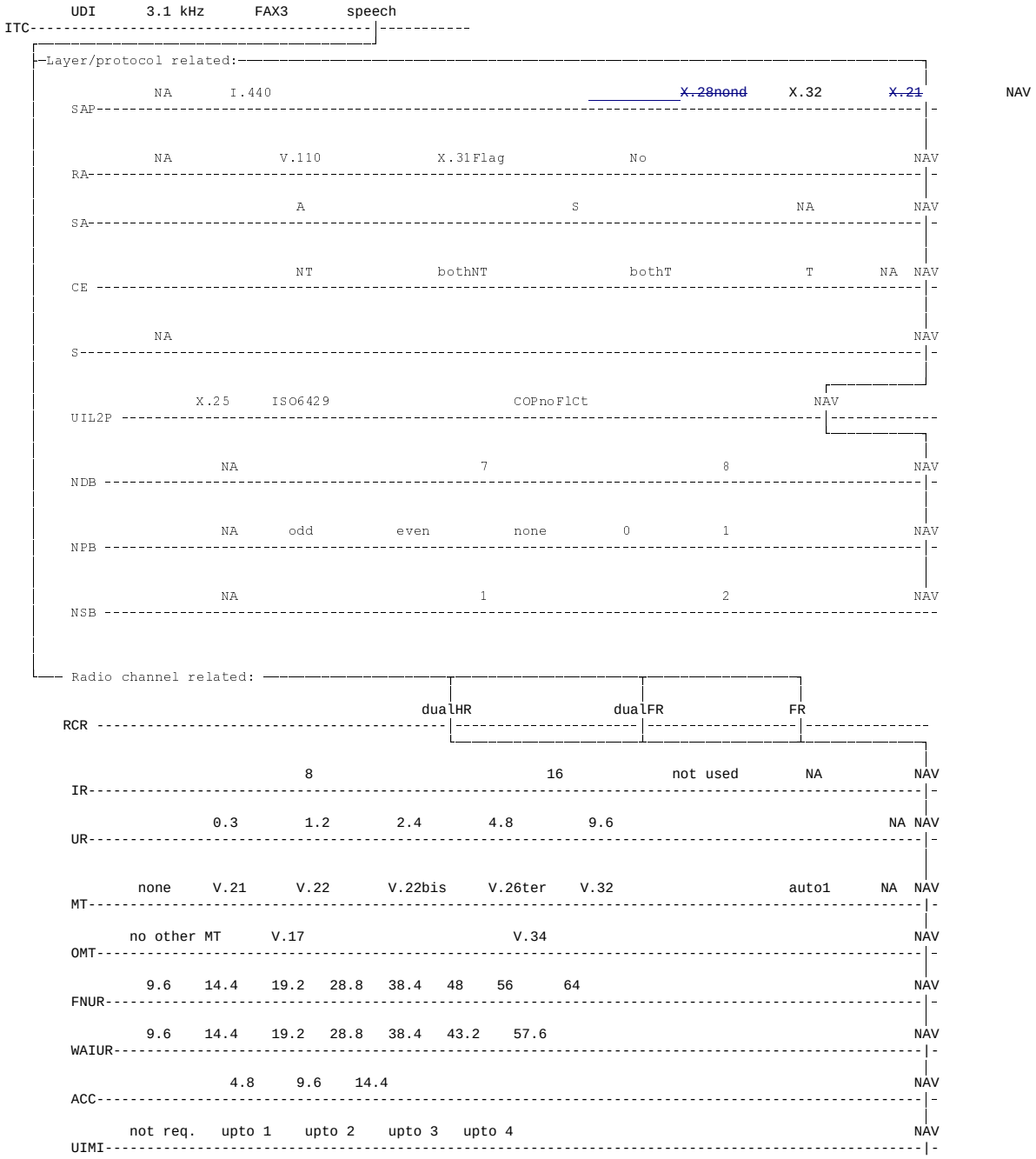
B.1.6 Bearer Service 61, Alternate Speech/Data~~Void~~

void

B.1.7 Bearer Service 81, Speech followed by Data~~Void~~

void

B.1.8 Teleservice 11 ... 12, Speech



```
                                                                                |
              1          2        3        4        5        6        7         8                                             NAV
NumTCH----------------------------------------------------------------------------------------------------------------------------
```

B.1.9 Teleservice 21 ... 23, Short Message

Not applicable.

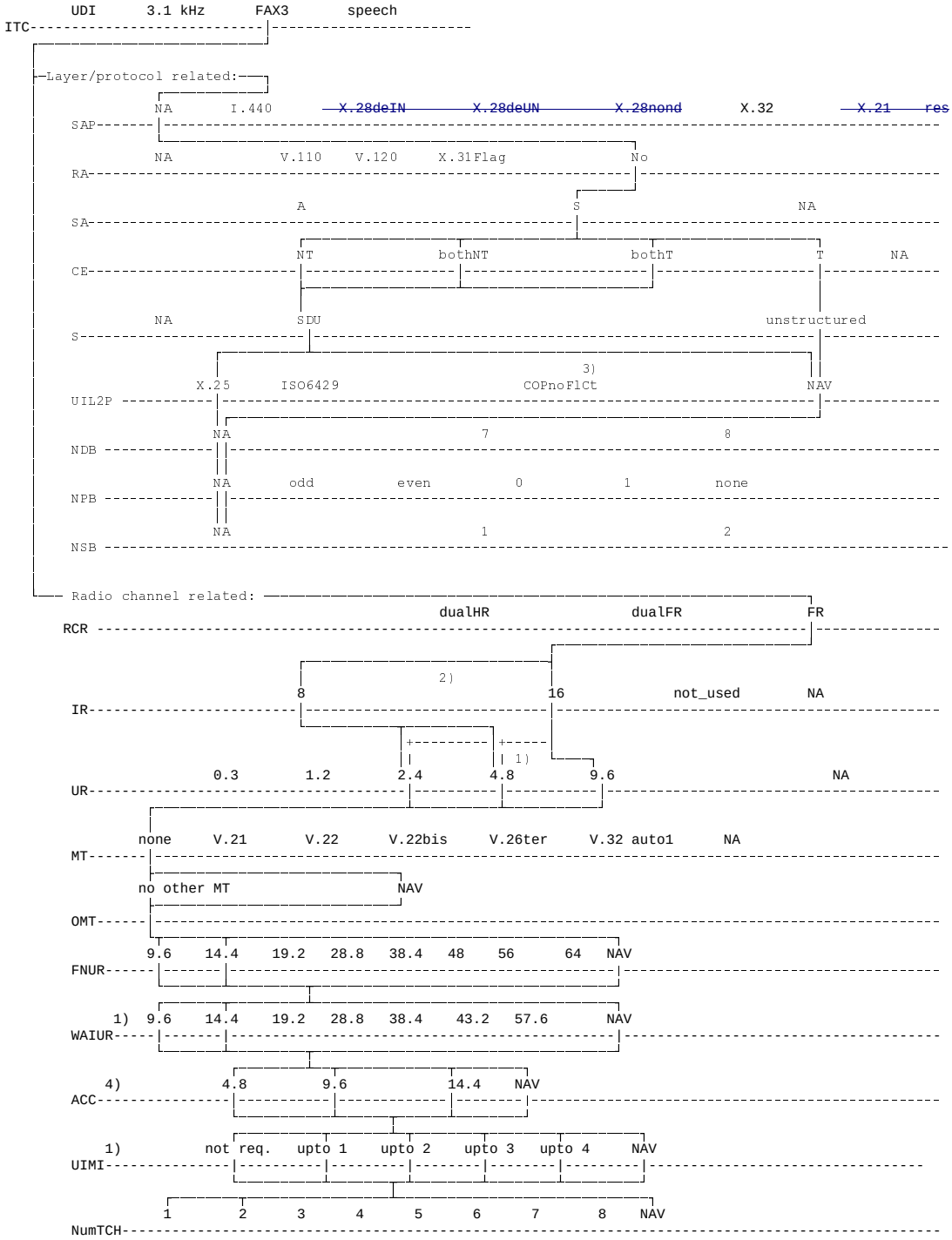
B.1.10 Teleservice 61, Alternate Speech and Facsimile group 3

The information element of the "repeat indicator" is set to the value "circular for successive selection (alternate)".

B.1.10.1 Teleservice 61, Speech

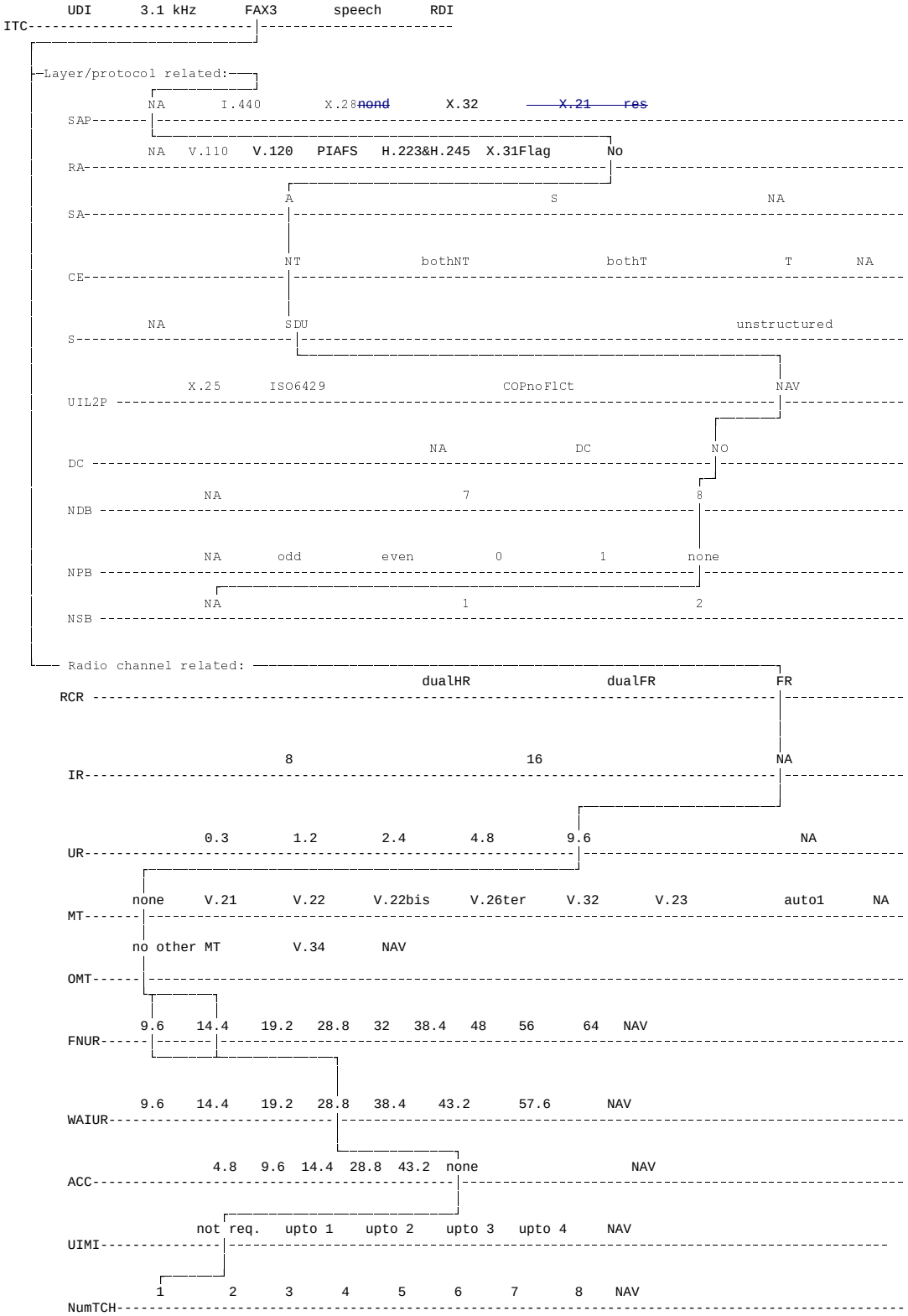
Ref. subclause B.1.8.

B.1.10.2 Teleservice 61, Facsimile group 3 in GSM



1) for CE:NT or "both";
2) for CE:T only;
3) for MT CALL in the SETUP message only;
4) ACC may have several values simultaneously (bit map coding).

B.1.10.3 Teleservice 61, Facsimile group 3 in UMTS



B.1.11 Teleservice 62, Automatic Facsimile group 3

Ref. subclause B.1.10, the information element "repeat indicator" is not available/valid.

B.1.12 Valid combinations of FNUR, WAIUR, ACC, mTCH

B.1.12.1 Transparent Services

The MS is allowed to signal any combination of FNUR, ACC and mTCH compliant to the following table. The network is allowed to assign any Channel Mode compliant to the following table.

FNUR	mTCH (Note 7)	ACC (Note 1,6)					Channel Mode (Note 4,5)				
		TCH/F4.8	TCH/F9.6	TCH/F14.4	TCH/F28.8	TCH/F32.0	TCH/F4.8	TCH/F9.6	TCH/F14.4	TCH/F28.8	TCH/F32.0
9.6 kbit/s	1	*	+	*	*	*	-	1	-	-	-
	2	+	*	*	*	*	2	1	-	-	-
14.4 kbit/s	1	*	*	+	*	*	-	-	1	-	-
	2	*	+	*	*	*	-	2 (N2)	1	-	-
	3	+	*	*	*	*	3	2 (N2)	1	-	-
19.2 kbit/s	2	*	+	*	*	*	-	2	-	-	-
	4	+	*	*	*	*	4	2	-	-	-
28.8 kbit/s	1	*	*	*	+	*	-	-	-	1	-
	2	*	*	+	*	*	-	-	2	1	-
	3	*	+	*	*	*	-	3	2	1	-
38.4 kbit/s	3	*	*	+	*	*	-	-	3 (N2)	-	-
	4	*	+	*	*	*	-	4	3 (N2)	-	-
48.0 kbit/s	4	*	*	+	*	*	-	-	4 (N2)	-	-
	5	*	+	*	*	*	-	5	4 (N2)	-	-
56.0 kbit/s	2	*	*	*	*	+	-	-	-	-	2(N8)
	4	*	*	+	*	*	-	-	4 (N2)	-	2(N8)
	5	*	+	*	*	*	-	5 (N3)	4 (N2)	-	2(N8)
64.0 kbit/s	2	*	*	*	*	+	-	-	-	-	2(N8)
	5	*	*	+	*	*	-	-	5 (N2)	-	2(N8)
	6	*	+	*	*	*	-	6 (N2,3)	5 (N2)	-	2(N8)

NB: N in the table stands for NOTE.

NOTE 1: A '+' indicates that a certain channel coding must be included in the ACC and a '*' indicates that it may or may not be included.

NOTE 2: Padding Required, ref GSM 04.21.

NOTE 3: Air interface user rate 11.2 kbit/s, ref. GSM 04.21.

NOTE 4: A '-' indicates that this channel coding cannot be assigned for this FNUR.

NOTE 5: A certain channel coding may only be assigned if indicated as acceptable in the ACC.

NOTE 6: In case the MS signals an ACC containing TCH/F4.8 only and the network does not support TCH/F4.8 channel coding, then the network may act as if TCH/F9.6 were included in the ACC.

NOTE 7: The MS is allowed to signal higher values for mTCH than indicated in the table for the signalled FNUR and ACC. Before initiating the assignment procedure, the MSC, if necessary, will lower the value of the mTCH to the highest value applicable for the signalled FNUR and ACC.

NOTE 8: Can only be used for bit transparent 56 (RDI) and 64 (UDI) kbit/s connections in 56 kbit/s and 64 kbit/s environments, respectively.

The final decision about the radio interface configuration is taken by the BSS during the Assignment procedure subject to the restrictions that the number of assigned TCH/F may not exceed the mTCH, that the channel coding is among the ACC and that the AIUR equals the FNUR.

The radio interface configuration may be changed by the BSS during the call as long as the channel coding used is among the ACC, the mTCH is not exceeded and the AIUR is kept constant (ref. 3G TS 22.034).

B.1.12.2 Non-transparent services

The MS is allowed to signal any combination of WAIUR, ACC and mTCH compliant to the following table. The network is allowed to assign any Channel Mode compliant to the following table.

WAIUR	mTCH (Note 5)	ACC (Note 1,4)					Channel Mode (Note 2,3,6)				
		TCH/F4.8	TCH/F9.6	TCH/F14.4	TCH/F28.8	TCH/F43.2	TCH/F4.8	TCH/F9.6	TCH/F14.4	TCH/F28.8	TCH/F43.2
9.6 kbit/s	1	*	+	*	*	*	1	1	-	-	-
	2	+	*	*	*	*	1 - 2	1	-	-	-
14.4 kbit/s	1	*	*	+	*	*	1	1	1	-	-
	3	+	*	*	*	*	1 - 3	1 - 2	1	-	-
19.2 kbit/s	2	*	+	*	*	*	1 - 2	1 - 2	1	1	-
	4	+	*	*	*	*	1 - 4	1 - 2	1	1	-
28.8 kbit/s	1	*	*	*	+	*	1	1	1	1	-
	2	*	*	+	*	*	1 - 2	1 - 2	1 - 2	1	-
	3	*	+	*	*	*	1 - 3	1 - 3	1 - 2	1	-
38.4 kbit/s	4	*	+	*	*	*	1 - 4	1 - 4	1 - 3	1 – 2	1
43.2 kbit/s	1	*	*	*	*	+	1	1	1	1	1
	3	*	*	+	*	*	1 - 3	1 - 3	1 - 3	1 – 2	1
57.6 kbit/s	2	*	*	*	+	*	1 - 2	1 - 2	1 - 2	1 – 2	1
	4	*	*	+	*	*	1 - 4	1 - 4	1 - 4	1 – 2	1

NOTE 1: A '+' indicates that a certain channel coding must be included in the ACC and a '*' indicates that it may or may not be included.
NOTE 2: A '-' indicates that this channel coding cannot be used for this WAIUR.
NOTE 3: A certain channel coding may only be assigned if indicated as acceptable in the ACC.
NOTE 4: In case the MS signals an ACC containing TCH/F4.8 only and the network does not support TCH/F4.8 channel coding, then the network may act as if TCH/F9.6 were included in the ACC.
NOTE 5: The MS is allowed to signal higher values for mTCH than indicated in the table for the signalled WAIUR and ACC. Before initiating the assignment procedure, the MSC, if necessary, will lower the value of the mTCH to the highest value applicable for the signalled WAIUR and ACC.
NOTE 6: Unless an EDGE channel is assigned in one direction at least, the same channel coding is assigned in both directions, and an equal or lesser number of channels is assigned in the up link direction than in the down link direction. If an EDGE channel is assigned in one direction, TCH/F14.4 or an EDGE channel is assigned in the other direction. If the user has indicated up or down link biased asymmetry preference, TCH/F14.4 is assigned in the unbiased direction. The number of channels assigned is the same in each direction unless restricted by the mobile classmark, and is always within the limits given in the corresponding column.

The final decision about the radio interface configuration is taken by the BSS during the Assignment procedure. The BSS may assign any number of TCH/F ranging from 1 to mTCH and use any of the channel codings among the ACC. The BSS shall try to reach the WAIUR if the resource situation allows it. The maximum possible AIUR shall not exceed the WAIUR unless the higher AIUR can be reached with a smaller number of TCH/F (ref. 3G TS 22.034).

The radio interface configuration may be changed by the BSS during the call as long as the channel coding used is among the ACC and the mTCH is not exceeded.

B.1.13 Assignment of radio access bearer parameters depending on FNUR and WAIUR

B.1.13.1 Transparent Services

Depending on the FNUR negotiated between the network and the MS, the network is allowed to assign any radio resources with a radio access bearer parameter indicating a Quality of Service specifying

QoS Parameter	Value	Comments
Traffic Class	Conversational	Subject to operator tuning
RAB Asymmetry Indicator	Symmetric	
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
Delivery Order	Yes	
Maximum SDU size	640 .. 288 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

The final decision about the radio interface configuration is taken by the RNC during the Assignment procedure.

B.1.13.2 Non-transparent services

Depending on the WAIUR signalled by the MS, the network is allowed to assign any radio resources with a radio access bearer parameter indicating a Quality of Service specifying

QoS Parameter	Value	Comments
Traffic Class	Streaming	Subject to operator tuning
RAB Asymmetry Indicator	Symmetric	
Maximum bit rate	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: In case the WAIUR is less than 14.4 kbit/s, the maximum bit rate is set to 14.4 kbit/s.

The final decision about the radio interface configuration is taken by the RNC during the Assignment procedure.

B.2 Low Layer/High Layer Compatibility Information Element

B.2.1 Introduction

B.2.1.1 General Consideration

The purpose of the Low Layer/High Layer Compatibility Information Element (LLC/HLC-IE) is to provide a means for additional end-to-end compatibility checking by an addressed entity (e.g. a remote user, an interworking unit or a high layer function network node). The LLC/HLC-IE may be manipulated by the PLMN to maintain consistency with the setup parameter negotiation between the mobile station and the network (ref. to 3G TS 29.007). The LLC/HLC-IE is transferred transparently by the ISDN between the call originating PLMN and the addressed entity.

