3GPP TSG CN Plenary **Tdoc NP-000606**
Meeting #10, Bangkok, Thailand
6th – 8th December 2000

Source: **TSG CN WG 3**

Title: **CRs to Release 4 Work Item T.E.I4 (CS Bearers)**

Agenda item: **7.6**

Document for: **APPROVAL**

Introduction:

This document contains **5** CRs on **Rel-4 Work Item "T.E.I",** that have been agreed by TSG CN WG3, and are forwarded to TSG CN Plenary meeting #10 for approval.

Spec	CR	Rev	Doc-2nd-	Phase	Subject	Cat	Version-Current
03.10	A014		N3-000600	Rel-4	Removal of BS 30 NT	C	8.3.0 [Note 1]
04.21	A022		N3-000601	Rel-4	Removal of BS 30 NT	C	8.3.0 [Note 1]
27.001	043		N3-000605	Rel-4	Removal of BS 30 NT	C	4.1.0
27.003	007		N3-000606	Rel-4	Removal of BS 30 NT	C	3.5.0
29.007	033		N3-000596	Rel-4	Removal of BS 30 NT	C	4.0.0

Note1. This R99 version will be created following CN#9, is used as the base for the new v4.0.0 [also created following TSG#9]

3GPP TSG-CN WG3 Meeting #14 ***Tdoc N3-000596***
Sophia Antipolis, France, 14th – 16th November 2000

CR-Form-v3

CHANGE REQUEST

⌘ **29.007** **CR** **033** ⌘ **rev** **-** ⌘ **Current vers** **4.0.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM [ ] ME/UE [X] Radio Access Network [ ] Core Network [X]

Title:	⌘	Removal of BS 30 NT
Source:	⌘	TSG CN WG3
Work item code:	⌘	TEI4 (CS bearers)
Date:	⌘	03/11/00
Category:	⌘	C
Release:	⌘	REL-4

Use one of the following categories:
F *(essential correction)*
A *(corresponds to a correction in an earlier release)*
B *(Addition of feature),*
C *(Functional modification of feature)*
D *(Editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	Removal of BS 30 NT and editorial corrections
Summary of change:	⌘	Update of scope, references and mapping tables
Consequences if not approved:	⌘	Inconsistent to 22.002

Clauses affected:	⌘	1, 2, 6.1, 7.1, 7.2, 7.3, 7.4, 7.5, 10.2.2.6, 10.2.4.5, 10.2.4.12, 10.2.4.15, Annex B		
Other specs affected:	⌘	[X] Other core specifications [ ] Test specifications [ ] O&M Specifications	⌘	22.002, 27.001, 27.003, 03.10, 04.21
Other comments:	⌘			

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at:
http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.
3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

1 Scope

The present document identifies the Mobile-services Switching Centre/Interworking Functions (MSC/IWFs) and requirements to support interworking between:

a) PLMN and PSTN;

b) PLMN and ISDN;

for circuit switched services in the PLMN. It is not possible to treat ISDN and PSTN as one type of network, even when both ISDN and PSTN subscribers are served by the same exchange because of the limitations of the PSTN subscribers access i.e. analogue connection without D-channel signalling.

Within the present document, the requirements for voice and non-voice (data) calls are considered separately.

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

- the dual Bearer Services "alternate speech/data" (BS 61) and "speech followed by data" (BS 81);
- the dedicated services for PAD (BS 4x) and Packet access (BS 5x);
- the single asynchronous and synchronous Bearer Services (BS 21..26, BS 31..34).

From R00 onwards the following service is no longer required by a PLMN:

- the synchronous Bearer Service non-transparent (BS 30 NT).

If a PLMN network still provides these services it shall fulfil the specification of GSM R98 or R99, respectively.

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.

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] ITU-T Recommendation G.711: "Pulse code modulation (PCM) of voice frequencies".

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

[3] ITU-T Recommendation I.464: "Multiplexing, rate adaption and support of existing interfaces for restricted 64 kbit/s transfer capability".

[4] ITU-T Recommendation Q.922 (1992): "DSS 1 Data link layer: ISDN data link layer specification for frame mode bearer services".

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

[6] ITU-T Recommendation V.22: "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".

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

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

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

[10] ITU-T Recommendation V.32bis: "A duplex modem operating at data signalling rates of up to 14 400 bit/s for use on the general switched telephone network and on leased point-to-point 2-wire telephone-type circuits"

[11] ITU-T Recommendation V.34: "A modem operating at data signalling rates of up to 33 600 bit/s for use on the general switched telephone network and on leased point-to-point 2-wire telephone-type circuits".

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

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

[14] 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".

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

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

[17] ETSI ETR 018: "Integrated Services Digital Network (ISDN); Application of the Bearer Capability (BC), High Layer Compatibility (HLC) and Low Layer Compatibility (LLC) information elements by terminals supporting ISDN services".

[18] ETSI ETS 300 102-1 Edition 1 (1990): "Integrated Services Digital Network (ISDN); User-network interface layer 3 Specifications for basic call control".

[19] ETSI EN 300 403-1 V1.2.2 (1998-04): "Integrated Services Digital Network (ISDN); Digital Sunscriber Signalling System No. One (DSS1) protocol; Signalling network layer for circuit-mode basic call control; Part 1: Protocol specification".

[20] 3GPP TS 41.001: "Digital cellular telecommunication system (Phase 2+); GSM Release 1999 Specifications".

[21] 3GPP TS 41.004: "Digital cellular telecommunication system (Phase 2+); Abbreviations and acronyms".

[22] 3GPP TS 42.001: "Digital cellular telecommunication system (Phase 2+); Principles of telecommunication services supported by a GSM Public Land Mobile Network (PLMN)".