With respect to the individual parameter settings at the MS the following cases may be distinguished (ref. 3G TS 27.002 and 3G TS 27.003):

- Mobile-originated call set up by a MS consisting of a MT with R interface:
  - The setting results from respective MMI actions and/or MT internal settings.
- Mobile-originated call set up by a MS consisting of a MT with S interface:
  - The LLC/HLC-IEs which are contained in the ISDN SETUP message received from the terminal are passed unchanged to the MSC.
- Mobile-terminated call set up to a MS consisting of a MT with R interface:
  - The LLC/HLC related part of the compatibility check is carried out according to the knowledge of the MT concerning its implemented functions (i.e. answering the call). The offered field values determine the selection of the terminal function for the intended connection.
- Mobile-terminated call set up to a MS consisting of a MT with S interface:
  - The LLC/HLC received from the MSC is passed to the terminal by the MT. The LLC/HLC related part of the compatibility check is up to the terminal connected to the S interface of the MT, as is the selection of the terminal function (i.e. answering the call).

Where applicable, the same settings and rules concerning LLC and/or HLC apply as for ISDN use (ref. ITU-T Recommendation Q.931 and ETR 018). However, considering that PLMN data transmission is based on ITU-T V.110 rate adaptation, the MS shall provide the LLC-IE for mobile-originated calls when using unrestricted or restricted digital information transfer capability. This is to assure the conveyance of the e.g. "V.110" indication towards the called entity, as the comparable indication in the ISDN BC-IE may be lost. It shall also be possible to choose whether or not the LLC-IE is provided for the case of an information transfer capability "3.1 kHz audio ex PLMN".

There shall be no contradiction of the information between the BC-IE and LLC-IE at the originating side. However, as some parts of the bearer capability may be modified during the transport of the call, there should be minimum duplication of this information between the BC-IE and the LLC-IE.

If as a result of duplication, a contradiction occurs between the BC-IE and the LLC-IE at the terminating side, the receiving entity shall ignore the conflicting information in the LLC-IE.

B.2.1.2 Interpretation of the Tables

The individual contents of the LLC/HLC-IE are represented in the following tables. The indication of the applicable service group defines the link between the PLMN BC-IE and its associated LLC/HLC-IEs.

If the appropriate message includes multiple BC-IEs and if LLC and/or HLC information is available, multiple LLCs and HLCs shall be included in the message. The LLC/HLC associated with the BC-IE indicating speech shall be marked as "not applicable" (3G TS 24.008).

Legend: { xxxx | yyyy } choice of values
---- not relevant for this service (set to appropriate value)
[zzzz] optional

B.2.2 LLC Bearer Service 20

B.2.2.1 Unrestricted / restricted digital information transfer capability

Low layer compatibility information element:

Octet	Information element field	field value
3	Coding standard Information transfer capability	ITU-T { unrestricted digital | restricted digital }
4	Transfer mode Information transfer rate	circuit mode 64 kbit/s
5	User information layer 1 protocol	{ V.110/X.30 | V.120 }
5a	Synchronous / asynchronous Negotiation User rate	asynchronous in-band not possible { 0.3 | 1.2 | 2.4 | 4.8 | 9.6 | 14.4 | 19.2 | 28.8 | 38.4 | 48 | 56 } kbit/s
5b 2)	Intermediate rate NIC on Tx NIC on Rx Flow control on Tx Flow control on Rx	{ 8 | 16 } kbit/s ----- ----- { not required 1)| required } { not accepted 1)| accepted }
5b 3)	Rate adaption header / no header Multiple frame establishment support Mode of operation Assignor / assignee In-band / out-band negotiation	Rate adaption header included Multiple frame establishment supported Protocol sensitive mode of operation ----- -----
5c	Number of stop bits Number of data bits Parity	{ 1 | 2 } bits { 7 | 8 } bits { odd | even | none | forced to 0 | forced to 1 }
5d	Duplex mode Modem type	á[duplex] -----

1) only these values are applicable to Mobile Originated Calls.
2) octet 5b for V.110/X.30.
3) octet 5b for V.120.

B.2.2.2 3.1 kHz audio ex-PLMN information transfer capability

Low layer compatibility information element:

Octet	Information element field	field value
3	Coding standard Information transfer capability	ITU-T 3.1kHz audio
4	Transfer mode Information transfer rate	circuit mode 64 kbit/s
5	User information layer 1 protocol	{G.711 A-law | G.711 u-law (PCS-1900)}
5a	Synchronous / asynchronous Negotiation User rate	(may be set depending on user's requirement)
5b	Intermediate rate NIC on Tx NIC on Rx Flow control on Tx Flow control on Rx	not relevant but cannot be omitted in order to have octet 5d
5c	Number of stop bits Number of data bits Parity	(may be set depending on the user's requirement)
5d	Duplex mode Modem type	[duplex] [{V.21|V.22|V.22bis| V.26ter|V.32|V.34}]

NOTE: If octet 5d is not specified, the whole LLC is not required.

B.2.3 LLC Bearer Service 30

B.2.3.1 Unrestricted / restricted digital information transfer capability

Low layer compatibility information element:

Octet	Information element field	field value
3	Coding standard Information transfer capability	ITU-T { digital unrestricted | restricted digital }
4	Transfer mode Information transfer rate	circuit mode 64 kbit/s
5	User information layer 1 protocol	{ V.110/X.30 | X.31 flag stuffing | V.120 | H.223 and H.245 }
5a	Synchronous / asynchronous Negotiation User rate	synchronous in-band not possible { 0.3 | 1.2 | 2.4 | 4.8 | 9.6 | 1.2/0.075 | 14.4 | 19.2 | 28.8 | 32.0 | 38.4 | 48 | 56 } kbit/s
5b 2)	Intermediate rate NIC on Tx NIC on Rx Flow control on Tx Flow control on Rx	{ 8 | 16 } kbit/s { not required | required } { not accepted | accepted } ----- -----
5b 3)	Rate adaption header / no header Multiple frame establishment support Mode of operation Assignor / assignee In-band / out-band negotiation	Rate adaption header included Multiple frame establishment supported Protocol sensitive mode of operation ----- -----
5c 1)	Number of stop bits Number of data bits Parity	not relevant but cannot be omitted in order to have octet 5d
5d 1)	Duplex mode Modem type	[duplex] -----
6	User information layer 2 protocol	[X.25]
7	User information layer 3 protocol	[X.25]

1) If octet 5d is not specified, octet 5c may be omitted.
2) octet 5b for V.110/X.30.
3) octet 5b for V.120.

B.2.3.2 3.1kHz audio ex-PLMN information transfer capability

Low layer compatibility information element:

Octet	Information element field	field value
3	Coding standard Information transfer capability	ITU-T 3.1kHz audio
4	Transfer mode Information transfer rate	circuit mode 64 kbit/s
5	User information layer 1 protocol	{G.711 A-law | G.711 u-law {PCS-1900)}
5a	Synchronous / asynchronous Negotiation User rate	(may be set depending on the user's requirement)
5b	Intermediate rate NIC on Tx NIC on Rx Flow control on Tx Flow control on Rx	not relevant but cannot be omitted in order to have octet 5d
5c	Number of stop bits Number of data bits Parity	(may be set depending on the user's requirement)
5d	Duplex mode Modem type	[duplex] [{ V.22 | V.22bis | V.26ter | V.32 | V.34 }]
6	User information layer 2 protocol	[X.25]
7	User information layer 3 protocol	[X.25]

NOTE: If octet 5d is not specified, octets 5a..5d may be omitted.

B.2.4 LLC Bearer Services 41 ... 46~~Void~~

void

B.2.5 LLC Bearer Services 51 ... 53~~Void~~

void

B.2.6 LLC Bearer Service 61~~Void~~

void

B.2.7 LLC Bearer Service 81~~Void~~

void

B.2.8 HLC Teleservices 11 ... 12

High layer compatibility information element:

Octet	Information element field	Field value
3	Coding standard Interpretation Presentation method of protocol profile	ITU-T first high layer characteristic identification to be used in the call high layer protocol profile
4	High layer characteristics identific.	Telephony

B.2.9 HLC Teleservices 21 ... 23

Not applicable.

B.2.10 HLC Teleservice 61

High layer compatibility information element:

Octet	Information element field	Field value
3	Coding standard Interpretation Presentation method of protocol profile	ITU-T first high layer characteristic identification to be used in the call high layer protocol profile
4	High layer characteristics identific.	Facsimile G2/G3

B.2.11 HLC Teleservice 62

High layer compatibility information element:

Octet	Information element field	Field value
3	Coding standard Interpretation Presentation method of protocol profile	ITU-T first high layer characteristic identification to be used in the call high layer protocol profile
4	High layer characteristics identific.	Facsimile G2/G3

Annex C (informative): Change history

Change history						
TSG CN#	**Spec**	**Version**	**CR**	**<Phase>**	**New Version**	**Subject/Comment**
Apr 1999	GSM 07.01	7.1.0				Transferred to 3GPP CN1
CN#03	27.001				3.0.0	Approved at CN#03
CN#04	27.001	3.0.0	001	R99	3.1.0	Introduction of EDGE channel codings into the specifications
CN#05	27.001	3.1.0	002	R99	3.2.0	Asymmetry in EDGE
CN#05	27.001	3.1.0	003	R99	3.2.0	EDGE related correction
CN#06	27.001	3.2.0	004	R99	3.3.0	Introduction of FTM
CN#06	27.001	3.2.0	005	R99	3.3.0	Introduction of UMTS
CN#06	27.001	3.2.0	006	R99	3.3.0	Introduction of PIAFS and enhancement of processing at mobile terminated call
CN#06	27.001	3.2.0	007	R99	3.3.0	Introduction of multi media
CN#06	27.001	3.2.0	008	R99	3.3.0	Service clean-up for Release 99
CN#06	27.001	3.2.0	009	R99	3.3.0	BC-IE setting for Real-time non-transparent FAX
CN#07	27.001	3.3.0	010	R99	3.4.0	FALLBACK TO SPEECH IN A CS MULTIMEDIA CALL SETUP
CN#07	27.001	3.3.0	011	R99	3.4.0	Bit transparent services RDI and UDI
CN#07	27.001	3.3.0	012	R99	3.4.0	FTM corrections
CN#07	27.001	3.3.0	013	R99	3.4.0	Alignment to RANAP and other clarifications
CN#07	27.001	3.3.0	014	R99	3.4.0	Corrections related to MULTIMEDIA

3GPP TSG-N3 #10
Oahu, Hawaii 22nd-26th May 2000

N3-000265

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

27.002	CR	004	Current Version:	3.3.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	TSG-N#8	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [X] UTRAN / Radio [ ] Core Network [ ]

Source: TSG_N3 **Date:** 2000-05-23

Subject: Adaptations for UMTS

Work item: TEI

Category: *(only one category shall be marked with an X)*

F	Correction	
A	Corresponds to a correction in an earlier release	
B	Addition of feature	
C	Functional modification of feature	X
D	Editorial modification	

Release:

Phase 2	
Release 96	
Release 97	
Release 98	
Release 99	X
Release 00	

Reason for change: This specification has been transferred from SMG to 3GPP. Therefore, adaptations for UMTS are required.

Clauses affected:

Other specs affected:

Other 3G core specifications		→ List of CRs:
Other GSM core specifications		→ List of CRs:
MS test specifications		→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

Other comments:

help.doc

<--------- double-click here for help and instructions on how to create a CR.

3G TS 27.002 V3.3.0 (2000-03)

Technical Specification

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Postal address

3GPP support office address
650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet
http://www.3gpp.org

Contents

Foreword

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

The present document defines the interfaces and Terminal Adaptation Functions (TAF) integral to a Mobile Termination (MT) which enables the attachment of asynchronous terminals to a MT within the 3GPP system.

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:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater 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 document.

1 Scope

The present document defines the interfaces and Terminal Adaptation Functions (TAF) integral to a Mobile Termination (MT) which enables the attachment of asynchronous terminals to a MT (see GSM 04.02 [3] and 3G TS 23.101 [6]).

The general aspects of Terminal Adaptation Functions are contained in 3G TS 27.001 [10].

The present document covers support of these services for the following interfaces and procedures:

(i) ITU-T V.14 [16] procedures.
(ii) ITU-T V.21 [17] DTE/DCE interface.
(iii) ITU-T V.22bis [18] DTE/DCE interface.
(iv) ITU-T V.32 [24] DTE/DCE procedures.
(v) ITU-T I.420 [14] S interface.
(vi) ITU-T V.25 bis [21] signalling procedures.
(vii) ITU-T V.250 ~~ter~~ [22] signalling procedures.

The asynchronous data rates between the MT and the TE2 are defined in 3G TS 22.002 [5].

NOTE: From GSM R99 onwards the following services are no longer ~~more~~ required ~~to be provided~~ by a GSM PLMN:

the dual Bearer Services “alternate speech/data” and “speech followed by data”;

the dedicated services for PAD and Packet access;

the BS 21 ... 26 and BS 31 ... 34.

The support of these services is still optional. The specification of these services is not within the scope of the present document. For that, the reader is referred to GSM Release 98.

1.1 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 01.04: "Digital cellular telecommunication system (Phase 2+); Abbreviations and acronyms".

[2] GSM 03.10: "Digital cellular telecommunication system (Phase 2+); GSM Public Land Mobile Network (PLMN) connection types".

[3] GSM 04.02: "Digital cellular telecommunication system (Phase 2+); GSM Public Land Mobile Network (PLMN) access reference configuration".

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

[5] 3G TS 22.002: "Circuit Bearer Services (BS) supported by a Public Land Mobile Network (PLMN)".

[6] 3G TS 23.101: "General UMTS Architecture".

[7] 3G TR 23.910: "Circuit Switched Data Bearer Services".

[8] 3G TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols-Stage 3".

[9] 3G TS 24.022: "Radio Link Protocol (RLP) for Circuit Switched Bearer and Teleservices".

[10] 3G TS 27.001: "General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".

[11] 3G TS 27.007: "AT command set for 3G User Equipment (UE)".

[12] 3G TR 21.905: "3G Vocabulary".

[13] 3G TS 29.007: "General requirements on Interworking between the PLMN and the ISDN or PSTN".

[14] ITU-T Recommendation I.420 (1998):"Basic user-network interface".

[15] ITU-T Recommendation V.4 (1988): "General structure of signals of international alphabet No.5 code for character oriented data transmission over public telephone networks".

[16] ITU-T Recommendation V.14 (1993): "Transmission of start-stop characters over synchronous bearer channels".

[17] ITU-T Recommendation V.21 (1988): "300 bits per second duplex modem standardized for use in the general switched telephone network".

[18] ITU-T Recommendation V.22bis (1988): "2400 bits per second duplex modem using the frequency division technique standardized for use on the general switched telephone network and on point-to-point 2-wire leased telephone-type circuits".

[19] ITU-T Recommendation V.24 (1996): "List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE)".

[20] ITU-T Recommendation V.25 (1996): "Automatic answering equipment and general procedures for automatic calling equipment on the general switched telephone network including procedures for disabling of echo control devices for both manually and automatically established calls".

[21] ITU-T Recommendation V.25 bis (1996): "Synchronous and asynchronous automatic dialling procedures on switched networks".

[22] ITU-T Recommendation V.250 ~~ter~~: "Serial asynchronous automatic dialling and control".

[23] ITU-T Recommendation V.28 (1993): "Electrical characteristics for unbalanced double-current interchange circuits".

[24] ITU-T Recommendation V.32 (1993): "A family of 2-wire, duplex modems operating at data signalling rates of up to 9600 bit/s for use in the general switched telephone network and on leased telephone-type circuits".

[25] ITU-T Recommendation V.42 (1996): "Error-correcting procedures for DCEs using asynchronous-to-synchronous conversion".

[26] ITU-T Recommendation V.42 bis (1990): "Data compression procedures for data circuit-terminating equipment (DCE) using error correction procedures".

[27] ITU-T Recommendation V.110 (1996): "Support of data terminal equipments with V-Series interfaces by an integrated services digital network".

[28] ITU-T Recommendation X.28 (1997): "DTE/DCE interface for a start-stop mode Data Terminal Equipment accessing the Packet Assembly/Disassembly facility (PAD) in a public data network situated in the same country".

[29] Personal Computer Memory Card Association: "PCMCIA 2.1 or PC-Card 3.0 electrical specification or later revisions".

[30] Infrared Data Association IrDA "IrPHY Physical layer signalling standard".

[31] ISO 2110: "Data communication - 25-pole DTE/DCE interface connector and contact number assignments".

[32] ITU-T Recommendation Q.931: "ISDN user-network interface layer 3 specification for basic call control".

1.2 Abbreviations

In addition to the abbreviations used in the present document that are listed in either GSM 01.04 [1] or TR 21.905 [12] the following internal abbreviations are used:

ITU	International Telecommunications Union
CFI	Call Failure Indication
CRN	Call Request with Number
DIC	Disregard Incoming Call
IA5	International Alphabet no. 5
INC	INcoming Call
INV	INValid
ITU-T	ITU-Telecommunication Standardization Sector
VAL	VALid
XID	Exchange IDentification (frame)

1.3 Definitions

The term ‘mobile station’ (MS) in the present document is synonymous with the term ‘user equipment’ (UE) in 3G terminology as defined in 3G TR 21.905.

The term ‘TE2’ in the present document is synonymous with the term ‘TE’ in 3G terminology as defined in 3G TR 21.905.

The term ‘MT2’ in the present document is synonymous with the term ‘MT’ in 3G terminology as defined in 3G TR 21.905.

2 Reference Configuration

3G TS 27.001 [10], 3G TS 23.101 [6] and GSM 04.02 [3] describe the basic reference configurations.

2.1 Customer Access Configuration

This configuration is as shown in figure 1 of GSM 04.02 [3]. The present document specifically refers to the Mobile Terminations (MTs) which support terminals of the type TE1 and TE2 with asynchronous capabilities. The TAF is functionally a part of an MT1, MT2 or MT0 with an integral asynchronous data capability.

2.2 ~~2.2~~ Terminal Adaptation Function (TAF)

Editor’s note: V.25bis is outdated. References to V.25 bis procedures need to be replaced by corresponding procedures based on V.250 and 3G TS 27.007.

The TAF provides facilities to allow manual or automatic call control functions associated with circuit switched services. The following functions are also included:

- Conversion of electrical, mechanical, functional and procedural characteristics of the ITU-T V series and ISDN type interfaces to those required by the PLMN.

- Bit rate adaptation of the ITU-T V series data signalling rates and the ISDN 64 kbit/s to that provided in the PLMN.
- The mapping functions necessary to convert automatic calling and/or automatic answering procedures of the ITU-T recommendations V.25 bis [21] or V.250 ~~ter~~ [22] and parameters for asynchronous operation.
- The mapping functions necessary to convert S interface signalling to the PLMN Dm channel signalling.
- Flow control (in some cases resulting in non-transparency of data as described in 4.3).
- Layer 2 Relaying (see annex A).
- In-call modification function.
- Synchronization procedure, which means the task of synchronizing the entry to and the exit from the data transfer phase between two user terminals. This is described in 3G TS 27.001 [10].
- Filtering of channel control information as described in 3G TS 27.001 [10].
- Terminal compatibility checking.
- Splitting and combining of the data flow in case of multiple substream data configurations.

3 Terminal Adaptation Functions for transparent services

GSM 03.10 [2] defines connection types for the support of transparent services in GSM whilst 3G TR 23.910 [7] defines connection types for transparent services in UMTS.

3.1 Rate Adaptation in GSM

GSM 04.21 [4] describes the rate adaptation scheme to be utilized over the Base Station (BS) to Mobile Station (MS) link. GSM 03.10 [2] refers to the rate adaptation elements to be provided in the MS.

3.1.1 Rate Adaptation - R interface

This is provided as indicated in GSM 04.21 [4].

3.1.2 Rate Adaptation - S Interface (ITU-T I.420 [14])

~~The ISDN rate adapted frame format is modified to the PLMN rate adapted format as indicated in GSM 04.21 [4].~~VOID.

3.2 Interchange Circuit Signalling Mapping – ITU-T V-series interface

The interchange circuit signalling at the interface between the TE2 and the MT shall conform to ITU-T Recommendation V.24 [19]. The signals required at this interface are shown in table 3.

The mapping of these signals to the pins of a 25 pin D-type connector is given in ISO 2110 [31]. The mapping for a commonly used 9 pin connector is given in Annex B.

3.2.1 Mapping of V.24 [19] circuits to status bits

Status bits SA, SB and X are used to convey channel control information associated with the data bits in the data transfer state. Table 1 shows the mapping scheme between the ITU-T V.24 [19] circuit numbers and the status bits for

the transparent mode. It also shows how the unused status bits should be handled. It is derived from the general mapping scheme described in annex C. A binary 0 corresponds to the ON condition, a binary 1 to the OFF condition.

The transport of these status bits by the various channel codings is described in subsequent sections.

Table 1: Mapping scheme at the MT for the transparent mode

Signal at TE2/MT interface or condition within the MT	Mapping direction: MT to IWF	Mapping direction: IWF to MT
CT 105	not mapped (note 1)	
CT 106		from status bit X (note 7)
CT 107		not mapped (note 5)
CT 108/2	not mapped (note 6)	
CT 109		from status bit SB (note 7)
CT 133	not mapped (note 2)	
always ON	To status bit SA (note 3)	
always ON	to status bit SB (note 1)	
always ON	To status bit X (note 4)	
ignored by MT		from status bit SA (note 3)

NOTE 1. The SB bit towards the IWF, according to the General Mapping (annex C), could be used to carry CT 105. However, CT 105 should always be ON in the data transfer state since only duplex operation is supported. Also, many DTEs use the connector pin assigned to CT 105 for CT 133. No interchange circuit shall be mapped to the SB bit, which shall always be set to ON in the data transfer state.

NOTE 2. CT 133 is not mapped since there is no flow control in transparent mode.

NOTE 3. The SA bits in both directions are available only with certain channel codings. Therefore, for maximum compatibility, they should not be mapped.

NOTE 4. The X bit towards the IWF is not mapped and shall always be set to ON in the data transfer state since there is no flow control in transparent mode.

NOTE 5. CT 107 is controlled by the channel synchronisation process (07.01).

NOTE 6. CT 108/2 may be used in the call setup and answering processes.

NOTE 7. The status bits are filtered before being mapped to the ITU-T V.24 [19] circuits (3G TS 27.001 [10]).

3.2.2 Single slot configurations (TCH/F9.6 or TCH/F4.8)

GSM 04.21 [4] refers to the frame structure and identifies the use of the status bits for the carriage of signalling information in transparent mode. The S bits are put into two groups. SA is carried by bits S1, S3, S6, S8 and SB by bits S4, S9 in the ITU-T V.110 [27] 80-bit intermediate rate frame.

3.2.3 Multislot configurations (TCH/F9.6 or TCH/F4.8)

In transparent multislot configurations, status bits S1, S3 and the X-bit between the D12 and D13 - in the ITU-T V.110 [27] 80-bit intermediate rate frame - are used for transferring substream numbering information. The S4-bit is used for frame synchronization between the parallel substreams (reference GSM 04.21 [4]). The remaining S bits are put into two groups. SA is carried by bits S6, S8 and SB by bit S9. The remaining X bits can be used as described in subclause 3.2.1.

3.2.4 Channel codings TCH/F14.4, TCH/F28.8

For information on the mapping of the interchange circuit signalling bits in the 14,5 kbit/s multiframe structure, refer to GSM 04.21 [4]. There is no SA bit in this channel coding. Only the SB and X bits are carried.

3.3 Interface Signal Levels - R interface

The signal levels at the interface between the TE2 and the MT shall conform to ITU-T V.28 [23], or to IrDA IrPHY physical signalling standard specification [30], or to PCMCIA 2.1 [29], or to PC-Card 3.0 [29] electrical specification or to later revisions.

3.4 Call Establishment and Clearing Signalling Mapping

3.4.1 V-series interface Autocalling/answering

Editor's note: V.25bis is outdated. References to V.25 bis procedures need to be replaced by corresponding procedures defined in V.250 and 3G TS 27.007.

The mapping of the ITU-T V.25 bis [21] procedures to the messages of the PLMN signalling in 3G TS 24.008 [8] is defined in Section 5.

a) Auto Calling:

This procedure is provided according to ITU-T V.25 bis [21] using only 108/2.

A subset of ITU-T V.25 bis [21] is shown in table 3. This subset gives minimum level of control and indication.

During the call establishment phase, i.e. after signalling, calling tone according to ITU-T V.25 [20] shall be generated in the IWF (3G TS 29.007 [13]).

An alternative to ITU-T V.25 bis [21] is to use the ITU-T V.250 ~~ter~~ [22] dial command as specified in 3G TS 27.007 [11].

b) Auto Answer:

This procedure is provided according to ITU-T V.25 bis [21] or to ITU-T V.250 ~~ter~~ [22].

During the call establishment phase:

- the states of the ITU-T V.24 [19] interchange circuits shall be according to 3G TS 27.001[10];
- the data and status bits from the IWF shall not be mapped;
- the data and status bits towards the IWF shall be according to 3G TS 27.001[10].

3.4.2 S Interface (I.420) Signalling Mapping ~~(applies to GSM only)~~

~~The mapping of ITU-T Recommendation Q.931 [32] signalling to 3G TS 24.008 [8] signalling requires the inclusion, by the MT, of PLMN specific elements (e.g. transparent or not, half/full rate channel). For asynchronous Bearer services, requests for bearer capabilities not listed in table 4 (or where the "Users information layer 1 protocol" element does not indicate ITU-T V.110 [27]) shall result in call rejection.~~VOID.

3.4.3 Call Establishment Manual Operation - Utilizing the Unrestricted Digital Capability

In this case the user shall not hear network supervisory tones or answer tone. The data transfer phase shall be entered automatically.

3.4.4 V-series interface Call Clearing

Editor's note: V.25bis is outdated. References to V.25 bis procedures need to be replaced by corresponding procedures defined in V.250 and 3G TS 27.007.

This procedure is provided according to ITU-T V.25 bis [21] using CT 108/2. An alternative to ITU-T V.25 bis [21] is to use the ITU-T V.250 ~~ter~~ [22] hook control command or the hangup commands specified in 3G TS 27.007 [11]. The mapping of the ITU-T V.25 bis [21] procedures to the messages of the PLMN signalling in 3G TS 24.008 [8] is defined in Section 5.

During the call clearing phase:

- the states of the ITU-T V.24 [19] interchange circuits shall be according to ITU-T V.24 [19];
- the data and status bits from the IWF shall not be mapped or used by the MT in any way;
- the data and status bits towards the IWF have no significance and may be set to 1 and OFF respectively.

4 Terminal Adaptation Functions for non-transparent services

GSM 03.10 [2] defines connection types for the support of non-transparent services in GSM whilst 3G TR 23.910 [7] defines connection types for non-transparent services in UMTS.

4.1 Data Structure

4.1.1 Data Structure on S Interface ~~(applies to GSM only)~~

~~The protocol models for this are described in GSM 03.10 [2]. The data structure shall be according to ITU-T Recommendation V.110 [27].~~VOID.

4.1.2 Data Structure on R Interface

The protocol models for this are described in GSM 03.10 [2]. The data consists of 7 or 8 bit characters with additional start and stop elements. The 7 bit data can additionally have an associated parity bit, 8 bit data cannot have an additional parity bit.

The interchange circuit signalling at the interface between the TE2 and the MT shall conform to ITU-T Recommendation V.24 [19]. The signals required at this interface are shown in table 3.

The interface shall provide inband (XON/XOFF) and out of band (CT106) flow control. The use of CT133 for out of band flow control shall be implemented according to ITU-T Recommendation V.42 [25].

4.1.3 Data Structure Provided by the L2R Function to the RLP Function

See annex A.

4.2 Signalling Mapping

4.2.1 Interchange Circuit Signalling Mapping – ITU-T V-series interface

Status bits SA, SB and X are used to convey channel control information associated with the data bits in the data transfer state. Table 2 shows the mapping scheme between the ITU-T Recommendation V.24 [19] circuit numbers and the status bits for the non-transparent mode. It also shows how the unused status bits should be handled. It is derived from the general mapping scheme described in annex C. A binary 0 corresponds to the ON condition, a binary 1 to the OFF condition.

The transport of the status bits by the L2RCOP is described in annex A.

Table 2: Mapping scheme at the MT for the non-transparent mode

Signal at TE2/MT interface or condition within the MT	Mapping direction: MT to IWF	Mapping direction: IWF to MT
CT 105	not mapped (note 1)	
CT 106 (note 4)		from status bit X (note 7)
CT 107		not mapped (note 5)
CT 108/2	not mapped (note 6)	
CT 109		from status bit SB
CT 133 (note 8)	to status bit X (notes 3,8)	
always ON	To status bit SA (note 2)	
always ON	to status bit SB (note 1)	
ignored by MT		from status bit SA (note 2)

NOTE 1. The SB bit towards the IWF, according to the General Mapping (annex C), could be used to carry CT 105. However, CT 105 should always be ON in the data transfer state since only duplex operation is supported. Also, many DTEs use the connector pin assigned to CT 105 for CT 133. No interchange circuit shall be mapped to the SB bit which shall always be set to ON in the data transfer state.

NOTE 2. The SA bits (both directions) are not mapped since CTs 107 and 108/2 are handled locally (notes 5, 6).

NOTE 3. The condition of status bit X towards the IWF may also be affected by the state of the receive buffer in the MT.

NOTE 4. The state of CT 106 (or other local flow control mechanism) may also be affected by the state of the transmit buffer in the MT and the state of the RLP (RR/RNR).

NOTE 5. CT 107 is controlled by the channel synchronisation process (3G TS 27.001 [10]).

NOTE 6. CT 108/2 may be used in the call setup and answering processes.

NOTE 7. For inband local flow control, changes in the condition of the status bit X from the IWF also result in the sending of XON or XOFF to the DTE.

NOTE 8. For inband local flow control, CT 133 is not mapped and the status bit X towards the IWF is controlled by the reception of XON and XOFF characters from the DTE.

4.2.2 Call Establishment and Clearing Signalling Mapping

This is identical to the transparent case with the exception of the transparent/non-transparent element, see 5.

In addition, the L2R/RLP shall give an explicit indication when the link into the connected network is established. If the link fails, an explicit "link lost" indication shall be given.

4.3 Flow Control

The passage of flow control information between L2Rs is described in annex A. 4.3.1, 4.3.2 and 4.3.3 describe the operation of the flow control mechanisms. These mechanisms apply for all the non-transparent services covered by this specification, with the exception of Character Orientated Protocol with No Flow Control which is treated in 4.3.4.

4.3.1 Conditions Requiring Flow Control towards the Network

The L2R function shall send immediately a "flow control active" indication in the following circumstances:

(i) If the receive buffer from the radio side reaches a preset threshold (BACKPRESSURE).

(ii) If local flow control is initiated by the TE2 (see 4.3.3 a) or c)). On receipt of this flow control indication transmission of data from the receive buffer towards the TE2 is halted.

On removal of the buffer congestion or local flow control the L2R shall send a "flow control inactive" indication.

In addition, for the local flow control condition, transmission of data from the receive buffers shall be restarted.

4.3.2 Conditions Requiring Flow Control towards TE2

The L2R functions shall immediately activate local flow control (see 4.3.3 b) or d)) under the following circumstances:

(i) The transmit buffer reaches a pre-set threshold (BACKPRESSURE).

(ii) The L2R receives a "flow control active" indication.

On removal of buffer congestion or receipt of L2R/RLP "flow control inactive" the local flow control shall be removed.

4.3.3 Local Flow Control

Two methods of local flow control are allowed:

Outband:

a) From TE2: CT133 shall be turned OFF to indicate flow control active, and ON to indicate flow control inactive.

b) From TAF: CT106 shall be turned OFF to indicate flow control active, and ON to indicate flow control inactive.

Inband:

c) From TE2: XOFF (DC3) is sent to indicate flow control active. XON (DC1) is sent to indicate flow control inactive. The XON/XOFF characters received from the TE2 are extracted by the L2R from the data stream and are not sent across the radio interface. Where XON/XOFF is utilized then the TAF shall generate flow control active/inactive immediately, i.e. the XON/XOFF characters do not enter the transmit buffer.

d) From TAF: As from TE2.

If the outband method is used, the L2R shall pass the DC1/DC3 characters as data, i.e. no flow control indications shall be generated on receipt of DC1/DC3.

4.3.4 Character Orientated Protocol with No Flow Control

If the users layer 2 indicates Character Orientated Protocol with no flow control then no flow control is used, i.e. the X-bit is not set to OFF and DC1/DC3 characters are passed through as data.

4.4 Buffers

4.4.1 TX Buffers

Data received on CT103 from the TE2 shall be buffered such that if the MT is unable to transfer the data over the radio path then data is not lost.

The buffer shall be capable of holding the data. Its size is up to the implementers.

When the buffer is half full, TE2 shall be flow controlled as per 4.3.2, unless Character Orientated Protocol with No Flow Control is being used (see 4.3.4).

4.4.2 RX Buffers

Data for transfer to the TE2 on CT104 shall be buffered such that if the TE2 is unable to accept data then data transferred from the MT is not lost.

The buffer size should be up to the implementers.

When the buffer becomes half full, the L2R shall send a "flow control active" indication, unless Character Orientated Protocol with No Flow Control is being used.

4.5 Bit Transparency

The ITU-T V.25 bis [21] indications generated by the TAF shall be even parity, even if the parity condition for the user's application is different.

4.6 Transportation of "BREAK" condition

The "BREAK" condition must be recognized by the L2R function and passed immediately to the IWF. The L2R shall generate a "BREAK" condition to the TE2 on receipt of a "BREAK" indication from the IWF.

Annex A describes how the L2R shall transport the "BREAK" indication.

4.7 Data Compression

L2R optionally includes a data compression function according to ITU-T V.42bis [26] that spans from the MS to the IWF in the MSC. The error correction function is provided by RLP instead of ITU-T Recommendation V.42 [25]. RLP XID is used to negotiate compression parameters. L2R includes the ITU-T V.42bis [26] control function especially for reinitializing in case of break recognition or RLP reset and error indication by the data compression function respectively.

Table 3: Minimum set of Interchange Circuits

Circuit Number	Circuit Name	Ground	Data		Control	
			To TE2	From TE2	To TE2	From TE2
CT102	Common return	X				
CT103	Trans-mitted data			x		
CT104	Received data return		x			
CT105	Request to send (Note 2)					x
CT106	Ready for sending				x	
CT107	Data set ready				x	
CT108/2	Data terminal ready					x
CT109	Data channel received line signal detector				x	
CT125	Calling indicator (Note 1)				x	
CT133	Ready for Receiving (Note 2)					x

NOTE 1: CT125 is used with the automatic answering function of the TAF.

NOTE 2: CT105 and CT133 are assigned to the same connector pin on both the standard 25 pin connector (ISO 2110) and the commonly used 9 pin connector (annex B). When this pin is used for CT133 then on the DCE (MT) side of the interface CT 105 is treated as being always in the ON condition. Similarly, when this pin is being used for CT105 then on the DCE (MT) side of the interface CT 133 is treated as being always in the ON condition. As circuit 133 is used only in duplex operation and circuit 105 is used only in half duplex operation (which is not supported by GSM or UMTS) there should be no conflict.

Table 4: Minimum Set of Call Set-up Commands and Indications

Editor's note: V.25bis is outdated. References to V.25 bis procedures need to be replaced by corresponding procedures defined in V.250 and 3G TS 27.007.

	Description	IA5 Characters
Commands From TE2	Call Request with Number provided 0,1..9,*,#,A,B,C,D	CRN
	Connect Incoming Call	CIC
	Disregard Incoming Call	DIC
Indications To TE2	Call Failure Indication XX = CB,AB,NT,FC (Note)	CFI XX
	INcoming Call	INC
	VALid	VAL
	INValid	INV

NOTE: CB = Local MT busy.
AB = Abort call.
NT = No answer.
FC = Forbidden call.*

* Forbidden call indication results from contravention of rules for repeat call attempts as defined by the appropriate national approvals administration. It is recommended that this is the responsibility of the MT, not the TE2.

5 Terminal interfacing to 3G TS 24.008 [8] Mapping

Editor's note: V.25bis is outdated. References to V.25 bis procedures need to be replaced by corresponding procedures based on V.250 and 3G TS 27.007.

Only those elements/messages that are of particular relevance are considered.

Interface procedures not directly mappable to 3G TS 24.008 [8] (i.e. ITU-T V.25 bis [21] VAL/INV) are not considered. Mobile management procedures of 3G TS 24.008 [8] are not considered applicable.

Mapping of other call establishment or clearing messages to the S interface e.g. "Call proceeding" etc. has not been included. It is assumed these can be mapped directly and as such are of no relevance to the ITU-T V.25 bis [21] or manual interfaces.

For the Alternate speech/group 3 facsimile service the TAF shall be able to generate a "Modify" message ~~for transmission on the Dm channel. This shall be~~ according to the defined procedure in 3G TS 24.008 [8].

5.1 Mobile Originated Calls

Call establishment is initiated by the keypad or DTE action:

a) Setup

Element	Derived from		
	MMI	ITU-T V.25 bis message [21]	S interface message
Called Address	Keypad	CRN/CRI/CRS	Setup
Called Sub Address	Keypad	CRI	Setup
HLC	Derived from internal settings or MMI infor- mation.		Setup
LLC	Same as HLC		Setup
BC	Same as HLC 3G TS 27.001 [10] gives allowed values		Setup (with addi- tional information from MMI originated settings)

b) Release Complete

Element	Derived from		
	MMI	ITU-T V.25 bis [21] message	S interface message
Cause	Display (optional)	CFI	Release Complete

5.2 Mobile Terminated Calls

Call establishment is initiated by receipt of Setup at the MS:

a) Setup

Element	Mapped on to		
	MMI	ITU-T V.25 bis [21] message	S interface message
Called Address	Display (optional)	INC	Setup
Called Sub Address	Display (optional)	Not applicable	Setup
HLC	Display (optional)	Not applicable	Setup
LLC	Display (optional)	Not applicable	Setup
BC	Display (optional)	Not applicable	Setup (with PLMN specific elements removed)

b) Call Confirm

Information for the BC element in the call confirm shall be derived from e.g. MMI or by internal settings.

c) Connect

Connect is sent in response to connect from the S interface, from MMI, or when the timeout period referred to in ITU-T V.25 bis [21] has expired. This period shall be between 5 and 10 seconds. During this time the automatic answering of the incoming call may be prevented by issuing a DIC command. The CIC can be used to cancel the effect of a preceding DIC command (see ITU-T Recommendation V.25 bis [21]).

5.3 Call Clearing

5.3.1 Mobile initiated

Call clearing is initiated by the keypad or DTE action:

Disconnect

Element	Derived from		
	MMI	ITU-T V.25 bis [21]	S interface message
Cause	Keypad	DTE shall turn CT 108/2 OFF	Disconnect or inband ITU-T V.110 [27] disconnect request

5.3.2 Network initiated

Call clearing is initiated by receipt of Disconnect at the MS:

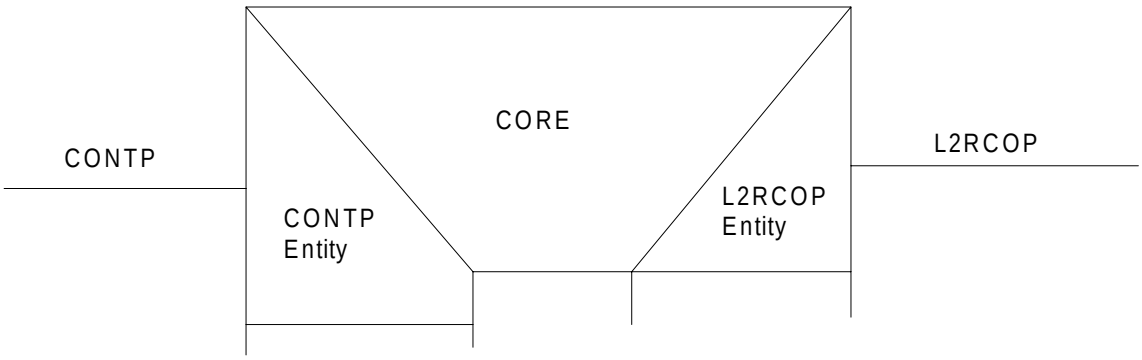
Disconnect

Element	Mapped on to		
	MMI	ITU-T V.25 bis [21]	S interface message
Cause	Display (optional)	MS shall turn CT 107 OFF	Disconnect

Annex A (Normative): L2R Functionality

A.1 Introduction

This annex describes the L2R functionality for non-transparent character oriented protocols. The general aspects of L2Rs are described in 3G TS 27.001 [10]. Figure 1 shows the 3 sub-functions of a character oriented L2R.



CONTP Character Oriented Non-Transparent Protocol.

CORE Character Oriented Relay Entity.

L2RCOP L2R Character Oriented Protocol.

Figure 1

Section 2 describes the L2R Character Oriented Protocol (L2RCOP) and section 3 the use of the L2RCOP.

A.2 The L2RCOP

Information is transferred between L2Rs in fixed length n octet Protocol Data Units (PDUs). This corresponds to the fixed length of the RLP frame information field. The octets within the L2RCOP-PDU are numbered 0 to n-1; octet 0 is transmitted first. The value of n depends on the negotiated RLP version and frame type (3G TS 24.022[9]). The bits within the octets are numbered 1 to 8; bit 1 is transmitted first.

The RLP version value 2 indicates RLP multi-link operation. The RLP version value 0 or 1 indicates RLP single-link operation.

- Each octet contains a status octet, an information octet or fill.

  Octet 0 contains either a status octet or a user information octet.

- Octet 0 shall always contain a status octet in case at least one status octet is transported in the L2RCOP PDU. In RLP-versions 0 and 1 a PDU always carries at least one status octet. In RLP version 2 a PDU carries status octet(s) only if actual status change(s) has taken place within the period represented by the PDU. Here the L2R status flag in the RLP version 2 header is set to 1 when status octet(s) is carried in the PDU.

- Status octets contain 3 status bits and 5 address bits. In cases where two status octets within the PDU are separated by more than 23 octets, the first status octet in octet m is followed by a pointer octet in octet m+1 forming a two-octet status field. The pointer octet contains one reserved bit and seven address bits indicating the number of characters between the status field and the second status octet.

- The 3 status bits correspond to SA, SB and X in ITU-T Recommendation V.110 [27]. The SA, SB and X bits use bit positions 8, 7 and 6 in the status octets. When a status bit changes the current state of all three bits shall be transmitted.