[23] 3GPP TS 42.003: "Digital cellular telecommunications system (Phase 2+); Teleservices supported by a GSM Public Land Mobile Network (PLMN)".

[24] 3GPP TR 43.010: "Digital cellular telecommunications system (Phase 2+); GSM PLMN Connection types".

[25] 3GPP TS 43.045: "Digital cellular telecommunications system (Phase 2+); Technical realization of facsimile group 3 transparent".

[26] 3GPP TS 43.050: "Digital cellular telecommunications system (Phase 2+); Transmission planning aspects of the speech service in the GSM Public Land Mobile Network (PLMN) system".

[27] 3GPP TS 44.021: "Digital cellular telecommunications system (Phase 2+); Rate adaption on the Mobile Station - Base Station System (MS - BSS) interface".

[28] 3GPP TS 48.020: "Digital cellular telecommunication system (Phase 2+); Rate adaption on the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface".

[29] 3GPP TS 48.060: "Digital cellular telecommunications system (Phase 2+); Inband control of remote transcoders and rate adaptors for Enhanced Full Rate (EFR) and full rate traffic channels".

[30] 3GPP TS 49.002 : "Digital cellular telecommunications system (Phase 2+); Mobile Application Part (MAP) specification".

[31] 3GPP TS 49.003: "Digital cellular telecommunication system (Phase 2+); Signalling requirements on interworking between the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN) and the Public Land Mobile Network (PLMN)".

[32] 3GPP TS 21.101: "3rd Generation Partnership Project; Technical Specification Group: Release 1999 Specifications".

[33] 3GPP TS 22.002: " Circuit Bearer Services (BS) supported by a GSM Public Land Mobile Network (PLMN)".

[34] 3GPP TS 22.004: "General on supplementary services".

[35] 3GPP TS 23.003: "Numbering, addressing and identification".

[36] 3GPP TS 23.008: "Organization of subscriber data".

[37] 3GPP TS 23.011: "Technical realization of supplementary services".

[38] 3GPP TS 23.146: "Technical realization of facsimile group 3 non-transparent".

[39] 3GPP TS 23.054: "Description for the use of a Shared Inter Working Function in a GSM PLMN; Stage 2".

[40] 3GPP TS 24.008: "Mobile radio interface layer 3 specification".

[41] 3GPP TS 24.022: "Radio Link Protocol (RLP) for circuit switched Bearer and Teleservices ~~data and telematic services on the Mobile Station - Base Station System (MS - BSS) interface and the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface~~".

[42] 3GPP TS 25.415: "Iu Interface CN-UTRAN User Plane Protocols".

[43] 3GPP TS 27.001: "General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".

[44] 3GPP TS 27.002: "Terminal Adaptation Functions (TAF) for services using asynchronous bearer capabilities".

[45] 3GPP TS 27.003: "Terminal Adaptation Functions (TAF) for services using synchronous bearer capabilities".

[46] 3GPP TS 29.002: "Mobile Application Part (MAP) specification".

[47] ~~3GPP TS 29.006: "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".~~void

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

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

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

[51] ITU-T Recommendation V.8: "Procedures for starting sessions of data transmission over the public switched telephone network".

[52] 3GPP TS 26.111: "Codec for Circuit Switched Multimedia Telephony Service; Modifications to H.324".

[53] 3GPP TR 23.910: " Circuit Switched Data Bearer Services".

[54] ITU-T Recommendation H.223: "Multiplexing protocol for low bit rate multimedia communication".

[55] ITU-T Recommendation H.223, Annex A: "Multiplexing protocol for low bit rate multimedia communication over low error-prone channels".

[56] ITU-T Recommendation H.223, Annex B: "Multiplexing protocol for low bit rate multimedia communication over moderate error-prone channels".

[57] ITU-T Recommendation H.223, Annex C: "Multiplexing protocol for low bit rate multimedia communication over highly error-prone channels".

[58] ITU-T Recommendation H.324: "Terminal for low bit-rate multimedia communication".

[59] ITU-T Recommendation H.221: “Frame structure for a 64 to 1920 kbit/s channel in audiovisual teleservices”.

[60] ITU-T Recommendation H.242: “System for establishing communication between audiovisual terminals using digital channels up to 2 Mbit/s”.

[61] ITU-T Recommendation H.245: “Control protocol for multimedia communication”.

[62] ITU-T Recommendation V.8 bis: “Procedures for the identification and selection of common modes of operation between data circuit-terminating equipments (DCEs) and between data terminal equipments (DTEs) over the public switched telephone network and on leased point-to-point telephone-type circuits”.

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

[64] 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".

[65] ITU-T Recommendation V.23: “600/1200-baud modem standardized for use in the general switched telephone network”.

[66] ITU-T Recommendation V.26: “2400 bits per second modem standardized for use on 4-wire leased telephone-type circuits”.

[67] ITU-T Recommendation V.26 bis: “2400/1200 bits per second modem standardized for use in the general switched telephone network”.

[68] ITU-T Recommendation V.26 ter: "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".

[69] ITU-T Recommendation V.27: “4800 bits per second modem with manual equalizer standardized for use on leased telephone-type circuits”.

[70] ITU-T Recommendation V.27 bis: “4800/2400 bits per second modem with automatic equalizer standardized for use on leased telephone-type circuits”.

[71] ITU-T Recommendation V.29: "9 600 bits per second modem standardized for use on point-to-point 4-wire leased telephone-type circuits".

[72] ITU-T Recommendation Q.921: “ISDN user-network interface - Data link layer specification”.