- Information octets are character octets or encoded character octets.
- Character octets are coded in the following way:
  - The first bit of the character received/transmitted corresponds to bit position 1 in the octet and the seventh bit corresponds to bit 7. For order of transmission of IA5 characters see ITU-T Recommendation V.4 [15].
  - 7 bit characters are padded with a 0 in bit position 8. Received parity (if used) is inserted in bit position 8, if parity is not used bit 8 is set to 0.
  - Any start/stop bits are removed by the L2R.
- Encoded character octets are provided by the compression function. They are encoded according to ITU-T V.42bis [26].
- Information octets are inserted into L2RCOP-PDUs in order of transmission in octets 1 to n-1 for RLP single-link operation, in octets 1 to n-1 for RLP multi-link operation with status octet transportation, and in octets 0 to n-1 for multi-link operation with no status octet transportation.
- The address field in the status octets indicates the position of next status octet within the L2RCOP-PDU. This indicates the number of characters between status octets. Thus if two status octets are inserted into L2RCOP-PDU at offsets l and m the address value shall be defined by m-l-1. Address bit 2^0 corresponds to bit 1 in the status octets. Address bit 2^1 to bit 2 etc.
- Status octets are inserted in the character stream whenever a status change needs to be transmitted.
- Only address values 1 to n-2 (n-2 ≤ 23) in the address field of status octets are used for addressing purposes. The implication of not allowing address value 0 to be used for addressing is that two status octets cannot be sent after each other. The remaining codes are used to indicate:
  - Last status change, remainder of L2RCOP-PDU empty. Address field value 31.
  - Last status change, remainder of L2RCOP-PDU full of characters. Address field value 30.
  - Destructive break signal, remainder of L2RCOP-PDU empty. Address field value 29.
  - Destructive break acknowledge, remainder of L2RCOP-PDU empty. Address field value 28.
    - L2RCOP-PDU contains at least two status octets which are separated by more than 23 characters; the address-field value in the first octet of the two-octet status field is 27 and the address bits in the pointer octet of the status field indicate the number of characters between the two-octet status field and the next status octet.
  - Address field values from n-1 to 26 are reserved. In case of a PDU more than 25 octets in length, address field values from 24 to 26 are reserved.
- When it is necessary to insert a status octet into the character stream when no status change has occurred, e.g. to indicate that the reminder of a L2RCOP-PDU is empty or to indicate a break signal, the current status shall be repeated.
- In case when 64 data octets are carried by a 66-octet PDU, a status octet is carried in octet 0 and another status octet within the first 24 data octets. (The first status octet gives the address of the second status octet, which carries value 30 in its address field).

Three examples of an L2RCOP PDU are shown in Figure 2.

	8	7	6	5	4	3	2	1	
0	SA	SB	x	0	0	0	1	1	
1	1	1	0	0	0	1	1	1	IA5 "G" (odd parity)
2	1	1	0	1	0	0	1	1	IA5 "S" (odd parity)
3	1	1	0	0	1	1	0	1	IA5 "M" (odd parity)
4	SA	SB	x	1	1	1	1	1	(last status change, rest of PDU empty)
.									
.									
.									
n-1									

Figure 2a: Single-link RLP and multi-link RLP with status octet transfer in PDU

	8	7	6	5	4	3	2	1	
0	1	1	0	1	0	0	1	1	IA5 "S" (odd parity)
1	1	1	0	0	0	1	1	1	IA5 "G" (odd parity)
2	1	1	0	1	0	0	1	1	IA5 "S" (odd parity)
3	1	1	0	0	1	1	0	1	IA5 "M" (odd parity)
4									
.									
.									
.									
n-1	1	1	0	0	1	1	0	1	IA5 "M" (odd parity)

Figure 2b: Multi-link RLP L2RCOP PDU with no status octet transfer

	8	7	6	5	4	3	2	1	
0	SA	SB	X	0	0	0	1	1	
1	1	1	0	0	1	1	0	1	IA5 "M" (odd parity)
2	1	1	0	0	0	0	0	1	IA5 "A" (odd parity)
3	1	1	0	1	0	0	1	0	IA5 "R" (odd parity)
4	SA	SB	X	1	1	0	1	1	
5	R	0	1	0	0	0	1	1	
.				.					
.				.					
41	SA	SB	X	0	0	0	0	1	
42	1	1	0	0	1	1	0	1	IA5 "K" (odd parity)
43	SA	SB	X	1	1	1	1	0	
.				.					
.				.					
65	1	1	0	0	1	1	1	1	IA5 "O" (odd parity)

Figure 2c: A 66-octet RLP L2RCOP PDU with status octets separated by more than 23 octets

A.3 Use of the L2RCOP

The CORE relays status changes, break conditions and characters in both directions between the CONTP entity and the L2RCOP entity.

The L2RCOP entity performs the following functions.

A.3.1 Radio Link Connection Control

Given appropriate indications from the signalling mechanisms the L2RCOP entity uses the services of the radio link to establish and release the connection to its peer L2RCOP entity in the IWF.

A.3.2 Data Transfer

The L2RCOP entity shall assemble and disassemble L2RCOP-PDUs. Data characters are assembled into L2RCOP-PDUs until either:

- The PDU is full.
- The Radio Link service can accept another Radio Link service Data Unit.

L2RCOP-PDUs are transferred to the peer L2RCOP entity using the data transfer services of the radio link.

A.3.3 Status Transfer

The L2RCOP entity transfers interface status information between L2Rs using bits SA, SB and X in the status octets in L2RCOP-PDUs. Status changes are inserted in the L2RCOP-PDU in the position corresponding to the position in the character stream that the interface status change occurred. When the RLP is established or reset a L2RCOP-PDU with the current status values shall be sent.

The general mapping between ITU-T V.24 [19] interface circuit numbers and status bits is described in annex C. A binary 0 corresponds to the ON condition, a binary 1 to the OFF condition. The specific mapping at the MT for the non-transparent bearer service is given in subclause 4.2.1. The mapping schemes used at the IWF are given in 3G TS 29.007 [13].

A.3.4 Flow Control

Flow control information is transferred between L2Rs in 2 ways, these are:

- back pressure caused by L2R buffer conditions.
- use of the X-bit in status octets:
  - flow control active, X-bit = ONE.
  - flow control inactive, X-bit = ZERO.

A.3.5 Break

The transfer of break conditions between L2Rs is via the status octets with appropriate coding of the address field. Where the "Break Signal" is generated it shall conform to the definition shown in ITU-T Recommendation X.28 [22].

A.3.5.1 Normal Realization

The L2RCOP-PDU contains the mandatory status octet coded as the Destructive Break.

Upon the receipt of the "Break Signal", the L2R shall destroy any existing data in front of the Break Signal in the same direction, and all the buffered data in the other direction. The L2R shall then pass the Break Signal immediately on.

The termination of a break condition is indicated by sending an L2RCOP-PDU containing characters.

A.3.5.2 Realization in case of Data Compression is used

If the data compression function is used L2RCOP has to ensure the synchronization of the encoder and decoder according to ITU-T V.42bis [26].

Upon receipt of a L2RCOP-PDU containing a status octet that signals a Destructive Break L2R destroys all data in the TX and RX buffer and re-initializes the compression function. Then L2R shall transmit an L2RCOP-PDU that contains the mandatory status octet coded as the Destructive Break Acknowledge. After that L2R shall restart the data transfer.

Upon an receipt of the "Break Signal" by the CONTP, the L2R destroys any existing data in the TX and RX buffer and shall then pass the Break Signal immediately by using L2RCOP-PDU containing a status octet coded as the Destructive Break. L2R shall wait for a L2RCOP-PDU containing a mandatory status octet coded as Destructive Break Acknowledge. Following data received by the CONTP shall be stored in the TX buffer. Data received in L2RCOP-PDUs shall be discarded. After reception of the L2RCOP-PDU containing a mandatory status octet coded as Destructive Break Acknowledge L2R shall re-initialize the data compression function and restart the data transfer.

Annex B (Informative): Use of a 9 pin connector as an MT2 type interface

For asynchronous data communications many of the physical pins on a standard 25 pin D-type connector (ISO 2110 [31]) are not used. As a result many communication devices have only a 9 pin connector to allow them to be made smaller. This interface is a MT2 type providing the correct ITU-T V.24 [19] signals are supported.

Table B1 gives the pin assignments for a 9 pin connector. Two variants are permitted:

1. Outband flow control

When outband (CT 133) flow control is required, pin number 7 carries CT 133 (Ready for Receiving). In this case CT 105 is not mapped to any physical pin. On the MT2 side of the interface, CT 105 is treated as being always in the ON condition.

2. No outband flow control

When no outband (CT 133) flow control is required, pin number 7 may carry CT 105 (Request to Send). In this case CT 133 is not mapped to any physical pin. On the MT2 side of the interface, CT 133 is treated as being always in the ON condition.

Table B1: Interchange circuit mappings

ITU-T V.24 [19] Circuit Number	Circuit Name	Pin Number
CT 102	Common ground	5
CT 103	TxD	3
CT 104	RxD	2
CT 105	RTS	7 (note)
CT 106	RFS (CTS)	8
CT 107	DSR	6
CT 108/2	DTR	4
CT 109	DCD	1
CT 125	CI	9
CT 133	RFR	7 (note)

NOTE: Only one of these mappings may exist at any one time.

Annex C (informative): General mapping of ITU-T V.24 [19] circuits to channel status bits

In the data transfer state, status bits SA, SB and X can be used to convey channel control information associated with the data bits. Table C1 shows the general mapping scheme between the ITU-T V.24 [19] circuit numbers and the status bits. A binary 0 corresponds to the ON condition, a binary 1 to the OFF condition. The specific mappings for the various PLMN bearer types are given elsewhere in this specification.

Table C1: General mapping scheme at the MT

Signal at TE2/MT interface	Status bit direction: MT to IWF	Status bit direction: IWF to MT
CT 105 (note 3)	SB	
CT 106 (note 1)		X
CT 107		SA
CT 108/2	SA	
CT 109		SB
CT 133 (note 3)	X (note 2)	

NOTE 1. The condition of CT 106 may also be affected by the state of any transmit buffer in the MT.

NOTE 2. The condition of Status bit X towards the IWF may also be affected by the state of any receive buffer in the MT.

NOTE 3: CT105 and CT133 are assigned to the same connector pin on both the standard 25 pin connector (ISO 2110) and the commonly used 9 pin connector (annex B). When this pin is used for CT133 then on the MT side of the interface CT 105 is treated as being always in the ON condition. SB towards the IWF shall therefore also always be ON.

Similarly, when this pin is being used for CT105 then on the MT side of the interface CT 133 is treated as being always in the ON condition. X towards the IWF shall therefore also always be ON.

As circuit 133 is used only in duplex operation and circuit 105 is used only in half duplex operation (which is not supported by GSM or UMTS) there should be no conflict.

Annex D (informative): Change history

Change history						
TSG CN#	**Spec**	**Version**	**CR**	**<Phase>**	**New Version**	**Subject/Comment**
Apr 1999	GSM 07.02	7.0.0				Transferred to 3GPP CN1
CN#03	27.002				3.0.0	Approved at CN#03
CN#04	27.002	3.0.0	001	R99	3.1.0	Introduction of EDGE channel codings into the specifications [E-mail approval]
CN#06	27.002	3.1.0	002	R99	3.2.0	Service clean-up for Release 99
CN#07	27.002	3.2.0	003	R99	3.3.0	UMTS Clean Up

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

27.003	CR	005	Current Version:	3.3.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	TSG-N#8	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)*

(U)SIM		ME	X	UTRAN / Radio		Core Network	

Source: TSG_N3 **Date:** 2000-05-24

Subject: Adaptations for UMTS

Work item: TEI

Category: *(only one category shall be marked with an X)*

F	Correction	
A	Corresponds to a correction in an earlier release	
B	Addition of feature	
C	Functional modification of feature	X
D	Editorial modification	

Release:

Phase 2	
Release 96	
Release 97	
Release 98	
Release 99	X
Release 00	

Reason for change: This specification has been transferred from SMG to 3GPP. Therefore, adaptations for UMTS are required.

Clauses affected:

Other specs affected:

Other 3G core specifications		→ List of CRs:
Other GSM core specifications		→ List of CRs:
MS test specifications		→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

Other comments:

help.doc

<--------- double-click here for help and instructions on how to create a CR.

3G TS 27.003 V3.3.0 (2000-03)

Technical Specification

3rd Generation Partnership Project; Technical Specification Group Core Network; Terminal Adaptation Functions (TAF) for services using synchronous bearer capabilities (Release 1999)

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Postal address

3GPP support office address
650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet
http://www.3gpp.org

Contents

Foreword

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

The present document defines the interfaces and Terminal Adaptation Functions (TAF) integral to a Mobile Termination (MT) which enables the attachment of synchronous terminals to a MT within the 3GPP system.

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:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater 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 document.

1 Scope

The present document defines Terminal Adaptation Functions (TAF) which are integrated in a Mobile Termination (MT) and which enable the attachment of Synchronous Terminals to an MT (see GSM 04.02 [3]). The general aspects of Terminal Adaptation Functions are contained in specification 3G TS 27.001 [9]. The present document covers support of synchronous data services (see 3G TS 22.002 [6]) for the following interfaces and procedures:

- V.22 [15] DTE/DCE Interface;
- V.22 bis [16] DTE/DCE Interface;
- V.26 ter [19] DTE/DCE Interface;
- V.32 [21] DTE/DCE Interface;
- ~~X.21 [23] DTE/DCE Interface;~~
- ~~X.21 bis [24] DTE/DCE Interface;~~
- X.32 [30] Procedure;
- V.25 bis [18] Procedure;
- ~~I.420 [11] Interface (S).~~

LAPB is the only synchronous non-transparent protocol which is considered in the present document.

NOTE: From GSM R99 onwards the following services are no longer~~more~~ required ~~to be provided~~ by a GSM PLMN:

- the dual Bearer Services "alternate speech/data" and "speech followed by data";
- the dedicated services for PAD and Packet access;
- BS 21 ... 26 and BS 31 ... 34.

The support of these services is still optional. The specification of these services is not within the scope of the present document. For that, the reader is referred to GSM Release 98.

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 01.04: "Digital cellular telecommunication system (Phase 2+); Abbreviations and acronyms".

[2] GSM 03.10: "Digital cellular telecommunication system (Phase 2+); GSM Public Land Mobile Network (PLMN) connection types".

[3] GSM 04.02: "Digital cellular telecommunication system (Phase 2+); GSM Public Land Mobile Network (PLMN) access reference configuration".

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

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

[6] 3G TS 22.002: "Circuit Bearer Services (BS) supported by Public Land Mobile Network (PLMN)".

[7] 3G TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols-Stage 3".

[8] 3G TS 24.022: "Radio Link Protocol (RLP) for Circuit Switched Bearer and Teleservices".

[9] 3G TS 27.001: "General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".

[10] 3G TR 21.905: "3G Vocabulary".

[11] ITU-T Recommendation I.420 (1998): "Basic user-network interface".

[12] ITU-T Recommendation Q.931: "ISDN user-network interface layer 3 specification for basic call control".

[13] ITU-T Recommendation V.10: "Electrical characteristics for unbalanced double-current interchange circuits operating at data signalling rates nominally up to 100 kbit/s".

[14] ITU-T Recommendation V.11: "Electrical characteristics for balanced double-current interchange circuits operating at data signalling rates nominally up to 10 Mbit/s ".

[15] ITU-T Recommendation V.22 (1988): "1200 bits per second duplex modem standardized for use in the general switched telephone network and on point-to-point 2-wire leased telephone-type circuits".

[16] ITU-T Recommendation V.22 bis (1988): "2400 bits per second duplex modem using the frequency division technique standardized for use on the general switched telephone network and on point-to-point 2-wire leased telephone-type circuits".

[17] ITU-T Recommendation V.24 (1996):"List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE)".

[18] ITU-T Recommendation V.25 bis (1996): "Synchronous and asynchronous automatic dialling procedures on switched networks".

[19] ITU-T Recommendation V.26 ter (1988): "2400 bits per second duplex modem using the echo cancellation technique standardized for use on the general switched telephone network and on point-to-point 2-wire leased telephone-type circuits".

[20] ITU-T Recommendation V.28 (1993): "Electrical characteristics for unbalanced double-current interchange circuits".

[21] ITU-T Recommendation V.32 (1993): "A family of 2-wire, duplex modems operating at data signalling rates of up to 9600 bit/s for use in the general switched telephone network and on leased telephone-type circuits".

[22] ITU-T Recommendation V.110 (1996): "Support of data terminal equipments with V-Series interfaces by an integrated services digital network".

[23] ITU-T Recommendation X.21 (1992): "Interface between Data Terminal Equipment and Data Circuit-terminating Equipment for synchronous operation on public data networks".VOID.

[24] ~~ITU-T Recommendation X.21 bis (1988): "Use on public data networks of Data Terminal Equipment (DTE) which is designed for interfacing to synchronous V-Series modems".~~VOID.

[25] ITU-T Recommendation X.24 (1988): "List of definitions for interchange circuits between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) on public data networks".

[26] ITU-T Recommendation X.26 (1993): "Electrical characteristics for unbalanced double-current interchange circuits operating at data signalling rates nominally up to 100 kbit/s ".

[27] ITU-T Recommendation X.27 (1996): "Electrical characteristics for balanced double-current interchange circuits operating at data signalling rates up to 10 Mbit/s".

[28] ~~ITU-T Recommendation X.30 (1993): "Support of X.21, X.21 bis and X.20 bis based Data Terminal Equipment (DTEs) by an Integrated Services Digital Network (ISDN)".~~VOID

[29] ~~ITU-T Recommendation X.31 (1995): "Support of packet mode terminal equipment by an ISDN".~~VOID

[30] ITU-T Recommendation X.32 (1996): "Interface between Data terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) for terminals operating in packet mode and accessing a Packet-Switched Public Data Network through a public switched telephone network or an Integrated Services Digital Network or a Circuit-Switched Public Data Network".

[31] ISO Recommendation 8885: "Information technology - Telecommunication and information exchange between systems - High-level data link control (HDLC) procedures - General purpose XID frame information field content and format".

[32] ISO Recommendation 8886: "Information technology - Telecommunication and information exchange between systems - Data link service definitions for Open Systems interconnection".

[33] Personal Computer Memory Card Association: "PCMCIA 2.1 or PC-Card 3.0 electrical specification or later revisions".

[34] Infrared Data Association IrDA: "IrPHY Physical layer signalling standard".

[35] 3G TR 23.910: "Circuit Switched Data Bearer Services".

2.1 Abbreviations

In addition to the abbreviations listed below, the present document also uses termslisted in 3GTR 21.905 [10] and GSM 01.04 [1].

AU	Access Unit
BORE	Bit Oriented Relay Entity
EDGE	Enhanced Data for Global Evolution
FFS	For further studies
IrDA	Infrared Data Association
IrPHY	InfraredPHYsical layer
ITU-T	ITU-Telecommunication Standardization Sector
MUX	Multiplexer
PCMCIA	Personal Computer Memory Card Association
PC	Personal Computer

2.2 Definitions

The term ‘mobile station’ (MS) in the present document is synonymous with the term ‘user equipment’ (UE) in 3G terminology as defined in 3G TR 21.905.

The term ‘TE2’ in the present document is synonymous with the term ‘TE’ in 3G terminology as defined in 3G TR 21.905.

The term ‘MT2’ in the present document is synonymous with the term ‘MT’ in 3G terminology as defined in 3G TR 21.905.

3 General

3.1 Customer access configuration

The ~~GSM~~ PLMN access reference configuration is described in figure 1 of GSM 04.02 [3] and 3G TS 27.001 [9]. ~~.~~ The present document specifically refers to the MTs which support terminal equipments (TE1 or TE2) that use synchronous bearer capabilities.

3.2 Terminal Adaptation Function

The TAF is functionally part of an MT0, MT1 or MT2 (see GSM 04.02 [3]). The terminal adaptation provides facilities to allow manual or automatic call control functions associated with circuit switched data services, in case of ITU-T V series interfaces. ~~The ITU-T X.21[23] DTE/DCE interface allows only for automatic call control functions.~~ The following functions are included:

Editor's note: V.25bis is outdated. References to V.25 bis procedures need to be replaced by corresponding procedures based on V.250 and 3G TS 27.007.

- conversion of electrical, mechanical, functional and procedural characteristics of the ITU-T V-series~~, ITU-T X-series and ISDN~~ type interfaces to those required by a ~~GSM~~ PLMN;
- bit rate adaptation of ITU-T V-series ~~and ITU-T X-series data signalling rates and the ISDN 64 kbit/s~~ to that provided in the ~~GSM~~ PLMN;
- the mapping of ITU-T V.25 bis [18] AUTO CALL/AUTO ANSWER procedures ~~and ITU-T X.21[23] procedures~~ to the ~~GSM~~ PLMN ~~Dm-channel~~Layer 3 signalling;
- the mapping functions necessary to convert ITU-T S-interface signalling to PLMN ~~Dm-channel~~Layer 3 signalling;
- synchronization procedure, which means the task of synchronizing the entry to and the exit from the data transfer phase between two subscriber terminals. This is described in the specification 3G TS 27.001 [9];
- filtering of channel control information. This is described in the specification 3G TS 27.001 [9];
- compatibility checking (see 3G TS 27.001 [9]);
- layer 2 relaying (see annex 1);
- flow control;
- in Call Modification function (see clause 4);
- splitting and combining of the data flow in case of multi substream data configurations.

3.3 TAF Interfacing to other MT functions

TAF interfacing is shown in figure 1.

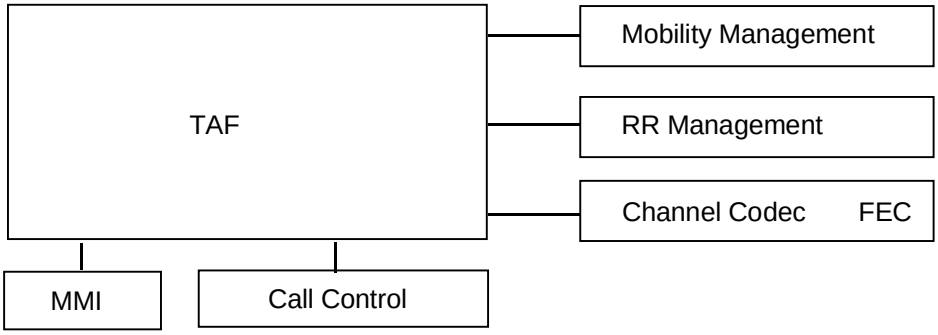


Figure 1: TAF interfacing to other MT functions

4 Terminal Adaptation Functions for synchronous transparent services

Specification GSM 03.10 [2] refers to the models for connection types supporting synchronous transparent services.

4.1 Rate Adaptation in GSM

Rate adaptation on the MS-BS interface is described in GSM 04.21[4]. The synchronous data services make use of the following rate adaptation functions: RA1, RA2, RA1/RA1', RA1' and in case of TCH/F28.8 usage, EDGE-MUX. See also figures 6, 7 and 8 in GSM 03.10 [2]. The D-bits of the rate adaptation frames are used to convey user data and the S- and X-bits are used to convey channel status information associated with the data bits in the data transfer state, or to carry substream numbering between the Split/Combine functions in case of mult substream operation. For the S- and X-bits, a ZERO corresponds to the ON condition, a ONE to the OFF condition.

4.1.1 Rate adaptation - ITU-T V-series

This is provided as indicated in specification GSM 04.21 [4]. The functions applied in this case are shown in figure 2 (see model 2b in figures 6, 7 and 8 of GSM 03.10 [2]).

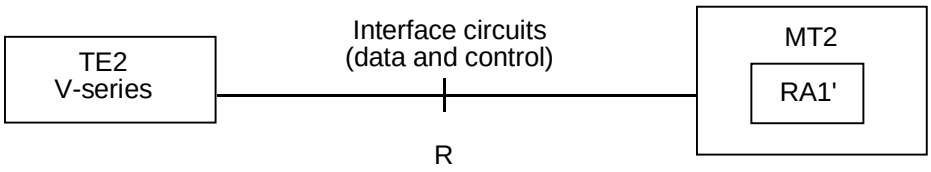
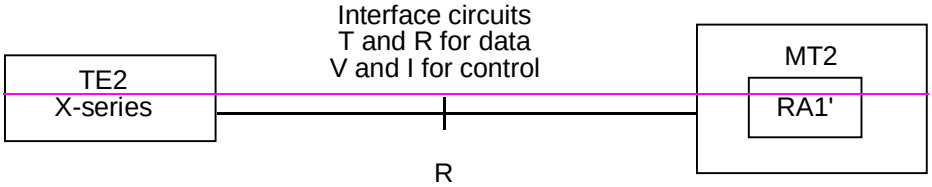


Figure 2: Rate adaptation for V-series terminals

4.1.2 Rate adaptation - ITU-T X.21

~~This is provided as indicated in specification GSM 04.21 [4]. The functions applied in this case are shown in figure 3 (see model 2b in figures 6, 7 and 8 of GSM 03.10 [2]).~~



~~**Figure 3: Rate adaptation for ITU-T X.21 [23] terminals**~~

VOID.

4.1.3 Rate adaptation - ITU-T S-interface

The functions applied in this case are shown in figure 4 (see model 2a in figures 6, 7 and 8 of GSM 03.10 [2]).

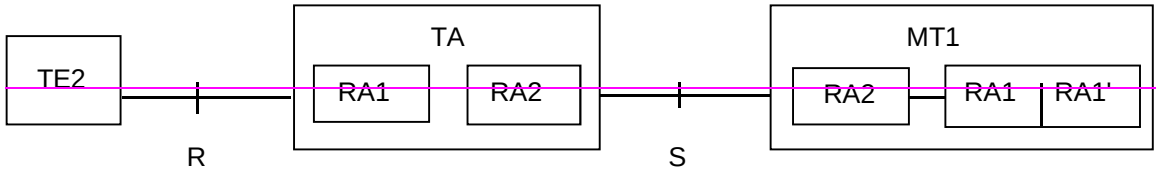


Figure 4a: Rate adaptation for ITU-T S-interface

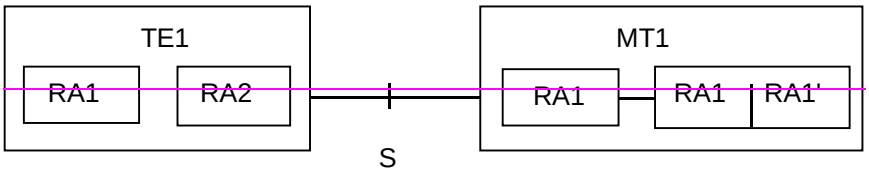


Figure 4b: Rate adaptation for ITU-T S-interface (continued)

There are two cases to be considered for the RA1 function:

a) V-series interface:

- for the V-series type of terminal equipments the rate adaptation functions are as described in GSM 04.21 [4].

b) ITU-T X.21 [23] interface:

- for terminal equipments using the ITU-T X.21 [23] interface the rate adaptation functions are identical to those described in GSM 04.21 [4], but the notation used is as described in ITU-T recommendation X.30 [28];

- the notation used is as follows:

  - the conversion of the user rates of 2.4 kbit/s and 4.8 kbit/s to 8 kbit/s and user rate of 9.6 kbit/s to 16 kbit/s shall be implemented by means of the 40 bit frame structure shown in figure 5;

  - figure 5 shows that in addition to the basic frame, a two frame multiframe is employed. In odd frames, octet 0 contains all zeros, whilst in even frames octet 0 consists of a one followed by seven E bits. The order of bit transmission of the 40 bit frame is from left to right and top to bottom;

  - this two frame multiframe corresponds to the 80 bit frame structure presented in GSM 04.21 [4] as shown in figure 6. The 24 information bits P1,..,P8, Q1,..Q8, R1,..,R8 of odd frames correspond with D1,..,D24 and those of even frames correspond with D25,..,D48 respectively. For the status bits there is the following correspondence: odd frame SQ, X, SR, SP = S1,X,S3,S4 and even frame SQ, X, SR, SP = S6, X, S8, S9.

- option for a manufacturer of mobile stations:

  - in transparent mode support of a packet mode TE1 or TE2/TA, which uses flag stuffing.

	Bit number 1	2	3	4	5	6	7	8
Octet 0 Odd frames	0	0	0	0	0	0	0	0
Even frames	1	E1	E2	E3	E4	E5	E6	E7
Octet 1	1	P1	P2	P3	P4	P5	P6	SQ
Octet 2	1	P7	P8	Q1	Q2	Q3	Q4	X
Octet 3	1	Q5	Q6	Q7	Q8	R1	R2	SR
Octet 4	1	R3	R4	R5	R6	R7	R8	SP
NOTE: Bit X, if not used for the optional flow control or for the indication of the far end synchronization, shall be set to 0 (see ITU-T Recommendation V.110 [22]).								

Figure 5: 40 bit frame structure of ITU-T X.30 [28]

	X.30 [28] Two frame multifr.								V.110 [22] 80 bit frame							
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
odd	1	P1	P2	P3	P4	P5	P6	SQ	1	D1	D2	D3	D4	D5	D6	S1
frame	1	P7	P8	Q1	Q2	Q3	Q4	X	1	D7	D8	D9	D10	D11	D12	X
	1	Q5	Q6	Q7	Q8	R1	R2	SR	1	D13	D14	D15	D16	D17	D18	S3
	1	R3	R4	R5	R6	R7	R8	SP	1	D19	D20	D21	D22	D23	D24	S4
	1	E1	E2	E3	E4	E5	E6	E7	1	E1	E2	E3	E4	E5	E6	E7
even	1	P1	P2	P3	P4	P5	P6	SQ	1	D25	D26	D27	D28	D29	D30	S6
frame	1	P7	P8	Q1	Q2	Q3	Q4	X	1	D31	D32	D33	D34	D35	D36	X
	1	Q5	Q6	Q7	Q8	R1	R2	SR	1	D37	D38	D39	D40	D41	D42	S8
	1	R3	R4	R5	R6	R7	R8	SP	1	D43	D44	D45	D46	D47	D48	S9

Figure 6: Correspondence of ITU-T X.30 [28] and ITU-T V.110 [22] frames

VOID.

4.2 Interchange Circuit Signalling Mapping

4.2.1 ITU-T V-series interchange circuit mapping

The interchange circuit signalling mapping at the interface between the TE2 and the MT shall conform to ITU-T recommendation V.24 [17]; while the signal levels at the interface shall conform either to ITU-T recommendation V.28 [20], or to IrDA IrPHY Physical signalling standard specification [34], or to PCMCIA 2.1 [33], or to PC-Card 3.0 [33] electrical specifications or to later revisions.

The signals required at this interface are shown in table 2.

- Specification GSM 04.21 [4] refers to the frame structure and identifies the use of status bits for the carriage of signalling information

Status bits SA, SB and X are used to convey channel control information associated with the data bits in the data transfer state. Table 1 shows the mapping scheme between the ITU-T V.24 [17]circuit numbers and the status bits for the transparent mode. It also shows how the unused status bits should be handled. It is derived from the general mapping scheme described in annex C. A binary 0 corresponds to the ON condition, a binary 1 to the OFF condition.

The transport of these status bits by the various channel codings is described in subsequent sections.

Table 1: Mapping scheme at the MT for the transparent mode

Signal at TE2/MT interface or condition within the MT	Mapping direction: MT to IWF	Mapping direction: IWF to MT
CT 105	not mapped (note 1)	
CT 106		from status bit X (note 7)
CT 107		not mapped (note 5)
CT 108/2	not mapped (note 6)	
CT 109		from status bit SB (note 7)
CT 133	not mapped (note 2)	
always ON	to status bit SA (note 3)	
always ON	to status bit SB (note 1)	
always ON	to status bit X (note 4)	
ignored by MT		from status bit SA (note 3)

NOTE 1: The SB bit towards the IWF, according to the General Mapping (27.002, annex C), could be used to carry CT 105. However, CT 105 should always be ON in the data transfer state since only duplex operation is supported. Also, many DTEs use the connector pin assigned to CT 105 for CT 133. No interchange circuit shall be mapped to the SB bit which shall always be set to ON in the data transfer state.
NOTE 2: CT 133 is not mapped since there is no flow control in transparent mode.
NOTE 3: The SA bits in both directions are available only with certain channel codings. Therefore, for maximum compatibility, they should not be mapped.
NOTE 4: The X bit towards the IWF is not mapped and shall always be set to ON in the data transfer state since there is no flow control in transparent mode.
NOTE 5: CT 107 is controlled by the channel synchronization process (3G TS 27.001 [9]).
NOTE 6: CT 108/2 may be used in the call setup and answering processes.
NOTE 7: The status bits are filtered before being mapped to the ITU-T V.24 [17] circuits (3G TS 27.001 [9]).

Table 2: Minimum set of V-series interchange circuits

Circuit Number	Circuit Name	Ground	Data		Control	
			to TE2	from TE2	to TE2	from TE2
CT102	Common Return	X				
CT103	Transmitted data			X		
CT104	Received data		X			
CT105	Request to send					X
CT106	Ready for sending				X	
CT107	Data set ready				X	
CT108.2	Data terminal ready					X
CT109	Data channel received line signal detector				X	
CT114	Transmitter signal element timing				X	
CT115	Receiver signal element timing				X	
CT125	Calling in-dicator (note)				X	

NOTE: CT125 is used with the AUTO ANSWER function of the TAF.

Use of Network Independent Clocking: (applicable to GSM only)

Network Independent Clocking is only applicable to calls using ITC value "3.1 kHz audio ex PLMN".

Within the GSM network the coding of the values for bits associated with NIC is specified in GSM specifications GSM 04.21 [4] and GSM 08.20 [5]. In the forward (transmitting) direction the multiframes shall be coded in exact accordance with that specified in those specifications. Bit E6 is set to "1" in alternate modified ITU-T V.110 [22] frames at the transmitter. However, the use of this bit at the receiver for monitoring frame Synchronization, or any other purpose, is not specified and is left to the discretion of the implementor.

A "perfect linear block Code" is used in C1-C5, whose error correction properties may be utilized in the receiver, in order to ensure reliable operation of NIC.

The NIC sending function has to recognize when the difference between the applicable clock speed of the GSM network and the interface speed generates a positive or negative whole bit requirement. When this positive or negative condition occurs, the NIC codewords specified in specification GSM 04.21 [4] are used to transport this condition to the receiving NIC function. Transmission of the codeword shall clear the positive or negative condition related to that codeword at the sending function. The sending function shall not send more than one positive or negative compensations within a contiguous period of time corresponding to 10 000 user data bits minus the number of user data bits necessary to make up an even number of ITU-T V.110 [22] frames between compensations (NIC compensation is coded in two ITU-T V.110 [22] frames). This results from the requirements to compensate for maximum clock differences of ± 100 parts per million. If the receiving function receives NIC compensations more often than a contiguous period of time corresponding to 10 000 user data bits, there is no guarantee that data will not be lost.

The NIC receiving function has to provide the capability to support the compensation requirements of the sending function. This compensation is managed by manipulating the clock speed of the interface, within the standard constraints of that interface.

Overall, the compensation functions have to be capable of managing clock tolerances of ±100 parts per million.

The NIC function has to recognize and manage the conversion of the NIC information received incoming from an ISDN terminal Interface. The conversion has to be made to the NIC format used within the GSM System as defined in specifications GSM 04.21 [4] and GSM 08.20 [5]). The NIC function has to manage the conversion of the GSM NIC format into that used within the ISDN in the traffic direction towards the ISDN terminal interface.

Due to the incompatibility between the ISDN and the GSM requirements NIC interworking is nor provided between these two formats. as such no NIC function is required in providing interworking to the ISDN for unrestricted digital.

Action on loss of synchronization:

If five consecutive NIC multiframes have incorrect framing bit values in E7, the receiver shall stop applying clocking compensation to the received data. Resynchronization shall be attempted and compensation shall resume when synchronization is achieved.

Signal element timing:

Receiver signal element timing (CT115) is generated by MT2. In the GSM transparent case, this shall be synchronized to the output of RA1' function. In the UMTS transparent case, this shall be synchronized to output of the RLC. In the non transparent case it is output from the L2R on the basis of the current user data rate. A transition from ON to OFF condition shall nominally indicate the centre of each signal element on CT104.

Transmitter signal element timing is generated by MT2 (CT114), this may be synchronized to CT115.

In the case of alternate Speech/Group 3 Facsimile ~~in GSM,~~ there may be a Channel Mode Modify during the course of the facsimile portion of the call. If this occurs ~~in GSM~~, the user data rate changes and this is reflected to the ITU-T V.24 [17] interface as a change in the clock speed on CT 114 and CT 115.

4.2.1.1 Multislot configurations (Channel coding TCH/F9.6 or TCH/F4.8 kbit/s)

In transparent multislot configurations status bits S1, S3 and the X-bit between the D12 and D13 in the ITU-T V.110 [22] 80-bit intermediate rate frame - are used for transferring substream numbering information. The S4-bit is used for frame synchronization between the parallel substreams (ref GSM 04.21[4]).

4.2.1.2 Channel coding TCH/F14.4 and TCH/F28.8

For information on the mapping of the interchange circuit signalling bits in the 14,5 multiframe structure, refer to GSM 04.21[4].

4.2.2 ITU-T X.21 [23] Interchange circuit mapping

~~The interchange circuit signalling mapping at the interface between the TE2 and the MT shall conform to ITU-T recommendations ITU-T X.21 [23] and ITU-T X.24 [25]; while the signal levels at the interface shall conform either to ITU-T recommendation ITU-T X.26 [26]/(ITU-T V.10 [13]), or to ITU-T X.27 [27] /(ITU-T V.11 [14]) - see also paragraph 2.1 of ITU-T recommendation X.21 [23], or to IrDA IrPHY Physical signalling standard specification [34], or to PCMCIA 2.1 [33], or to PC Card 3.0 [33] electrical specifications or to later revisions.~~

~~The signals required at this interface are shown in table 3.~~

~~Specification GSM 04.21 [4] refers to the frame structure and identifies the use of status bits for the carriage of signalling information.~~

~~**Status bits (S1, S3, S4, S6, S8, S9):**~~

~~For the purpose of alignment with the case where the ITU-T X.21 [23] TE2 is connected to the MT via a TA conforming to ITU-T recommendation X.30 [28], the notation for the S-bits shall be SP, SQ and SR as in figure 5 in. For the bits SP, SQ and SR, a ZERO corresponds to the ON condition, a ONE to the OFF condition.~~

~~The bits SP, SQ and SR are used to convey channel associated status information. The mapping of the information on circuit C of the ITU-T X.21 [23] interface to the S bits and from the S bits to the circuit I in the distant interface should be done in such a way that the SP, SQ and SR bits are associated with the bit groups P, Q and R. To assure proper and secure operation the mapping scheme has to be consistent with ITU-T recommendations X.21 [23]and X.24 [25].~~

~~The mechanism for mapping is as follows:~~

- ~~in all cases where ITU-T X.21 [23] byte timing interchange circuit B is not provided, the status bits SP, SQ and SR of the bit groups P, Q and R are evaluated by sampling the circuit C in the middle of the 8th bit of the respective preceding bit group. On the other hand, the conditions of the status bits SP, SQ and SR are adopted by the circuit I beginning with transition of the respective 8th bit of a bit group P, Q and R to the first bit of the consecutive bit group on the circuit R;~~

- ~~in the case where ITU-T X.21 [23] byte timing interchange circuit B is provided for character alignment, the circuit C is sampled together with the bit 8 of the preceding octet and the circuit I is changing its state at the boundaries between the old and new octets at the circuit R. This operation is defined in ITU-T recommendation X.24 [25].~~

~~**Table 3: ITU-T X.21 [23] interchange circuits**~~

~~Interchange circuit~~	~~Interchange circuit name~~	~~Data~~		~~Control~~		~~Timing toTE2~~
		~~to TE2~~	~~from TE2~~	~~to TE2~~	~~from TE2~~	
~~G~~	~~Common return~~					
~~Ga~~	~~TE2 common return~~					
~~T~~	~~Transmit~~		~~X~~		~~X~~	
~~R~~	~~Receive~~	~~X~~				
~~C~~	~~Control~~				~~X~~	
~~I~~	~~Indication~~			~~X~~		
~~S~~	~~Signal element timing~~					~~X~~
~~B~~	~~Byte timing (note)~~					~~X~~

~~NOTE: According to ITU-T recommendation X.21 [23] the provision of the 8-bit timing interchange circuit B is not mandatory.~~

VOID.

4.2.3 Case of ITU-T S-interface

~~At the S-interface an ITU-T X.30 [28] rate adapted bit stream is provided by the TE1 or TE2-TA combination (see figure 4). The terminal adaptation function within the MT does not have any interchange circuit signalling mapping function to perform.~~VOID.

4.3 Call establishment signalling mapping at TE/MT interface

4.3.1 ITU-T V-series interfaces

~~4.3.1.1~~ ~~VOID~~4.3.1.1 Call establishment manual operation – utilizing Alternate Speech/Data or Speech followed by Data Capabilities

VOID.

4.3.1.2 Call establishment manual operation - utilizing the Unrestricted Digital Capability

In this case the user shall not hear network supervisory tones or answer tone. The data transfer phase shall be entered automatically.

4.3.1.3 ITU-T V.25 bis [18]auto call/auto answer

Editor's note: V.25bis is outdated. References to V.25 bis procedures need to be replaced by corresponding procedures based on V.250 and 3G TS 27.007.

The mapping of the ITU-T V.25 bis [18] procedures to the messages of the PLMN ~~Dm channel~~Layer 3 signalling (3G TS 24.008 [7]) is defined in clause 4.

Auto Call:

This procedure is provided according to ITU-T V.25 bis [18] using only circuit 108/2. A subset of ITU-T V.25 bis [18] is shown in table 4. This subset gives minimum level of control and indication.

During the call establishment phase, i.e. after signalling, call tone according to ITU-T V.25 bis [18] shall be generated in the IWF, where appropriate.

Auto Answer:

This procedure is provided according to ITU-T V.25 bis [18].