[73] ITU-T Recommendation X.21: “Interface between Data Terminal Equipment and Data Circuit-terminating Equipment for synchronous operation on public data networks”.

[74] 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".

[75] ITU-T Recommendation X.28: "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".

[76] ITU-T Recommendation X.31: “Support of packet mode terminal equipment by an ISDN”.

[77] ITU-T Recommendation X.75: “Packet-switched signalling system between public networks providing data transmission services”.

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

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

Next section modified

6 Network Characteristics

6.1 Key Characteristics of Networks Concerned

Table 1: Key Characteristics of Networks Concerned

Characteristic	PLMN	ISDN	PSTN
Subscriber Interface	Digital	Digital	Analogue
User-network signalling	3GPP TS 24.008	DSS1, other UNIs	loop-disconnect and DTMF
User-terminal equipment supported	for GSM see 3GPP TS 04.02 for UMTS see 3GPP TS 27.001	Digital TE (ISDN NT, TE1 or TE2+TA) see e.g. I.411	Analogue TE (e.g. dial pulse telephones PABXs modem equipped DTEs)
Inter-exchange signalling	SS No.7 ISUP TUP+, MAP	SS No.7 ISUP TUP+, TUP, NUP	Channel associated (e.g. R2, No.4, No.5) or common channel (e.g. No.6)
Transmission facilities	Digital	Digital	Analogue
Exchange types	Digital	Digital	Analogue/digital
Information transfer mode	Circuit~~/Packet~~	Circuit~~/Packet~~	Circuit
Information transfer capability	Speech, digital unrestricted, alternate speech/ group 3 fax etc.	Speech, digital unrestricted, 3,1 kHz audio, video etc.	3,1 kHz audio (voice/voice- band data)

Next section modified

7 Interworking classifications

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 (Teleservice 61 or 62 interworking with standard facsimile group 3 service), has been identified as a requirement of the PLMN system for PSTN/ISDN network based services.

7.2 Network interworking

Network interworking is required whenever a PLMN and a non-PLMN together are involved to provide an end to end connection and may be required in instances of PLMN to PLMN connections.

The concept of Bearer Services was developed for the ISDN and has been extended to the PLMN. A bearer service is defined (in 3GPP TS 42.001) as.

A type of telecommunication service that provides the capability for the transmission of signals between user-network interfaces.

Bearer services are described by a number of attributes, where an attribute is defined as a specified characteristic of an object or element whose values distinguish that object or element from others.

For the purpose of the present document, a PSTN is assumed to provide a bearer service which equates to an ISDN 3,1 kHz audio bearer service.

Refer to 3GPP TS 22.002 for complete list of bearer services. Refer to 3GPP TS 24.008 for coding of Bearer Capabilities. Refer to 3GPP TS 27.001 for the allowed combinations of parameter value settings.

Table 3: Bearer Service Interworking

~~Bearer service category in PLMN~~	~~Bearer Service in PLMN~~	~~Bearer service in ISDN~~	~~Service in PSTN~~
~~Circuit mode unstructured with unrestricted digital capability Transparent and Non transparent~~	~~Asynchronous Data general~~	~~Cct mode structured 64 kbit/s unrestricted~~	~~Not Applicable~~
~~Circuit mode unstructured with unrestricted digital capability Transparent~~	~~Synchronous Data general~~		
~~Circuit mode unstructured with unrestricted digital capability. Non-transparent~~	~~Packet Services see 3GPP TS 29.006~~	~~Packet Services see 3GPP TS 29.006~~	
~~3,1 kHz Audio Ex PLMN Transparent and Non-transparent~~	~~Asynchronous Data general~~	~~Cct Mode 3,1 kHz Audio~~	~~Cct Mode 3,1 kHz Audio~~
~~3,1 kHz Audio Ex PLMN Transparent~~	~~Synchronous Data general~~		
~~3,1 kHz Audio Ex PLMN Non Transparent~~	~~See 3GPP TS 29.006~~	~~See 3GPP TS 29.006~~	

Bearer service category in PLMN	Bearer Service in PLMN	Bearer service in ISDN	Service in PSTN
Circuit mode unstructured with unrestricted digital capability Transparent and Non-transparent	Asynchronous Data general	Cct mode structured 64 kbit/s unrestricted	Not Applicable
Circuit mode unstructured with unrestricted digital capability Transparent	Synchronous Data general		
3,1 kHz Audio Ex PLMN Transparent and Non-transparent	Asynchronous Data general	Cct Mode 3,1 kHz Audio	Cct Mode 3,1 kHz Audio
3,1 kHz Audio Ex PLMN Transparent	Synchronous Data general		

Table 4: Network interworking of Teleservices

Teleservice in PLMN	Lower layer capabilities addressed in the PLMN Bearer Capabilities IE	Bearer service in ISDN	Service in PSTN
Telephony	Unstructured with speech capability	Speech or Cct mode 3,1 kHz audio	Cct Mode 3,1 kHz audio
Emergency calls	Unstructured with speech capability		
Alternate speech/ facsimile group 3	Data Cct duplex synchronous access alternate speech group 3 fax	Cct mode 3,1 kHz audio	Cct mode 3,1 kHz audio
Automatic Facsimile group 3	Data Cct duplex synchronous access group 3 fax	Cct mode 3,1 kHz audio	

This table does not identify any relationship between Teleservices in the PLMN with those in the ISDN/PSTN, it is merely to identify the interworking of the lower network layers of that teleservice with the network layers i.e. bearer service in the ISDN/PSTN.

7.3 Signalling interworking

See 3GPP TS 49.003[31].

7.4 Numbering

See 3GPP TS 23.003[35].