Table 4: Minimum set of ITU-T V.25 bis [18] Call Set-up Commands and Indications

	Description	IA5Characters
Commands	Call Request with Number	CRN
from TE2	Provided 0,1..9,*,#,A,B,C,D	
	Disregard Incoming Call	DIC
	Connect Incoming Call	CIC
Indications	Call Failure Indication	CFI XX
to TE2	XX = CB,AB,NT,FC (Note)	
	Incoming Call	INC
	VALid	VAL
	INValid	INV

NOTE to table 4: CB = Local MT busy
AB = Abort call
NT = No answer
FC = Forbidden call (*)

(*) Forbidden call indication results from contravention of rules for repeat call attempts as defined by the appropriate national approvals administration. It is recommended that this is the responsibility of the MT, not the TE2.

4.3.2 ITU-T X-series interfaces

~~4.3.2.1 ITU-T X.21 bis [24] call establishment manual operation - utilizing the Unrestricted Digital Capability~~

~~In this case the user shall not hear network supervisory tones or answer tone. The data transfer phase shall be entered automatically.~~

~~4.3.2.2 ITU-T X.21 bis [24] /ITU-T V.25 bis [18] call establishment signalling mapping~~

~~The mapping of the ITU-T V.25 bis [18] procedures to the messages of the PLMN Dm channelLayer 3 signalling (3G TS 24.008 [7]) is defined in clause 6.~~

~~**Auto Call:**~~

~~This procedure is provided according to ITU-T V.25 bis [18] using only circuit 108/2. A subset of ITU-T V.25 bis [18] is shown in table 4. This subset gives minimum level of control and indication.~~

~~**Auto Answer:**~~

~~This procedure is provided according to ITU-T V.25 bis [18].~~

~~4.3.2.3 ITU-T X.21 [24] call establishment signalling mapping~~

~~The mapping of the ITU-T X.21 [24] procedures to the messages of the PLMN Dm channelLayer 3 signalling (3G TS 24.008 [7]) is defined in clause 7.~~VOID.

4.3.3 ITU-T S-interface (ITU-T I.420 [11]) signalling mapping

~~The mapping of ITU-T Q.931 [12] signalling to 3G TS 24.008 [7] signalling requires the inclusion, by the MT, of PLMN specific elements (eg. transparent or not, half or full rate channel). The required Bearer Capability Elements are shown in 3G TS 27.001 [9] annex 2.~~VOID.

~~4.3.4 Void~~4.3.4 X.25 Procedures Mapping

VOID.

5 Terminal Adaptation Functions for synchronous non-transparent services. ~~in GSM~~

5.1 Rate Adaptation and protocol model

5.1.1 ITU-T R-interface

For the protocol model and rate adaptation function applied in this case see Models 4b and 4e of figures 6, 7 and 8 in GSM 03.10 [2] and 3G TS 23.910~~)~~[35].

5.1.2 ITU-T S-interface

~~For the cases where the method indicated in ITU-T X.30 [28] is used see Models 4a and 4d of figures 6, 7 and 8 in GSM 03.10 [2]).~~

~~For the cases where the HDLC interframe flag stuffing shown in the recommendation ITU-T X.31 [29] is used see Models 4c and 4f of figures 6, 7 and 8 in GSM 03.10 [2]).~~VOID.

5.2 Signalling Mapping (GSM only)

5.2.1 Interchange circuit signalling mapping

Status bits SA, SB and X are used to convey channel control information associated with the data bits in the data transfer state. Table 5 shows the mapping scheme between the ITU-T V.24 [17] circuit numbers and the status bits for the non-transparent mode. It also shows how the unused status bits should be handled. It is derived from the general mapping scheme described in annex C. A binary 0 corresponds to the ON condition, a binary 1 to the OFF condition.

The transport of the status bits by the L2RCOP is described in annex A.

Table 5: Mapping scheme at the MT for the non-transparent mode

Signal at TE2/MT interface or condition within the MT	Mapping direction: MT to IWF	Mapping direction: IWF to MT
CT 105	not mapped (note 1)	
CT 106 (note 4)		from status bit X (note 7)
CT 107		not mapped (note 5)
CT 108/2	not mapped (note 6)	
CT 109		from status bit SB
CT 133 (note 8)	To status bit X (notes 3,8)	
always ON	to status bit SA (note 2)	
always ON	to status bit SB (note 1)	
ignored by MT		from status bit SA (note 2)

NOTE 1: The SB bit towards the IWF, according to the General Mapping (27.002, annex C), could be used to carry CT 105. However, CT 105 should always be ON in the data transfer state since only duplex operation is supported. Also, many DTEs use the connector pin assigned to CT 105 for CT 133. No interchange circuit shall be mapped to the SB bit, which shall always be set to ON in the data transfer state.
NOTE 2: The SA bits (both directions) are not mapped since CTs 107 and 108/2 are handled locally (notes 5, 6).
NOTE 3: The condition of status bit X towards the IWF may also be affected by the state of the receive buffer in the MT.
NOTE 4: The state of CT 106 (or other local flow control mechanism) may also be affected by the state of the transmit buffer in the MT and the state of the RLP (RR/RNR).
NOTE 5: CT 107 is controlled by the channel synchronisation process (3G TS 27.001 [9]).
NOTE 6: CT 108/2 may be used in the call setup and answering processes.
NOTE 7: For inband local flow control, changes in the condition of the status bit X from the IWF also result in the sending of XON or XOFF to the DTE.
NOTE 8: For inband local flow control, CT 133 is not mapped and the status bit X towards the IWF is controlled by the reception of XON and XOFF characters from the DTE.

5.2.2 Call establishment signalling mapping

~~FFS~~VOID.

5.3 Flow Control

The passage of flow control information between L2Rs is described in annex 1.

5.3.1 Conditions requiring flow control towards the network

The L2R function shall send immediately a "flow control active" indication in the following circumstances:

(i) if the receive buffer from the radio side reaches a preset threshold;

(ii) if local flow control is initiated by the TE2 (see subclause 5.3.3 a)). On receipt of this flow control indication transmission of data from the receive buffer towards the TE2 is halted.

On removal of the buffer congestion or local flow control the L2R shall send a "flow control inactive" indication.

In addition, for the local flow control condition, transmission of data from the receive buffers shall be restarted.

5.3.2 Conditional requiring flow control towards TE2

The L2R function shall immediately activate local flow control (see subclause 5.3.3 b)) under the following circumstances:

(i) the transmit buffer reaches a pre-set threshold;

(ii) the L2R receives a "flow control active" indication.

On removal of the buffer congestion or receipt of L2R/RLP "flow control inactive" the local flow control shall be removed.

5.3.3 Local flow control

Only inband flow control is allowed:

a) from TE2:

- RNR is sent to indicate flow control active. RR is sent to indicate flow control inactive. Where RR/RNR is utilized then the TAF shall generate flow control active/inactive immediately.

b) from TAF: As from TE2.

- where this method is used, the L2R shall pass the RNR/RR frames to the TE2.

5.4 Buffers

5.4.1 TX buffers

Data received from the TE2 shall be buffered such that if the MT is unable to transfer the data over the radio path then data is not lost.

The buffer shall be capable of holding n1 bytes. When the buffer is half full, TE2 shall be flow controlled as per subclause 5.3.2. The value for n1 is up to the implementors.

5.4.2 RX buffers

Data for transfer to the TE2 shall be buffered such that if the TE2 is unable to accept data then data transferred from the MT is not lost.

The buffer size should be n2 bytes. The value for n2 is up to the implementors.

When the buffer becomes half full, the L2R shall send a "flow control active" indication.

6 V- ~~and S-~~series interface procedures to 3G TS 24.008 [7] mapping

Editor's note: V.25bis is outdated. References to V.25 bis procedures need to be replaced by corresponding procedures based on V.250 and 3G TS 27.007.

Interface procedures not directly mappable to 3G TS 24.008 [7] (ie. ITU-T V.25 bis [18] VAL/INV) are not considered. Mobile management procedures of 3G TS 24.008 [7] are not considered applicable.

Mapping of other call establishment or clearing messages to the S interface e.g. "Call proceeding", etc. have not been included. It is assumed that these may be mapped directly and thus are of no relevance to the ITU-T V.25 bis [18] or manual interface.

6.1 Mobile Originated calls

a) SET-UP.

<table>
<tr><th rowspan="2">Element</th><th colspan="3">Derived from</th></tr>
<tr><th>MMI</th><th>ITU-T V.25 bis [18] message</th><th>ITU-T S interface message</th></tr>
<tr><td>Called Address</td><td>Keypad</td><td>CRN/CRI/CRS</td><td>Setup</td></tr>
<tr><td>Called Sub Address</td><td>Keypad</td><td>CRI</td><td>Setup</td></tr>
<tr><td>HLC</td><td colspan="2" rowspan="3">Derived from internal settings or MMI information.
Same as HLC
Same as HSC
3G TS 27.001 [9] gives allowed values</td><td>Setup</td></tr>
<tr><td>LLC</td><td>Setup</td></tr>
<tr><td>BC</td><td>Setup (with additional information from MMI oriented settings)</td></tr>
</table>

b) RELEASE COMPLETE.

Element	Derived from		
	MMI	**ITU-T V.25 bis [18] message**	**ITU-T S interface message**
Cause	Display (optional)	CFI	Release complete

6.2 Mobile Terminated calls

Call establishment is initiated by receipt of Setup at the MS:

a) SET-UP.

Element	Mapped on to		
	MMI	**ITU-T V.25 bis [18] message**	**ITU-T S interface message**
Called Address	Display (optional)	INC	Set-up
Called Sub Address	Display (optional)	Not applicable	Set-up
HLC	Display (optional)	Not applicable	Set-up
LLC	Display (optional)	Not applicable	Set-up
BC	Display (optional)	Not applicable	Set-up (with PLMN specific elements removed)

b) CALL CONFIRM.

Information for the BC element in the call confirm is derived from e.g. MMI or by internal settings.

c) CONNECT.

Connect is sent in response to connect from the S-interface, CIC from ITU-T V.25 bis [18] or from MMI.

7 ITU-T X.21 [23] interface procedures to 3G TS 24.008 [7] mapping

VOID.

7.1 ITU-T X.21 [23] procedures mapping

The ITU-T X.21 [23] procedures mapping is shown in figures 10 and 11. The Bearer Capability Elements required on Dm channelLayer 3signalling are shown in 3G TS 27.001 [9] annex 2.

NOTE: DTE corresponds to TE2 and DCE corresponds to MT2 in the signal names of ITU-T X.21 [23] interface.

7.1.1 Mobile originated call (see figure 7)

Call Request of TE2 to Dm channelLayer 3 signalling SET-UP:

At R interface: In Ready state both TE2 and MT transmit (1,OFF). When the calling TE2 indicates Call Request (0,ON), the MT transmits Proceed to Select (+,OFF). Then the TE2 sends the Selection signals (IA5,ON) and End of Selection (+,ON) and enters the state DTE Waiting (1,ON). The MT shall transmit DCE Waiting (SYN,OFF).

At MS-MSC interface: By receiving Call Request at R interface, the MT shall start mobile originated call establishment (CHANNEL REQUEST message etc.). When the MT has received Selection signals and End of Selection from TE2, it shall send SET-UP, when possible.

CALL PROCEED:

After the traffic channel assignment is complete, the MT shall start sending (1,OFF) within the 40 bit frames (see seubclauses 4.1.3 and 4.2.2) via the user plane.Bm (Lm) channel.

Dm channelLayer 3 signalling ALERT to Call Progress to TE2:

This is applicable only to manually answered calls.

When the MT receives ALERT from Dm channelLayer 3 signalling, it shall transmit Call Progress signals (IA5,OFF) to TE2 and then enter the state DCE Waiting (SYN,OFF).

Dm channelLayer 3 signalling CONN to Ready For Data to TE2:

When the MT receives CONN from Dm channelLayer 3 signalling, it shall respond with CONN ACK message and it may send DCE Provided Information to the calling TE2. The MT transmits then Connection in Progress (1,OFF) to TE2.

When the MT receives a frame with all data bits set to ONE, it performs the switch-through of data and control lines to TE2.

7.1.2 Mobile terminated call (see figure 7)

Dm channelLayer 3 signalling SET-UP to Incoming Call to TE2:

When the TE2 is in Ready state and the MT receives SET-UP via Dm channelLayer 2 signalling, the MT shall respond with ALERT in case of manual answering. Via R interface the MT transmits Incoming Call (Bell OFF) to TE2.

Call Accepted of TE2 to Dm channelLayer 3 signalling CONN:

When the MT receives Call Accepted via R interface (1,ON), it shall send CONN message via Dm channelLayer 3 signalling.

Dm channelLayer 3 signalling CONN ACK to Ready For Data to TE2:

When the MT receives CONN ACK from Dm channelLayer 3 signalling, it shall start sending (1,OFF) within the 40 bit frames via the user planeBm (Lm) channel. Via R interface the MT transmits Connection in Progress (1,OFF) to TE2 after delivering DCE Provided Information if any.

When the MT receives a frame with all data bits set to ONE, it performs the switch through of data and control lines to TE2.

7.1.3 Mobile termination clearing (see figure 8)

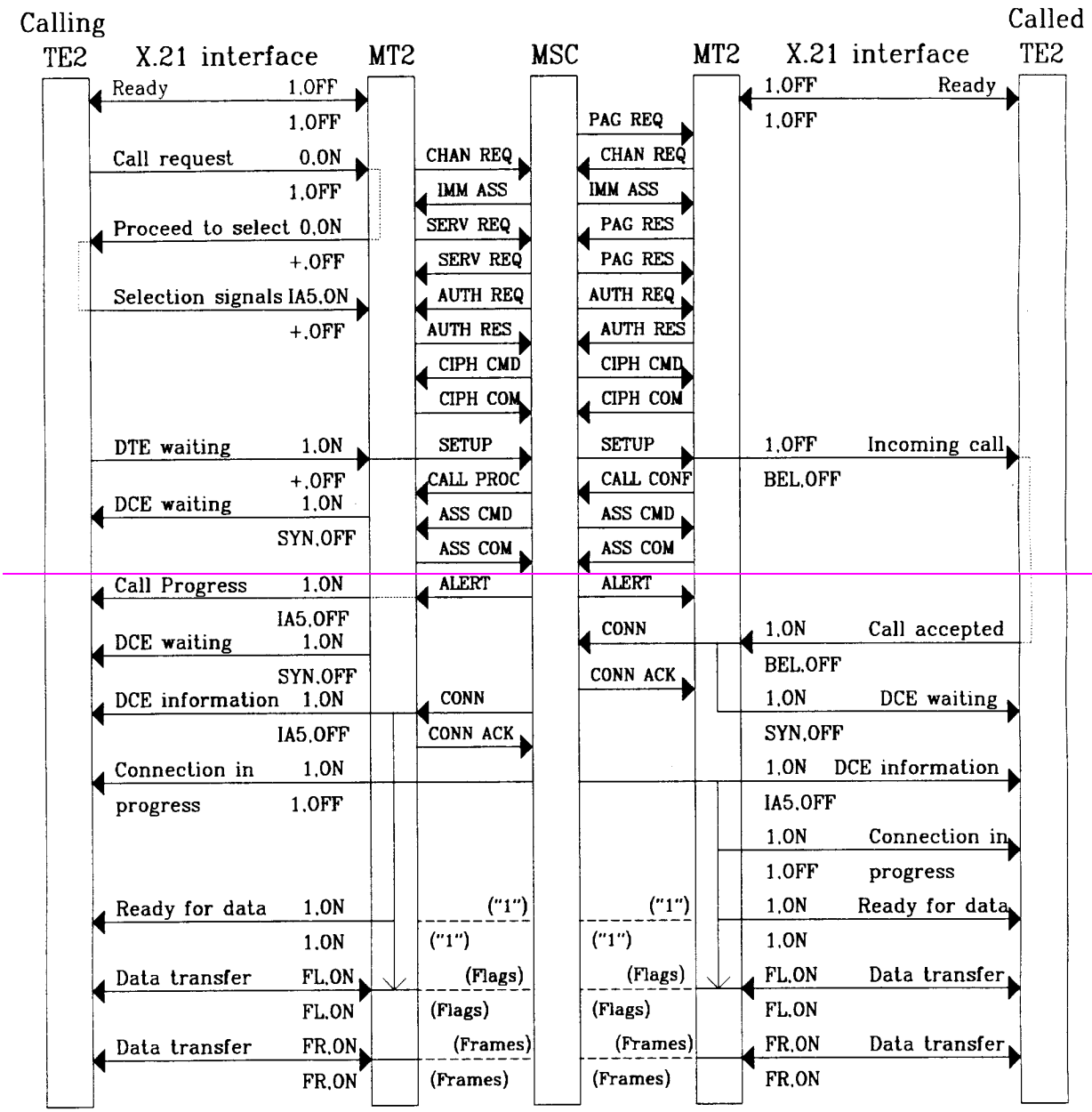
DTE Clear Request (0,OFF) is transmitted via the user planeBm (Lm) channel to the cleared terminal. The MT at the clearing TE2 recognizes the Clear Request, transmits DCE Clear Confirmation (0,OFF) to TE2 and sends DISCONNECT message via Dm channelLayer 3 signalling. When the radio channel is released, the MT shall transmit DCE Ready (1,OFF) and TE2 shall then enter the state DTE Ready (1,OFF).

7.1.4 Distant end terminal clearing

When the MT receives DCE Clear Request via the user planeBm (Lm) channel, it shall transmit DCE Clear Indication (0,OFF) to its TE2 via R interface. After the MT has received DTE Clear Confirmation (0,OFF), it sends DISCONNECT message via Dm channelLayer 3 signalling. When the radio channel is released, the MT shall transmit DCE Ready (1,OFF) and TE2 shall then enter the state DTE Ready (1,OFF).

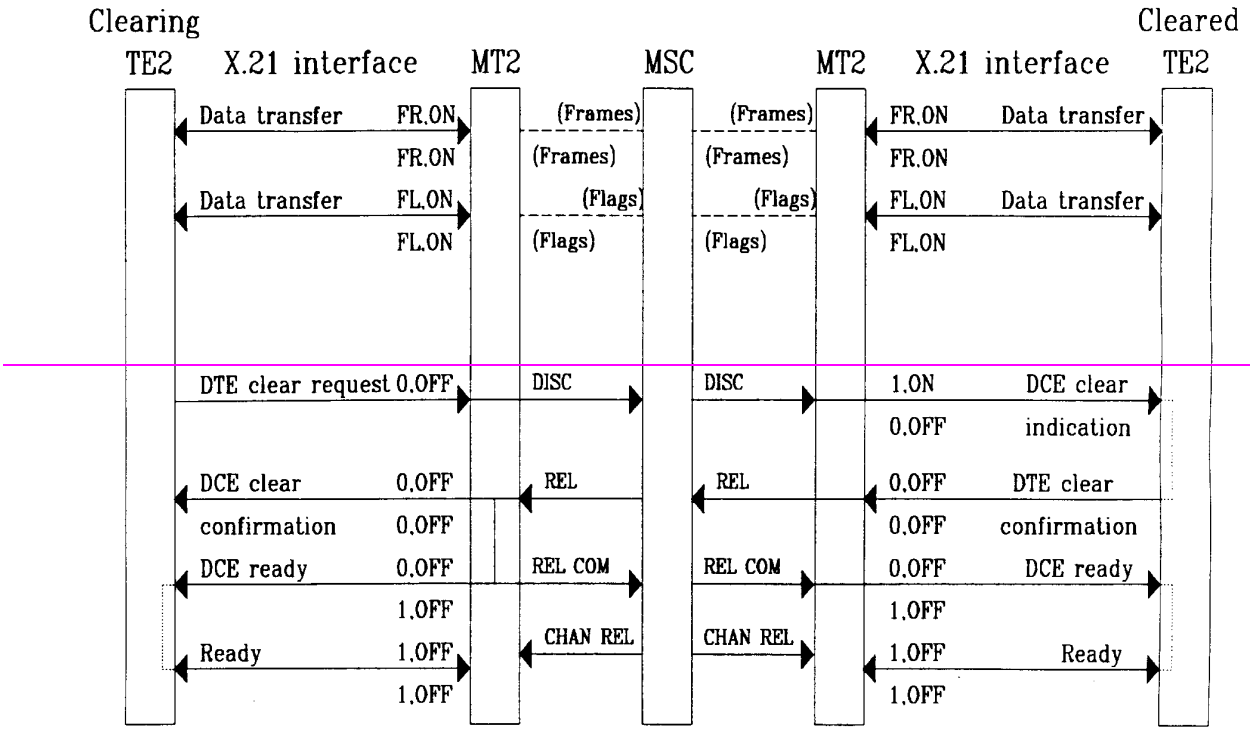
7.1.5 Network generated clearing (see figure 8)

When the MT has received DISCONNECT message via Dm channelLayer 3 signalling, it shall transmit DCE Clear Indication (0,OFF) to its TE2 via R interface. After the MT has received DTE Clear Confirmation (0,OFF) and the radio channel is released, the MT shall transmit DCE Ready (1,OFF) and TE2 shall then enter the state DTE Ready (1,OFF).



NOTE: In the signal names of ITU-T X.21 [23] interface DTE corresponds with TE2 and DCE corresponds with MT2.

Figure 7: Example of a calling and a called TE2 (ITU-T X.21 [23])



NOTE: In the signal names of ITU-T X.21 [23] interface DTE corresponds with TE2 and DCE corresponds with MT2.

Figure 8: Example of a clearing and a cleared TE2 (ITU-T X.21 [23])

7.2 Layer 3 Dm Signalling causes mapping to ITU-T X.21 [23] call progress signals

The mapping of Layer 3 PLMN Dm channel signalling to ITU-T X.21 [23] call progress signals and DCE Provided Information is shown in table 6.

7.3 ITU-T X.21 [23] FACILITIES MAPPING

The ITU-T X.21 [23] facilities are shown in table 7. The mapping of these to PLMN supplementary services is for FFS.

Table 6: Mapping of Layer 3 signallingDm cause fields to ITU-T X.21 [23] call progress signals

Item	Layer 3 Dm signalling cause	Code	ITU-T X.21 call progress signal sign.	Code
01	Unassigned (unallocated) number	01	Not obtainable	43
02	No route to destination	03	Not obtainable	43
03	Channel unacceptable	06	Not obtainable	43
04	Normal call clearing	16		
05	User busy	17	Number busy	21
06	No user responding	18	No connection	20
07	User alerting, no answer	19	No connection	20
08	Call rejected	21	Controlled not ready	45
09	Number changed	22	Changed number	42
10	Destination out of order	27	Uncontrolled not ready	46
11	Invalid number format (incomplete)	28	Selection sign. procedure error	22
12	Facility rejected	29	Invalid facility request	48
13	Response to status enquiry	30		
14	Normal, unspecified	31		
15	No circuit/channel available	34	No connection	20
16	Network out of order	38	Out of order	44
17	Temporary failure	41	Out of order	44
18	Switching equipment congestion	42	Network congestion	61
19	Access information discarded	43		
20	Requested circuit/channel not available	44	No connection	20
21	Resources unavailable, unspecified	47	Network congestion	61
22	Quality of service unavailable	49	---	
23	Requested facility not subscribed	50	Invalid facility request	48
24	Bearer capability not authorized	57	Incompat. user class of service	52
25	Bearer capability not presently available	58	Network congestion	61
26	Service or option not available, unspecified	63	No connection	20
27	Bearer service not implemented	65	Invalid facility request	48
28	Only restricted digital information bearer capability is available	70	Invalid facility request	48
29	Service or option not implemented, unspecified	79	Invalid facility request	48
30	Invalid call reference value	81	Not obtainable	43
31	Incompatible destination	88	Not obtainable	43
32	Invalid transit network selection	91	Not obtainable	43
33	Invalid message, unspecified	95	Selection signal transmis. error	23
34	Mandatory info. element error	96	Selection signal procedure error	22
35	Message type non-existent or not implemented	97	Selection signal procedure error	22
36	Message not compatible with call state or message type non-existent or not implemented	98	Selection signal procedure error	22
37	Information element non-existent or not implemented	99	Selection signal procedure error	22
38	Invalid info. element contents	100	Selection signal transm. error	23
39	Message not compatible with call state	101	Selection signal procedure error	22
40	Recovery on timer expiry	102	Not obtainable	43
41	Protocol error, unspecified	111	Selection signal procedure error	22
42	Interworking, unspecified	127	RPOA out of order	72

~~Table 7: ITU-T X.21 [23] facilities~~

~~Facility request code~~	~~Facility~~
~~1~~	~~Closed user group~~
~~45~~	~~DTE inactive registration~~
~~45~~	~~DTE inactive cancellation~~
~~60~~	~~Multiple address calling~~
~~61~~	~~Charging information~~
~~62~~	~~Called line identification~~
~~63~~	~~Redirection of callactivation~~
~~63~~	~~Redirection of callcancellation~~
~~63~~	~~Redirection of callstatus~~
~~64~~	~~Reverse status~~
~~65~~	~~Direct call registration~~
~~65~~	~~Direct call cancellation~~
~~66~~	~~Abbreviated address registration~~
~~66~~	~~Abbreviated address cancellation~~

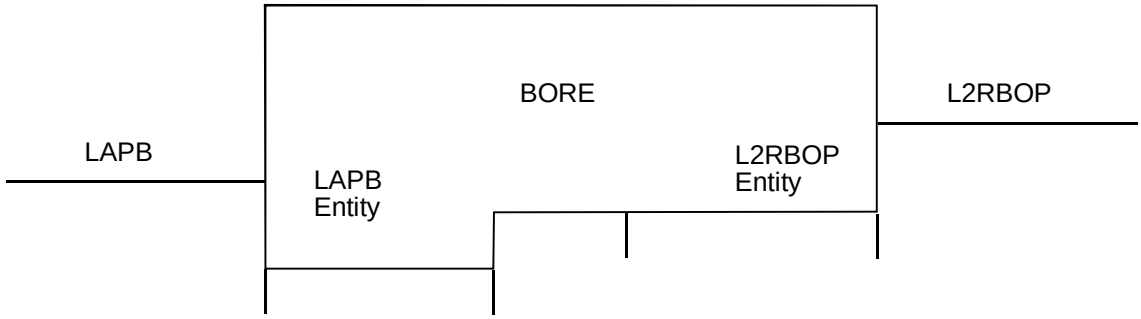
~~8 Void~~8 Support for packet service

VOID.

Annex A (normative): L2R Functionality

A.1 Introduction

This annex describes the Layer 2 Relay (L2R) functionality required to support LAPB non-transparently. The general aspects of L2Rs are described in specification 3G TS 27.001 [9]. Figure 1 shows the three sub-functions of the L2R.



LAPB Link Access Protocol Balanced
BORE Bit Oriented Relay Entity
L2RBOP L2R Bot Oriented Protocol

Figure 1: Sub-functions of the L2R

Clause 2 describes the L2R Bit Oriented Protocol (L2RBOP) and clause 3 describes the use of the L2RBOP to transport LAPB information fields.

A.2 L2RBOP

The LAPB user information fields and interface status changes are transferred between L2Rs using the services of the radio link. The L2RBOP entity segments and reassembles the LAPB user information fields to fit into the service data units (SDUs) handled by the radio link. I.e. segments of LAPB user information fields and interface status changes are transferred between L2Rs in n octet Protocol Data Units (PDUs). This corresponds to the fixed length of the RLP frame information field. The octets within the L2RBOP-PDU are numbered 0 to n-1, octet 0 is transmitted first. The value of n depends on the negotiated RLP version and frame type (3G TS 24.002 [8]). The bits within the octets are numbered 1 to 8, bit 1 is transmitted first.

The RLP version value 2 indicates RLP multi-link operation. The RLP version value 0 or 1 indicates RLP single-link operation.

The L2RBOP also provides facilities for transferring LAPB connection control information between L2Rs. This LAPB connection control information allows concatenated LAPB connections to be established, reset and released.

The L2RBOP PDUs are coded as follows:

- each octet contains a status octet, 1 - 8 bits of user information, control information or fill;
- octet 0 shall always contain a status octet in case at least one status octet is transportet in the L2RBOP PDU. In RLP-versions 0 and 1 a PDU always carries at least one status octet. In RLP version 2 a PDU carries status octet(s) only if actual status change(s) has taken place within the period represented by the PDU. Here the L2R status flag in the RLP version 2 header is set to 1 when status octet(s) is carried in the PDU;

- status octets contain 3 status bits and 5 address bits. In cases where two status octets within the PDU are separated by more than 23 octets, the first status octet in octet m is followed by a pointer octet in octet m+1 forming a two-octet status field. The pointer octet contains one reserved bit and seven address bits indicating the number of characters between the status field and the second status octet;

- the 3 status bits are used to convey the interface conditions that are conveyed by the S and X bits in ITU-T recommendations V.110 [22] ~~and X.30 [28]~~. In the case of ITU-T V series interfaces the 3 status bits correspond to SA, SB and X bits specified in ITU-T V.110 [22]. ~~In the case of ITU-T X series interfaces only 2 bits are used and these correspond to S and X bits specified in ITU-T X.30 [28].~~ The ITU-T V series SA, SB and X bits use bit positions 8, 7 and 6 respectively in the status octets. The ITU-T X series S and X bits use bit positions 7 and 6 respectively, in this case bit position 8 is unused;

- LAPB user information is carried in L2RBOP-PDU information octets such that the first LAPB user information bit, in any consecutive group of 8, received or transmitted corresponds to bit position 1 in the octet. The second to bit position 2, etc.;

- information octets are inserted into the L2RBOP-PDU in order of arrival in octets 1 to n-1 for RLP single-link operation, in octets 1 to n-1 for RLP multi-link operation with status octet transportation and in octets 0 to n-1 for multi-link operation with no status octet transportation;

- the address field in the status octets indicates the position of the next status octet within the L2RBOP-PDU. This indicates the number of information octets between status octets. Thus if two status octets are inserted into an L2RBOP-PDU at offsets l and m the address field value for the status octet at offset 1 shall be defined by m-l-1 (m>l+1). The low order bit of the address corresponds to bit 1 of the octet and the high order bit to bit 5;

- status octets are inserted in the information stream whenever a status change needs to be transmitted;

- only address values 1 to n-2 (n-2 ≤ 23) in the address field of status octets are used for addressing purposes. The implication of not allowing address value 0 to be used for addressing is that two status octets can not be sent after each other. The remaining codes are used to indicate:

  - last status change, remainder of L2RBOP-PDU is empty. Address field value is 31;

  - last status change, remainder of L2RBOP-PDU full of information octets. Address field value is 30;

  - end of a LAPB user information field. Address field value is 29. This is used to delimit LAPB user information fields. In this case the 3 status bits do not have their usual meaning. They are used to indicate the number of information bits in the previous information octet. A binary number in the range 0 to 7 is contained in bit positions 8, 7 and 6, bit 6 is the low order bit. The values 1-7 indicates the number of information bits used, value 0 indicates all bits used. If this octet is not on the last position in a L2RBOP-PDU another status octet follows (e.g. an End of LAPB user information field in octet 0 is followed by a status octet in octet 1);

  - abort a LAPB user information field transfer. The address field value is 28. This is used to abort the transmission of a LAPB user information field after sending one or more segments in L2RBOP-PDUs. If this octet is not on the last position in a L2RBOP-PDU another status octet is following (e.g. an Abort a LAPB user information field transfer in octet 0 is followed by a status octet in octet 1);

  - L2RBOP-PDU contains at least two status octets which are separated by more than 23 characters; the address-field value in the first octet of the two-octet status field is 27 and the address bits in the pointer octet of the status field indicate the number of characters between the two-octet status field and the next status octet.

- address field values from n-1 to 26 are reserved. In case of a PDU more than 25 octets in length, address field values from 24 to 26 are reserved.- When it is necessary to insert a status octet into the information stream when no status change has occurred, e.g. to indicate that the remainder of an L2RBOP-PDU is empty or to indicate end of a LAPB user information field, the current status shall be repeated;

- in case when 64 data octets are carried by a 66-octet PDU, a status octet is carried in octet 0 and another status octet within the first 24 data octets. (The first status octet gives the address of the second status octet, which carries value 30 in its address field);

- LAPB connection control information is transferred between L2Rs by use of a connection control PDU. Connection control PDUs consists of an L2RBOP PDU with the status octet in octet 0 containing address field value 0. The coding of the remainder of the L2RBOP connection control PDU is as follows:

  - octet 1 contains the connection number, always 0 for LAPB. Other values are reserved for future use;

  - octet 2 contains the connection control information. The connection control information values are 1 for Connect, 2 for Reset, 3 for Disconnect and 4 for loss of LAPB interframe fill. This octet is coded as a binary number with the low order bit corresponding to bit 1;

  - the use of octets 3 to n-1 is reserved.

- LAPB exchange identification frames (XID) are transferred between L2Rs by use of exchange identification PDUs. These PDUs consist of L2RBOP PDUs with the status octet in octet 0 containing address field values 0. The coding of the remainder of the PDU is as follows:

  - octet 1 contains the connection number, always 0 for LAPB. Other values are reserved for future use;

  - octet 2 contains the exchange identification indication. The values are 5 for an Exchange Identification Request and 6 for an Exchange Identification Acknowledge. The values 7 to 255 are reserved. This octet is coded as a binary number with the low order bit corresponding to bit 1;

  - the octet 3 contains a normal status octet. The rest of the PDU and of the following PDUs, if any, is used to transfer the XID information and it is treated like normal user data information PDUs as far as the coding is concerned.

A.3 Use of the L2RBOP

The L2R function required to support LAPB non-transparently consists conceptually of the three sub-functions shown in figure 1, i.e. the LAPB entity, the BORE and the L2RBOP entity. These perform the following functions:

- LAPB entity - This terminates the LAPB protocol from the terminal or the network. The service provided by the LAPB entity to the BORE is described in ISO DIS 8886.2 [32] - OSI Data link service definition;

- L2RBOP entity - This uses the services provided by the radio link, see specification 3G TS 24.022 [8]. The service provided by the LAPB entity to the BORE;

- BORE - This concatenates the data link services provided by the use of the L2RBOP and LAPB.

The functions are described in more detail in the following subclauses.

A.3.1 Radio Link Connection Control

The L2RBOP entity uses the services of the radio link to establish, reset and release the connection to its peer L2RBOP entity. The radio link connection shall be established and released as a result of indications from the signalling mechanisms when the supporting circuit switched connection is established.

After an RLP reset or RLP disconnect the L2RBOP entities shall assume that the remote LAPB connection is in disconnected state. No data can therefore be transported between the L2RBOP entities before an exchange of the connection control PDU "Connect" has taken place. All connection control PDUs transferred before the RLP reset are no longer valid and must not be acknowledged. All PDUs (except XID) received by the L2RBOP entities after an RLP reset or disconnect and before a new connection control PDU "Connect" has been received shall be discarded by the L2RBOP entity.

A.3.2 Status transfer

The L2RBOP entity transfers interface status information between L2Rs via the status octets in the L2RBOP-PDUs. The meaning of the bits is exactly the same as that defined in ITU-T recommendation V.110 [22]~~and X.30 [28]~~. Status changes are inserted in the L2RBOP-PDU in the position corresponding to the position in the information stream at the DTE/DCE interface that the interface status change occurred. When the RLP is established or reset a L2RBOP-PDU with the current status octet shall be sent.

A.3.3 LAPB connection control

The L2RBOP entity transfers LAPB connection control information between L2Rs via the L2RBOP connection control PDUs. This allows a LAPB connection to be established, reset and released when the remote LAPB connection is established, reset and released or vice versa. L2RBOP connection control PDUs containing connect or reset requests shall be acknowledged by a similarly coded L2RBOP connection control PDU in the reverse direction. Data transfer between L2Rs is not allowed until the connection control acknowledge PDU is received.

In the case of requests crossing they shall each be treated as acknowledgements of the other.

A.3.4 LAPB exchange identification

The L2RBOP entity transfers a LAPB exchange identification request/acknowledge between L2Rs via the L2RBOP exchange identification PDUs. This allows transfer of identification information prior to link establishment and/or during the link (especially with respect to ISO 8885 [31]/DADI). A L2RBOP exchange identification request PDU shall be answered by an associated exchange identification acknowledge PDU. In case of crossing of two requests each request shall be answered individually. A LAPB exchange identification request with identification information shall be acknowledged by the LAPB entity from L2R only when the acknowledge from the remote LAPB connection is indicated by an exchange identification acknowledge PDU sent by the remote L2RBOP entity.

A.3.5 Data Transfer

The L2RBOP entity assembles and disassembles L2RBOP-PDUs by segmenting and reassembling the LAPB user information fields.

A.3.6 Flow control

Flow control information is transferred between L2Rs in two ways, these are:

- back pressure caused by L2R buffer conditions;
- use of the X-bit in the status octet;

  X = 1 flow control active;

  X = 0 flow control inactive.

Annex B (informative): Change history

Change history						
TSG CN#	**Spec**	**CR**	**<Phase>**	**Version**	**New Version**	**Subject/Comment**
Apr 1999	GSM 07.03			6.0.0		Transferred to 3GPP CN1
CN#03	27.003				3.0.0	Approved at CN#03
CN#04	27.003	001	R99	3.0.0	3.1.0	Introduction of EDGE
CN#06	27.003	002	R99	3.1.0	3.2.0	Introduction of Asynchronous interface for Real-time non-transparent FAX
CN#06	27.003	003	R99	3.1.0	3.2.0	R99 service clean-up (also subclause 8.3 removed)
CN#07	27.003	004	R99	3.2.0	3.3.0	UMTS clean up

3GPP TSG-CN3 / ETSI SMG3 WPD
Meeting #9
Berlin, Germany,10th– 14th April 2000

Document N3-000136

e.g. for 3GPP use the format TP-99xxx
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29.007	CR	017	Current Version:	3.4.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	TSGN #8	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)*	(U)SIM		ME		UTRAN / Radio		Core Network	X

Source: TSG_N3 **Date:** 04.04.2000

Subject: Fax

Work item: Technical Enhancements and Improvements

Category: *(only one category shall be marked with an X)*

F	Correction	X
A	Corresponds to a correction in an earlier release	
B	Addition of feature	
C	Functional modification of feature	
D	Editorial modification	

Release:

Phase 2	
Release 96	
Release 97	
Release 98	
Release 99	X
Release 00	

Reason for change: GSM 02.03 on teleservices was transferred to 3G 22.003. So, the notations TS 61 and 62 are also applicable for 3G and no more only for GSM. Some corrections in table 7A.

Clauses affected: See attached pages

Other specs affected:

Other 3G core specifications		→ List of CRs:
Other GSM core specifications		→ List of CRs:
MS test specifications		→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

Other comments:

7.1 Service interworking

Service interworking is required when the Teleservices at the calling and called terminals are different. No service interworking, except for facsimile group 3 (~~GSM~~ Teleservice 61 or 62 interworking with standard facsimile group 3 service), has been identified as a requirement of the ~~GSM~~ PLMN system for PSTN/ISDN network based services.

Next section modified

10.2.2.6 Mapping Functions

The following tables (7A + 7B) show that only the ISDN BC is used for mapping (exceptions are indicated).

NOTE: The ISDN/ PLMN BC-IE mapping shall be performed as specified in tables 7A and 7B. This shall be done to allow setup of a compatible end-to-end connection between two MSs or one MS and an ISDN terminal.

In the following tables 7A and 7B the comparison is drawn between parameters in the PLMN call set up request message and that of the ISDN call set up request message. In some cases no comparable values are available and these will be marked as such. In these cases reference will need to be made to the table of network interworking in 3G TS 29.007 to identify the appropriate choice. In some cases it is not necessary to support a particular option, and in this case those parameters will be annotated appropriately.

The PLMN parameters and values are as in 3G TS 24.008 in combination as in 3G TS 27.001. The ISDN parameters and values are as in Q.931 (05/98).