7.5 Supplementary service interworking

For general aspects of supplementary services refer to 3GPP TS 22.004 [34] and 23.011 [37].

Not every supplementary service may be used in combination with each basic service. The applicability of each supplementary service for a basic service is defined in 3GPP TS 22.004 [34].

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 3GPP 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 3GPP TS 24.008 in combination as in 3GPP 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 #5	**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 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~~(note 25) 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 No comparable value H.223 & H.245 (note 26)
5a #5..4	**Other rate adaptation** V.120 (note 17) PIAFS (note 27) H.223 & H.245		
5 #3..1	**Signalling access protocol** I.440/I.450 X.21 (note 24) X.28, ded.PAD, indiv.NUI (note 24) X.28, ded PAD, univ.NUI (note 24) X.28, non-ded PAD (note 24) X.32 (note 24)		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 3GPP 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 (note 24) ISO 6429, codeset 0 COPnoFICt videotex profile 1 (note 7) X.75 layer 2 modified (CAPI) (note 24)	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 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

General notes:

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 3GPP 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 transmission ,

Flow control on reception: This shall be selected if outband flow control applies. Outband flow control is indicated by the absence of the UIL2P parameter for non-transparent connections.

~~NOTE 0: 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.

Notes regarding particular entries in table 7A:

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.

NOTE 2: This value is present in combination with information transfer capability parameter value "3,1 kHz audio Ex PLMN" or "facsimile group 3" and will therefore be mapped to the value "Recommendation G.711 A-law" or Recommendation G.711 µ-law" (PCS-1900) of the Q.931 (05/98) parameter user layer 1 protocol (see note 3).

NOTE 3: The value "Recommendation G.711 A-law" or "Recommendation G.711 µ-law" (PCS-1900) applies only when the Q.931 (05/98) parameter information transfer capability indicates "3,1 kHz audio" or "speech".

NOTE 4: When interworking with an ISDN according to ETS 300 102-1 octets 4a and 4b shall not be included because default values apply. In an ISDN according to Q.931 (05/98) these octets no more exist.

NOTE 5: In this case octet 5d shall not be included.

NOTE 6: Octet 6 shall not be sent unless specific application rules are given for a particular case (PLMN specified). End-to-end significant user information layer 2 protocol shall be sent by LLC.

NOTE 7: Not used for currently defined Bearer Services and Teleservices.

NOTE 8: These values will only be set if the "Information Transfer Capability" indicates "3,1 kHz audio", synchronous data transmission is used and octet 5b of the ISDN BC is present.

NOTE 9: (VOID).

NOTE 10: The PLMN BC-IE parameter value "autobauding modem type 1" will be mapped to the ISDN BC-IE parameter values "inband negotiation possible" and "user rate indicated by E-bits specified in ITU-T Recommendation I.460 or may be negotiated inband" (octet 5a of ISDN BC-IE). In case of data compression high speed modems, like V.32bis, V.34 and/or V.90 may be used in the IWF. Autobauding may also be used to support user rates less than 9.6 kbit/s towards the PSTN.

NOTE 11: The ITC value of the PLMN BC-IE "speech", "3,1 kHz audio Ex PLMN" will indicate these requirements.

NOTE 12: For the use of NIRR see 3GPP TS 27.001.

NOTE 13: The value of the Intermediate Rate field of the ISDN Bearer Capability information element shall only depend on the values of the User Rate and the Information Transfer Capability in the same information element. The correspondence is:

Intermediate Rate = not used if User Rate > than 19.2 kbit/s.
Intermediate Rate = 32 kbit/s if User Rate = 19,2 kbit/s or 14.4 kbit/s.
Intermediate Rate = 16 kbit/s if User Rate = 9,6 kbit/s.
Intermediate Rate = 8 kbit/s otherwise.

In case of Audio calls the value of the Intermediate Rate may be set to "not used".

NOTE 14: If compression is supported by the MSC and "data compression allowed" is indicated, then the ISDN user rate for UDI calls shall be set as follows. If the parameter "FNUR" is present the ISDN user rate shall be set to this value. Otherwise the PLMN user rate shall be mapped to an equal or any higher ISDN user rate value (in case of V.110 the highest ISDN user rate shall be 19,2 kbit/s). The Intermediate Rate shall be set to an appropriate value.(see subclause 10.2.4.11).

In case of "3,1 kHz audio" the modem shall try to negotiate data compression and flow control (see subclause 9.2.4.11). In case of "autobauding type 1" high speed modems may be used (see note 10).

NOTE 15: User rate of the PLMN -BC is overridden by the fixed network user rate of the PLMN BC-IE if available. When the MT indicates „autobauding", „modem for undefined interface" or „none", the other modem type shall be set to „no other modem type"; any other value of the modem type is overridden by the other modem type value (see 3GPP TS 27.001). In UMTS, if octet 6d is not present in the PLMN BC, the MSC shall reject the call. The support of user rates lower than 9.6 kbit/s in UMTS are only possible in the scope of autobauding (see note 10).

NOTE 16: The ISDN-BC will consist of the octets 1 to 4 only, coded:

Coding standard:	CCITT
Information Transfer capability:	UDI
Transfer mode:	circuit
Information transfer rate:	64 kbit/s

NOTE 17: V.120 interworking is selected.

If an LLC element is not present, the network will insert an LLC. If an LLC is present it may be modified. The PLMN -BC parameters negotiated with the MS shall be mapped to the LLC parameters. The LLC parameter Rate Adaptation will be set to "V.120".

When interworking with unrestricted 64 kbit/s networks the ISDN BC shall be coded according to note 16.

NOTE 18: When the MSC is directly connected to a restricted 64 kbit/s network, the ISDN BC-IE is coded with an ITC = RDI.
When indirectly interworking with a restricted 64 kbit/s network the ISDN BC-IE shall be coded according to ETR 018, as shown below:

Coding standard:	CCITT
Information Transfer capability:	UDI
Transfer mode:	circuit
Information transfer rate:	64 kbit/s
User information layer 1 protocol:	V.110/X.30
Synchronous/Asynchronous:	synchronous
Negotiation:	In-band negotiation not possible
User rate:	56 kbit/s

If an LLC element is not present, the network will insert an LLC. If an LLC is present it may be modified. The PLMN -BC parameters negotiated with the MS shall be mapped to the LLC parameters according to the rules in this table. The LLC parameter Information Transfer Capability will be set to „restricted digital"

NOTE 19: 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 MSC may act as if TCH/F9.6 were included in the ACC.

NOTE 20: Extension of the 'Acceptable channel codings' field in octet 6e in case EDGE channel codings are supported.

NOTE 21: Void

NOTE 22: Only applicable for non-transparent services.

NOTE 23: This parameter shall be included if EDGE channel codings are indicated in ACC. 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 24: This value was used by services defined for former GSM releases and does not need to be supported.

NOTE 25: The case of FTM is identified by Rate adaptation in the PLMN BC-IE set to "CCITT X.31 flag stuffing", Connection element set to "non-transparent", and Synchronous/asynchronous set to "asynchronous". The parameter values shall be set according to Note 16 in case FNUR is 64 kbit/s and according to Note 18 if Other ITC is RDI.

NOTE 26: In the case FNUR=64 kbit/s the ISDN BC-IE shall be coded as follows:

Coding standard:	ITU-T
Information Transfer capability:	UDI
Transfer mode:	circuit
Information transfer rate:	64 kbit/s
User information layer 1 protocol:	H.223 and H.245

In the case FNUR=56 kbit/s the ISDN BC-IE shall be coded as in note 18.

In the case FNUR=32 kbit/s the ISDN BC-IE shall be coded as follows:

Coding standard:	ITU-T
Information Transfer capability:	UDI
Transfer mode:	circuit
Information transfer rate:	64 kbit/s
User information layer 1 protocol:	V.110, I.460 & X.30
Synchronous/Asynchronous:	synchronous
Negotiation:	In-band negotiation not possible
User rate:	32 kbit/s

In the case FNUR=28.8 kbit/s the ISDN BC-IE shall be coded as follows:

Coding standard:	ITU-T
Information Transfer capability:	3,1 kHz Audio
Transfer mode:	circuit
Information transfer rate:	64 kbit/s
User information layer 1 protocol:	G.711 A-law or µ-law
Synchronous/Asynchronous:	synchronous
Negotiation:	In-band negotiation not possible
Modem type:	V.34
User rate:	28.8 kbit/s

In the case FNUR=33.6 kbit/s the ISDN BC-IE shall be coded as follows:

Coding standard:	ITU-T
Information Transfer capability:	3,1 kHz Audio
Transfer mode:	circuit
Information transfer rate:	64 kbit/s
User information layer 1 protocol:	G.711 A-law or µ-law

NOTE 27: In the case the FNUR=32 kbit/s the ISDN BC-IE shall be coded for PIAFS as follows:

Coding standard:	ITU-T
Information Transfer capability:	UDI
Transfer mode:	circuit
Information transfer rate:	64 kbit/s
User information layer 1 protocol:	V.110, I.460 and X.30
Synchronous/Asynchronous:	synchronous
Negotiation:	In-band negotiation not possible
User rate:	32 kbit/s

In the case of a FNUR=64 kbit/s the ISDN BC-IE shall be coded for PIAFS as in note 16.

Table 7B: Comparable setting of parameters in PLMN and ISDN: Mobile Terminated

Octet	ISDN BC parameter value	Octet	PLMN BC parameter value
1	**Bearer Capability IEI**	1	**Bearer Capability IEI**
2	**Length of BC contents**	2	**Length of BC contents**
	no comparable field	3 #7..6	**Radio channel requirement** full rate channel (these bits are spare in the network to MS direction)
3 #7..6	**Coding standard** CCITT standardized coding	3 #5	**Coding standard** GSM standardized coding
3 #5..1	**Information transfer capability** speech unrestricted digital 3,1 kHz audio no comparable value no comparable value 7 kHz audio video (note 23)	3 #3..1	**Information transfer capability** speech unrestricted digital 3,1 kHz audio ex PLMN (note2) facsimile group 3 (note 3) other ITC (see octet 5a) not supported not supported
		5a #7..6	**Other ITC** restricted digital
4 #7..6	**Transfer mode** circuit mode packet mode	3 #4	**Transfer mode** circuit mode not supported~~circuit mode~~
4 #5..1	**Information transfer rate** 64 kbit/s		no comparable field
	No comparable field	4 #7	**Compression** (note 18) data compression possible data compression not possible
	No comparable field (note 4)	(4) 4 #6..5	**Structure** (note 9) SDU integrity unstructured
4a #4..3	No comparable field (note 4)	4 #3	**Configuration** point-to-point (note 5)
	No comparable field	4 #2	**NIRR** (note 17) No meaning Data ≤ 4.8 kbit/s, FR nt, 6 kbit/s radio interface requested
4a #2..1	No comparable field (note 4)	4 #1	**Establishment** demand (note 5)
4b #7..6			
4b #5..1			

(continued)

Table 7B (continued): Comparable setting of parameters in PLMN and ISDN: Mobile Terminated