Table 7A: Comparable setting of parameters in PLMN and ISDN: Mobile Originated

Octet	PLMN BC parameter value	Octet	ISDN BC parameter value
1	**Bearer Capability IEI**	1	**Bearer Capability IEI**
2	**Length of BC contents**	2	**Length of BC contents**
3 #7..6	**Radio channel requirement** half rate channel full rate channel dual, full, rate preferred dual, half rate preferred		No comparable field
3 #45	**Coding Standard** GSM standard coding	3 #7..6	**Coding Standard** CCITT standardized coding
3 #4	**Transfer mode** circuit mode packet mode (note7)	4 #7..6	Transfer mode circuit mode packet mode
3 #3..1	**Information transfer capability** speech unrestricted digital 3,1 kHz audio ex PLMN facsimile group 3 (note 1) other ITC (see octet 5a)	3 #5..1	**Information transfer capability** speech unrestricted digital 3,1 kHz audio 3,1 kHz audio~~see table 4 in GSM 09.07~~ no comparable value
5a #7..6	**Other ITC** restricted digital		(note 18)
4 #7	**Compression** (note 14) data compression allowed data compression not allowed		No comparable field
4 #6..5	**Structure** SDU integrity unstructured	4a #7..5	**Structure** (note 4)
4 #4	**Duplex mode** half duplex full duplex	5d #7	**Duplex mode** half duplex full duplex
4 #3	**Configuration** point to point	4a #4..3	**Configuration** (note 4)
4 #1	**Establishment** demand	4a #2..1	**Establishment** (note 4)
4	**NIRR** (note 12) no meaning Data ≤ 4.8kbit/s, FR nt, 6kbit/s radio interface is requested		No comparable field

(continued)

Table 7A (continued): Comparable setting of parameters in PLMN and ISDN: Mobile Originated

Octet	PLMN BC parameter value	Octet	ISDN BC parameter value
5 #5..4	**Rate adaptation** no rate adaptation (note 2) V.110, I.460/X.30 rate adaptation CCITT X.31 flag stuffing No comparable value(note 11) No comparable value(note 11) No comparable value(note 11) other rate adaptation (see octet 5a)	5 #5..1	**User information layer 1 protocol** no comparable value CCITT standardized rate adaption V.110, I.460/X.30 CCITT standardized rate adaption X.31 flag stuffing Recommendation G.711 µ-law Recommendation G.711 A-law (note 3) Recommendation G.721 32 kbit/s ADPCM and I.460 No comparable value
5a #5..4	**Other rate adaptation** V.120 (note 17) PIAFS (note 27) H.223 & H.245		 No comparable value H.223 & H.245 (note 26)
5 #3..1	**Signalling access protocol** I.440/I.450 X.21 X.28, ded.PAD, indiv.NUI (note 24) X.28, ded PAD, univ.NUI (note 24) X.28, non-ded PAD X.32		No comparable field
6 #1	**Synchronous/asynchronous** synchronous asynchronous	5a #7	**Synchronous/asynchronous** synchronous asynchronous (note 25)
6 #5..2	**User info. layer 1 protocol** default layer 1 protocol	5 #5..1	**User info. layer 1 protocol** see section under rate adaptation for 3G TS 24.008 above
6a #7	**Number of stop bits** 1 bit 2 bits	5c #7..6	**Number of stop bits** 1 bit 2 bits
6a #6	**Negotiation** In band neg. not possible no comparable value	5a #6	**Negotiation** In band neg. not possible In band neg. possible (note 10)
6a #5	**Number of data bits** 7 bits 8 bits	5c #5..4	**Number of data bits excluding parity if present** 7 bits 8 bits
6a #4..1	**User rate** 0.3 kbit/s 1.2 kbit/s 2.4 kbit/s 4.8 kbit/s 9.6 kbit/s 12 kbit/s (note 7) 1.2 kbit/s / 75 bit/s (note 24) any value no comparable value	5a #5..1	**User rate** 0.3 kbit/s 1.2 kbit/s 2.4 kbit/s 4.8 kbit/s 9.6 kbit/s 12 kbit/s 75 bit/s / 1.2 kbit/s 19.2 kbit/s (note 14) Ebits or inband negotiation (note 10)

(continued)

Table 7A (continued): Comparable setting of parameters in PLMN and ISDN: Mobile Originated

Octet	PLMN BC parameter value	Octet	ISDN BC parameter value
6b #7..6	**Intermediate rate** 8 kbit/s 16 kbit/s any value	5b #7..6	**Intermediate rate** (note 13) 8 kbit/s or not used 16 kbit/s or not used 32 kbit/s or not used (note 14)
6b #5	**NIC on Tx** does not require requires (note7)	5b #5b	**NIC on Tx** does not require requires (note 8)
6b #4	**NIC on Rx** cannot accept can accept (note 7)	5b #4	**NIC on Rx** cannot accept can accept (note 8)
6b #3..1	**Parity information** odd even none forced to 0 forced to 1	5c #3..1	**Parity information** odd even none forced to 0 forced to 1
6c #7..6	**Connection element** transparent non-transparent (RLP) both, transp. preferred both, non-transp. preferred		No comparable field
6c #5..1	**Modem type** none V.21 V.22 V.22bis V.23 (note 24) V.26ter V.32 modem for undef. interface autobauding type 1	5d #6..1	**Modem type** no comparable value (note 5) V.21 V.22 V.22bis V.23 V.26ter V.32 No comparable value (note 5) No comparable value (note 5, note 10)
7 #5..1	**User info. layer 2 protocol** X.25 link level ISO 6429, codeset 0 COPnoFICt videotex profile 1 (note 7) X.75 layer 2 modified (CAPI)	6	**User info.layer 2 prot.** (note 6) X.25 link level no comparable value no comparable value no comparable value X.25 link level
6d #5..1	**Fixed network user rate** (note 15) FNUR not applicable (note 7) 9,6 kbit/s 12 kbit/s (note 7) 14,4 kbit/s 19,2 kbit/s 28,8 kbit/s 32.0 kbit/s 33.6 kbit/s 38,4 kbit/s 48,0 kbit/s 56,0 kbit/s 64,0 kbit/s	5a #5..1	**User rate** no comparable value 9,6 kbit/s 12 kbit/s 14,4 kbit/s 19,2 kbit/s 28,8 kbit/s 32.0 kbit/s no comparable value 38,4 kbit/s 48,0 kbit/s 56,0 kbit/s no comparable value (note 16)

(continued)

Table 7A (concluded): Comparable setting of parameters in PLMN and ISDN: Mobile Originated

Octet	PLMN BC parameter value	Octet	ISDN BC parameter value
6e #3..1	**Maximum number of traffic channels** 1 TCH 2 TCH 3 TCH 4 TCH 5 TCH 6 TCH 7 TCH (note 7) 8 TCH (note 7)		No comparable field
6f #4..1	**Wanted air interface user rate (note 23)** air interface user rate not applicable (note 7) 9,6 kbit/s 14,4 kbit/s 19,2 kbit/s 28,8 kbit/s 38,4 kbit/s 43,2 kbit/s 57,6 kbit/s interpreted by the network as 38.4 kbit/s (note 7)		No comparable field
6d #7..6	**Other modem type** (note 15) No other modem type V.34	5d #6..1	**Modem type** no comparable value V.34
6e #7..4	**Acceptable channel coding(s)** TCH/F4.8 acceptable (note 19) TCH/F9.6 acceptable TCH/F14.4 acceptable		No comparable field
6f #7..5	**User initiated modification indicator (note 23)** User initiated modification not required User initiated modification upto 1 TCH/F may be requested User initiated modification upto 2 TCH/F may be requested User initiated modification upto 3 TCH/F may be requested User initiated modification upto 4 TCH/F may be requested		No comparable field
6g #7..5	**Acceptable channel coding(s) (note 20)** TCH/F28.8 acceptable TCH/F32.0 acceptable (note 21) TCH/F43.2 acceptable (note 22)		No comparable field
6g #4..3	**Asymmetry preference indication (Note 23)** no preference up link biased asymmetry preference down link biased asymmetry preference		No comparable field

The application rules for coding the information elements ISDN-BC/LLC/HLC as set out in ETR 018 and Q.931 (05/98) shall apply.

Other field values in the ISDN BC-IE not supported in 3G TS 24.008 are:

Information transfer rate: In this case default 64 kbit/s is selected.

Flow control on transmission: This shall be selected if outband flow control applies.

Flow control on reception: This shall be selected if outband flow control applies.

NOTE: Outband flow control is indicated by the absence of the UIL2P parameter for non-transparent connections.

User information layer 3 protocol:

Octet 7 shall not be sent unless specific application rules are given for particular cases (to be defined by PLMN). End-to-end significant User Information layer 3 protocol shall be sent by LLC.

NOTE 1: In the case where PLMN BC "Information Transfer Capability" indicates "Facsimile group 3" and only a single PLMN BC is contained in the call set-up request then this shall be mapped to an ISDN BC with:

Coding standard:	CCITT
Information Transfer capability:	3,1 kHz audio
Transfer mode:	circuit
Information transfer rate:	64 kbit/s
User layer 1 protocol:	G711 A-law or µ-law (PCS-1900)

and

- If an HLC is not present, the network will insert a "Facsimile group 2/3" HLC.
- If an HLC element is present, the network will pass it through unmodified.

In the case where PLMN BC "Information Transfer Capability" indicates "Facsimile group 3" and two PLMN BCs are contained in the call set-up request, then the same ISDN BC as mentioned above is created. If the first PLMN BC indicates "facsimile group 3" an HLC "facsimile group 2/3" will be inserted by the network (if not received from the MS). However if the first PLMN BC indicates "speech", the network will not send a HLC, irrespective where a HLC was received from the MS or not.

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Oahu, Hawaii, 22nd – 26th May 2000

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GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

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list expected approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [ ] UTRAN / Radio [ ] Core Network [X]

Source: TSG_N3 **Date:** 25.5.2000

Subject: Clarification of the VMSC behaviour in case of interworking

Work item: GSM maintenance

Category: *(only one category shall be marked with an X)*

F	Correction		**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature	X		Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change:
Due to the fact, that some national specifications on ISUP interworking require a special behaviour, following happens quite often:
In case of a mobile terminated international FAX/Data Call, at the VMSC incoming IAM with the MSRN, contains a complete “Speech” ISDN BC, which differs from the one stored in the VLR, received with the MAP Beg “ Provide Roaming Number” message. Following 29.007 the IAM/ISDN BC applies and not the GSM/ISDN BC from the VLR. This fact leads to unsuccessful calls. The CR adds an addition to Chapter 10.2.2.4 stating clearly the behaviour of the VMSC in the above mentioned case. The general behaviour of the VMSC will not change with this CR.
The SDL diagrams in annex A are changed as in case of facsimile.

Clauses affected:
10.2.2.4 Functions in VMSC
Annex A

Other specs affected:

Other 3G core specifications		→ List of CRs:
Other GSM core specifications		→ List of CRs:
MS test specifications		→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

Other comments:


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Chapter 10.2.2.4 edited

10.2.2.4 Functions in VMSC

At the VMSC, when the incoming call arrives, the LLC/HLC and the PLMN or ISDN BC associated with the MSRN is retrieved from the VLR. LLC and HLC are sent with the PLMN BC in general to the MS at call set-up. In particular, however the following rules apply:

1) If the Initial Address Message (IAM) contains no ISDN BC and there is no PLMN or ISDN BC/LLC/HLC retrieved from the VLR, the call is handled as subclause 9.2.2 case b.

2) If there is no ISDN BC in the IAM but a PLMN or ISDN BC/LLC/HLC was signalled in the "provide roaming number" message, the retrieved PLMN or ISDN BC/LLC/HLC applies.

3) If there is an ISDN BC in the IAM with the ITC field set to "3,1 kHz audio" but without any associated modem type or indication of facsimile group 3 in the HLC, the PLMN or ISDN BC/LLC/HLC retrieved from the VLR is considered as applicable when it exists. If no PLMN or ISDN BC is retrieved from the VLR, the call is handled as in subclause 9.2.2 case b.

4) If the ISDN BC received in the IAM has the ITC field set to the value "unrestricted digital information" and the fields for the applicable "user layer 1 protocol" and "user rate" (except for the 64kbit/s case, see Note 22 Table 7B) are available (either in the ISDN BC or ISDN LLC), or if 3,1 kHz audio and a modem type is indicated, this ISDN BC is applicable regardless of what has been retrieved from the VLR. In this case the ISDN BC shall be mapped to an appropriate PLMN BC (refer to table 7B).

   In exception to this the BC stored in the VLR is retrieved and send to the MS if one of the following cases applies:

   If ITC = UDI/RDI and User Rate = 32 kbit/s /56 kbit/s and User information layer 1 protocol = V.110, I.460/X.30 and the stored BC indicates FTM, PIAFS or Multimedia.

   If ITC = 3.1 kHz audio and User Rate = 28.8 kbit/s and Modem Type = V.34 and the stored BC indicates Multimedia.

5) If the ISDN BC received in the IAM has the ITC field set to the value "3,1kHz audio" and a HLC "facsimile group 3" is indicated, the PLMN BC retrieved from the VLR is applicable when it exists. If a PLMN BC-IE with the parameter "information transfer capability" set to "alternate speech/facsimile group 3, starting with speech" (stating TS61) is retrieved from the VLR, this shall be mapped to two PLMN BC-IE preceded by a repeat indicator, one representing speech, the other representing facsimile group 3.

   When no PLMN BC is retrieved from the VLR, either two PLMN BCs preceded by a repeat indicator (stating Teleservice TS 61), or a single PLMN BC-IE (stating TS 62), are sent in the setup message, depending whether TS 61 or TS 62 is subscribed (see also subclause 10.3.1.3).

   In case of TS 61, the order in which the two PLMN BC-IEs are sent towards the MS, in the setup message, is a network option.

6) If the ISDN BC received in the IAM has a ITC value "unrestricted digital information" but without applicable "user layer 1 protocol" and "user rate", etc. fields, neither in the ISDN BC nor ISDN LLC, then the PLMN or ISDN BC/LLC retrieved from the VLR is applicable, if available otherwise subclause 9.2.2 case b applies.

   In case of an ISDN BC/LLC/HLC was attached to the MSRN this shall be mapped to an appropriate PLMN BC (refer to table 7B). However in both cases (PLMN or ISDN BC attached) the PLMN specific parameters of the PLMN BC-IEs may be added/modified in line with procedures identified in subclause 9.2.2.

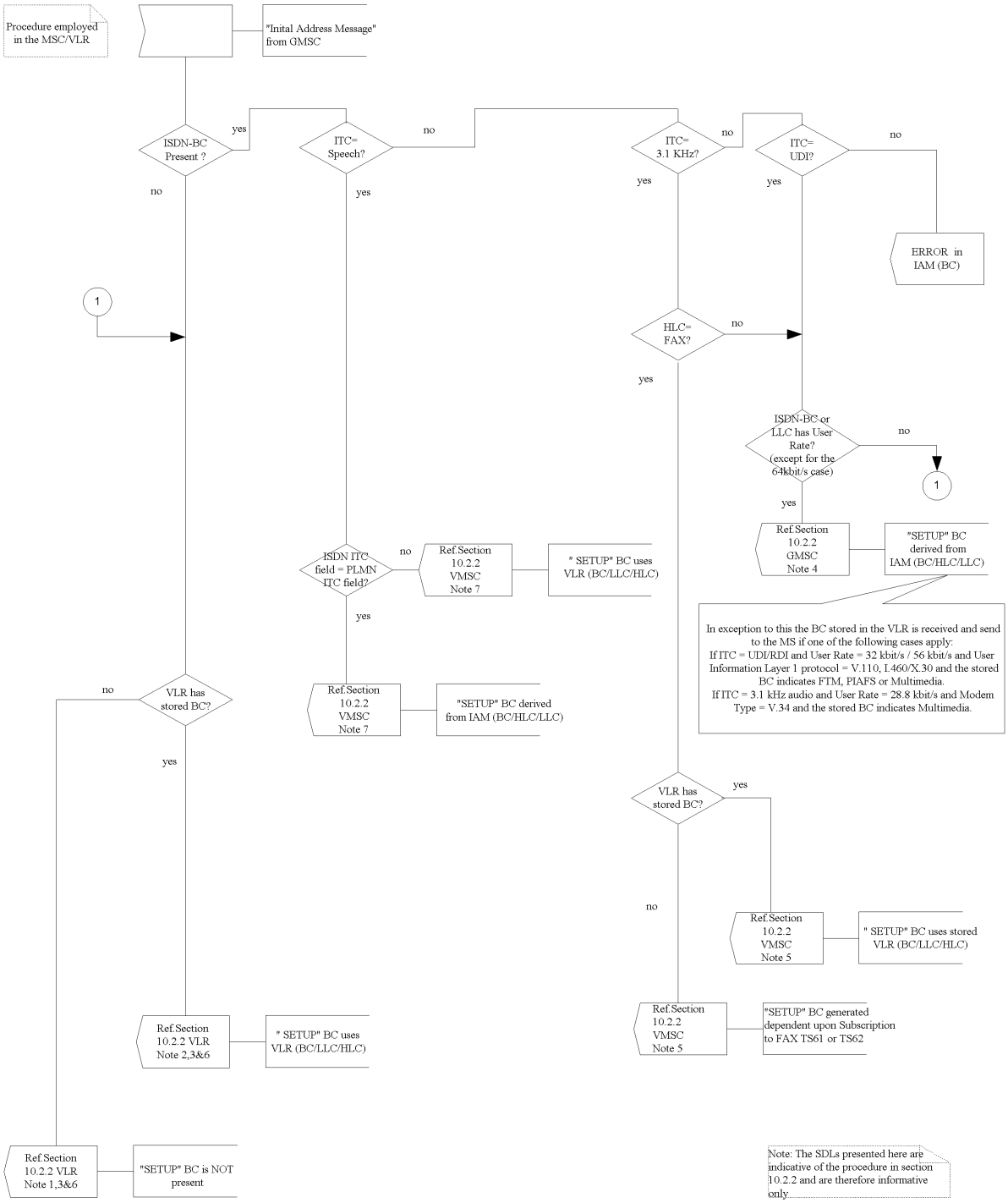
7) If the ISDN BC received in the IAM has the ITC field set to the value " Speech" and the~~e BC~~ ITC field of the ISDN BC received with the IAM differs from the ~~ISDN/PLMN BC~~ ITC field of the BC stored~~received~~ in

the VLR for this call, the VLR BC/LLC/HLC is considered applicable. If no PLMN or ISDN BC is retrieved from the VLR, the call is handled as in subclause 9.2.2 case b.

In all cases when no PLMN or ISDN BC is retrieved from the VLR and no ISDN Compatibility information allowing deduction of a PLMN Bearer Service is available, then no PLMN BC is inserted by the VMSC and subclause 9.2.2 case b applies.

Annex A following

Procedure DataFlow_MSC_VLR



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Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [ ] UTRAN / Radio [ ] Core Network [X]

Source: TSG_N3 **Date:** 2000-05-23

Subject: ISDN TA function in case of bit transparent 56 kbit/s (RDI) and 64kbit/s (UDI)

Work item: Technical Enhancements and Improvements

Category: *(only one category shall be marked with an X)*

F	Correction	X	**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change: IWF has no ISDN TA function in case of bit transparent 56 kbit/s (RDI) and 64kbit/s (UDI). Structure of the MSC/IWF (transparent) for UMTS should explicitly indicate that.

Clauses affected: Figure 10 in section 10.2.3.1

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other GSM core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments:

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10.2.3 Transparent service support

The protocol stacks for transparent services are specified in GSM 03.10 (GSM) and in 3G TR 23.910 (UMTS).

In UMTS, the transparent services are based in the Iu User Plane protocol specified in 3G TS 25.415.

In GSM identifies the rate adaptation scheme shall be utilized on the BSS to MSC link as identified in GSM 08.20. The transcoding function will generate the 64 kbit/s rate adapted format utilizing the 8 and 16 kbit/s intermediate data rates. The MSC - MSC/IWF will utilize the same rate adaptation scheme as that indicated in GSM 08.20, i.e. adapted to 64 kbit/s.

10.2.3.1 Structure of the MSC/IWF for UMTS

The transmission towards the RNC is based on AAL2. The Iu UP is used in the transparent mode.

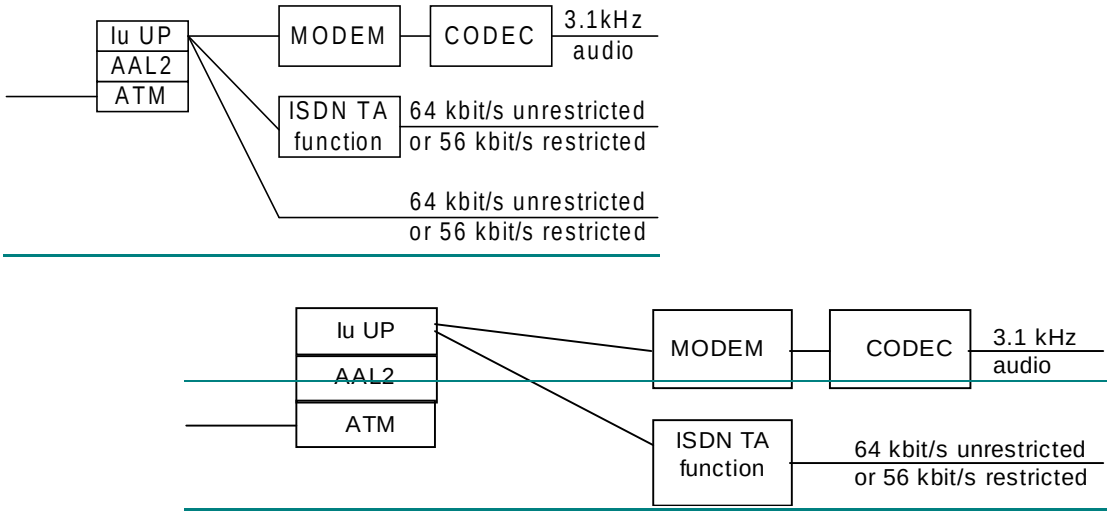

Figure 10: Structure of the MSC/IWF (transparent)

10.2.3.2 Structure of the MSC/IWF for GSM

When interworking to the unrestricted digital bearer service rate adaptation according to ITU-T V.110 will be necessary within the MSC/IWF. For multislot, TCH/F14.4 or EDGE operations MSC/IWF shall adapt the data stream as defined in GSM 04.21 and GSM 08.20.

NOTE: From the perspective of MSC/IWF, a TCH/F28.8 EDGE configuration is identical to a multislot 2×TCH/F14.4 configuration.

When interworking to the 3,1 kHz audio service, then the same process as for the PSTN case is necessary (section 9.2.3.2).

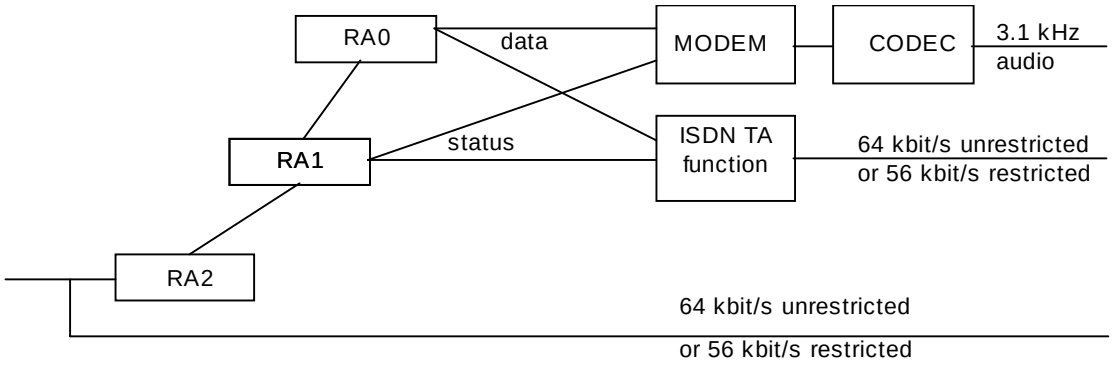

Figure 11: Structure of the MSC/IWF (transparent)