Octet	ISDN BC parameter value	Octet	PLMN BC parameter value
5 #5..1	**User information layer 1 protocol** no comparable value CCITT V.110, I.460 / X.30 G.711 A-law CCITT X.31 flag stuffing no comparable value No comparable value H.221 & H.242(note 28) H.223 & H.245	5 #5..4	**Rate adaption** no rate adaption (note 11) V.110, I.460/X.30 rate adaption no comparable value not supported~~CCITT X.31 flag stuffing~~ other rate adaption (see octet 5a)
		5a #5..4	**Other rate adaptation** V.120 (note 24) PIAFS H.223 & H.245 H.223 & H.245
	no comparable field	5 #3..1	**Signalling access protocol** I.440/I.450 X.21 (note 26) X.28, ded.PAD, indiv.NUI (note 26) X.28, ded.PAD, univ.NUI (note 26) X.28, non-ded.PAD (note 26) X.32 (note 26)
	any of the above values ~~see above~~	6 #5..2	**User information layer 1 protocol** default layer 1 protocol
5a #7	**Synchronous / asynchronous** synchronous asynchronous	6 #1	**Synchronous/asynchronous** synchronous asynchronous
5a #6	**Negotiation** not possible inband neg, possible (note 16)	6a #6	**Negotiation** not possible no comparable value

(continued)

Table 7B (continued): Comparable setting of parameters in PLMN and ISDN: Mobile Terminated

Octet	ISDN BC parameter value	Octet	PLMN BC parameter 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 rate is indicated by Ebit as specified in rec. I.460 0,6 kbit/s 3,6 kbit/s 7,2 kbit/s 8 kbit/s 14,4 kbit/s 16 kbit/s 19.2 kbit/s 28.8 kbit/s 32 kbit/s 38.4 kbit/s 48 kbit/s 56 kbit/s 57.6 kbit/s 0,1345 kbit/s 0,1 kbit/s 75 bit/s / 1,2 kbit/s 1,2 kbit/s / 75 bit/s 0,110 kbit/s 0,2 kbit/s	6a #4..1	**User rate (note 18 and 29)** 0,3 kbit/s 1,2 kbit/s 2,4 kbit/s 4,8 kbit/s 9,6 kbit/s 12 kbit/s (note 13) **(**note 16) not supported not supported not supported not supported (note 20) not supported (note 20) (note 20) (note 20) (note 20) (note 20) (note 20) not supported not supported not supported not supported not supported not supported not supported
5b #7..6	**Intermediate rate** not used (note 19) 8 kbit/s 16 kbit/s 32 kbit/s	6b #7..6	**Intermediate rate** (note 6) (note 18) 8 or 16 kbit/s 8 kbit/s 16 kbit/s
5b #5	**NIC on Tx** (note 14) does not require requires	6b #5	**NIC on Tx** does not require requires (note 13)
5b #4	**NIC on Rx** (note 14) cannot accept can accept	6b #4	**NIC on Rx** cannot accept can accept (note 13)
5b #3	**Flow control on Tx** (note 15) Not Required Required		no comparable field
5b #2	**Flow control on Rx** (note 15) Cannot Accept Accept		no comparable field
5c #7..6	**Number of stop bits** 1 bit 2 bits not used 1.5 bits	6a #7	**Number of stop bits** 1 bit 2 bits no comparable value not supported

(continued)

Table 7B (continued): Comparable setting of parameters in PLMN and ISDN: Mobile Terminated

Octet	ISDN BC parameter value	Octet	PLMN BC parameter value
5c #5..4	**Number of data bits** 7 bits 8 bits not used 5 bits	6a #5	**Number of data bits** 7 bits 8 bits no comparable value not supported
5c #3..1	**Parity information** odd even none forced to 0 forced to 1	6b #3..1	**Parity information** odd even none forced to 0 forced to 1
	no comparable field	6c #7..6	**Connection element** (note 1) transparent non-transparent (RLP) both, transp. preferred both, non-transp preferred
5d #7	**Duplex mode** half duplex full duplex	4 #4	**Duplex mode** half duplex (note 13) full duplex (note 5)
5d #6..1	**Modem type** reserved V.21 V.22 V.22bis V.23 V.26ter V.32 V.26 V.26bis V.27 V.27bis V.29 no comparable value	6c #5..1	**Modem type** (note 12) none (note 7) V.21 V.22 V.22bis not supported V.26ter V.32 not supported not supported not supported not supported not supported autobauding type 1 (note 16)
5a #5..1	**User rate** no comparable value 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 kbit/s 56 kbit/s no comparable value	6d #5..1	**Fixed network user rate** (note 20) FNUR not applicable 9,6 kbit/s 14,4 kbit/s 19,2 kbit/s 28,8 kbit/s 32.0 kbit/s (note 27) 38,4 kbit/s 48,0 kbit/s 56,0 kbit/s 64,0 kbit/s (note 22)
	Modem type no comparable value (note 21) V.34	6d #7..6	**Other modem type** No other modem type V.34

(continued)

Table 7B (concluded): Comparable setting of parameters in PLMN and ISDN: Mobile Terminated

Octet	ISDN BC parameter value	Octet	PLMN BC parameter value
	No comparable field	6f #7..5	**User initiated modification indicator (note 1) (note 25)** 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
6 #5..1	**User information layer 2 protocol (note 10)** Q.921 (I.441) X.25, link level no comparable value	7	**User information layer 2 protocol (note 8)** no comparable value not supported~~X.25, link level~~ ISO 6429, codeset 0
7	**User information layer 3 protocol (note 10)** Q.931 (I.451) X.25, packet level		 not supported not supported

General notes:

1) Other ISDN BC parameter values than those listed in the table, if indicated in the BC-IE, will be rejected by clearing the call, exception see mapping note 4.

2) Only the PLMN BC parameter values listed in the table may be generated (comparable values) during a mobile-terminated call by mapping the ISDN BC parameter values, exception see (10).

3) According to Q.931 (05/98) and 3GPP TS 24.008, respectively, the octets are counted from 1 to n onwards; the bit position in a particular octet is indicated by #x..y, with {x,y} = 1..8 (bit 1 is the least and bit 8 the most significant bit).

4) If octets 5 to 5d of the ISDN BC are absent but present in the LLC, the LLC octets should apply for the mapping as indicated above. In the case of V.120 interworking (see note 24) these LLC octets shall apply.

5) If within the ISDN BC the parameters information transfer capability indicates "3,1 kHz audio" and user layer 1 protocol indicates "G711 A-law" or "G.711 µ-law" (PCS-1900) but no modem type is available and the HLC does not indicate "facsimile group 3", octets 5 to 5d of the LLC, if available, apply for the above mapping procedure.

6) The number of octets which shall be encoded for the PLMN BC-IE must comply to encoding rules in 3GPP TS 24.008 and the combination of the different parameter values shall be in accordance to 3GPP TS 27.001.

~~NOTES regarding the mapping~~Notes regarding particular entries in table 7B:

1) This PLMN parameter value is inserted according to user rate requirements and network capabilities / preferences.

2) This PLMN parameter value is inserted, if the information transfer capability in ISDN BC is "3,1kHz audio" and a comparable modem type is specified.

3) This PLMN parameter value is inserted, if the information transfer capability is "3,1 kHz audio" and the content of the HLC-IE, if any, indicates "facsimile group 2/3", (for details refer to subclause 10.2.2 case 3 for HLR action and case 5 for VMSC action). Note that via MAP the value "alternate speech/facsimile group 3 - starting with speech" shall be used, when TS 61 applies.

4) When interworking with an ISDN according to ETS 300 102-1, octets 4a and 4b may be present. The values are ignored and PLMN values are set according to notes 5 and 9.

5) This PLMN parameter value is inserted if the comparable ISDN parameter value is missing.

6) The value of the Intermediate Rate field of the GSM Bearer Capability information element shall only depend on the value of the user rate in the same information element. If the connection element is "transparent", the value is 16 kbit/s, if the user rate is 9.6 or 12 kbit/s, and 8 kbit/s otherwise. For any other connection element setting the value is 16 kbit/s.

7) This PLMN BC parameter value is inserted, if the PLMN BC parameter "Information Transfer Capability" indicates "Unrestricted digital information", "facsimile group 3" or "alternate speech/facsimile group 3, starting with speech".

8) Where the network indicates "asynchronous" and connection elements "non-transparent", "both, transparent preferred" or "both, non-transparent preferred" , then the GSM BC should be forwarded without parameter user information layer 2 protocol, see also (10).

9) The PLMN parameter value shall be set to "unstructured" where the network indicates connection element "transparent". Where the network indicates connection elements "non transparent" "both, transparent preferred" or "both, non transparent preferred" the value of the parameter structure shall be set to "SDU Integrity".

10) Mapping of parameter values of this octet to PLMN BC parameters and values are subject to specific application rules, i.e. unless otherwise explicitly stated in an appropriate TS mapping to PLMN BC parameters shall not take place.

11) This value shall be used when the value of the PLMN BC parameter "Information Transfer Capability" indicates the value "3,1 kHz audio ex PLMN", "facsimile group 3" or "alternate speech/facsimile group 3, starting with speech" which is reserved for MAP operations.

12) The modem encoding of both Q.931 (05/98) and ETS 300 102-1 version 1 shall be accepted and mapped according to 3GPP TS 24.008.

13) Value not used for currently defined bearer services and Teleservices.

14) NIC is only supported in GSM for "3,1 kHz Ex PLMN audio" interworking with synchronous data transmission.

15) Because the required flow control mechanism can not be indicated to the MS (refer to 3GPP TS 27.001), the network shall check if the flow control mechanism selected by the MS and indicated in the CALL CONFIRMED message suits to the requirements requested by the ISDN terminal adaptor. In case of a mismatch the call shall be released in the IWF.

    Because an asymmetric flow control mechanism (with respect to transmitting and receiving side) is not supported in the PLMN, the different values of the ISDN BC-IE parameters "flow control on Tx" and "flow control on Rx" shall be interpreted in the following way:

    - "Flow control on Rx" set to "accepted" matches with "outband flow control", irrespective of the value of the parameter "flow control on Tx".

    - "Flow control on Rx" set to "not accepted" and "flow control on Tx" set to "not required" matches with "inband flow control" and "no flow control".

    - where "Flow control on Rx" is set to "not accepted" and "flow control on Tx" to "required" the call shall be released by the IWF.

16) If in case of 3,1 kHz audio interworking "inband negotiation possible" is indicated and the parameter user rate is set to "rate is indicated by E bits specified in Recommendation I.460 or may be negotiated inband" the user rate in the PLMN BC-IE shall be set according to a network preferred value. If ISDN-BC parameter modem type is present, its value shall be ignored. The PLMN-BC parameter modem type shall be set according to the user rate in case of connection element "transparent" and to "autobauding type 1" in case of connection element "non transparent", "both, transparent preferred" or "both, non transparent preferred". In case of data compression high speed modems, like V.32bis, V.34 and/or V.90 may be used in the IWF. Autobauding may also be used to support user rates less than 9.6 kbit/s towards the PSTN.

    For unrestricted digital interworking the call shall be rejected if these values are indicated.
    If the PLMN-BC parameter modem type indicates "autobauding type 1" or "none", then the PLMN-BC parameter other modem type shall be set to "no other modem type".

17) For the use of NIRR see 3GPP TS 27.001. The VMSC shall set this parameter dependent upon its capabilities and preferences.

18) If compression is supported by the MSC, the value "data compression possible" may be set. Depending on the capabilities of the MSC, the user rate value and the intermediate rate value is set to an appropriate value.

19) Only applicable if the parameter ISDN-BC ITC indicates "3,1 kHz audio" and for "UDI" calls if User Rate > "19,2 kbit/s".

20) The user rate of the PLMN BC is set to the value for the fall-back bearer service. In case the mobile station does not support the fixed network user rate (i.e. the call confirmation message does not contain the fixed network user rate parameter), the network may release the call for a transparent connection element.

21) The modem type parameter of the PLMN -BC is taken into account, only.

22) In case no LLC is received and the ISDN-BC received consists of octets 1 to 4 only, coded:

Coding standard:	CCITT
Information Transfer capability:	UDI
Transfer mode:	circuit
Information transfer rate:	64kbit/s

the following PLMN -BC parameters, shall be set to:

fixed network user rate:	64 kbit/s
connection element:	transparent bothNT or bothT (If IWF supports FTM or PIAFS)

The other parameters of the PLMN -BC shall be set to values indicating a fall-back service.

23) When the MSC is directly connected to a restricted 64 kbit/s network, the ISDN BC-IE is coded with an ITC = RDI.
An ISDN BC-IE, as specified in ETR 018 and shown below, shall be taken to indicate that interworking with an indirectly connected restricted 64 kbit/s network is required:

Coding standard:	CCITT
Information Transfer capability:	UDI
Transfer mode:	circuit
Information transfer rate:	64 kbit/s
User information layer 1 protocol:	V.110/X.30
Synchronous/Asynchronous:	synchronous
Negotiation:	In-band negotiation not possible
User rate:	56 kbit/s

In this case the PLMN BC parameter Information Transfer Capability is set to „Other ITC" and Other ITC parameter is set to „restricted digital".If ISDN LLC exists, all the corresponding fields in the PLMN BC shall be derived from the ISDN LLC. Otherwise, the corresponding fields in the UMTS BC shall be derived from the ISDN BC. In the above both case, Connection element is set as follows.

Connection element:	transparent bothNT or bothT (If IWF supports FTM)

24) V.120 interworking is required if the ISDN LLC parameter User Information Layer 1 Protocol is set to „V.120". In this case the PLMN BC parameter Rate Adaptation is set to „Other rate adaptation" and Other Rate Adaptation parameter is set to „V.120". All the corresponding fields in the GSM BC shall be derived from the ISDN LLC.

25) This parameter is only included in case of non-transparent multislot connections.

26) This value was used by services defined for former GSM releases and does not need to be supported.

27) Following BC parameters in SETUP message shall be set to:

Fixed network user rate	32 kbit/s
Connection element	transparent (for multimedia) bothNT or bothT (If IWF supports PIAFS, UMTS only)

28) UIL1P is set to "H.221 & H.242" or "H.223 & H.245" by H.324/I. In the case where UIL1P is set to "H.221 and H.242", this should be mapped to "H.223 & H.245".

29) In UMTS, if the User Rate of the ISDN BC is less than 9,6 kbit/s and the Connection Element is mapped to "NT", then FNUR is fixed to 9,6 kbit/s.

Next section modified

10.2.4.5 In band signalling mapping flow control

This entails the L2R function providing the means of controlling and responding to flow control function of the modem (or in the rate adapted frame) plus any synchronizations requirements related to flow control. ~~f~~For synchronous services flow control is covered by the protocol indicated whereas for asynchronous services a specific rule applies for flow control (see 3GPP TS 27.001).

In case of interworking to the ISDN "3,1kHz audio" bearer service the flow control process is as for the PSTN interworking case (see subclause 9.2.4.5). In case of interworking to the ISDN unrestricted digital bearer service the following procedures apply:

The flow control function chosen will be dependent upon the availability of the "user information layer 2" information element of the GSM BC and if available its value.

For V.110 interworking, outband flow control will be by means of the "X" bit in the V.110 frame to the ISDN.

For V.120 interworking, outband flow control shall be as follows. In Multiple frame acknowledged mode the functions of the data link control sublayer (send RNR or withhold update of the sequence state variable V(R)) shall be used. In Unacknowledged mode the RR bit in the Control State octet shall be used.

For PIAFS interworking, outband flow control shall be as follows. The functions of the data link control sublayer (withhold update of the frame number) shall be used.

If flow control is provided irrespective of the type used, the L2R function shall:

a) provide immediate indication of flow control to the fixed network on receipt of flow control request from the MS; and/or

b) provide immediate indication of flow control to the MS on receipt of flow control request from the fixed network i.e. in the next available L2R status octet to be transmitted.

Where in band (X-on/X-off) flow control is in use, then the X-on/X-off characters will not be passed across the radio interface.

If no flow control is provided the involved end systems are responsible for performing in-band flow control on their own by taking into account the buffer capacity of the MSC/IWF as stated below.

Next section modified

10.2.4.12 Additional aspects of V.120 Interworking

V.120 rate adaptation may be invoked with ~~either synchronous or~~ asynchronous services only. V.120 is applicable to both UDI and RDI connections.

10.2.4.12.1 V.120 Signalling parameters

The signalling parameters relevant to V.120 will be carried in the ISDN LLC and PLMN BC and PLMN LLC information elements. The mapping of the parameter values takes place in the MSC/IWF.

For mobile terminated calls both single-numbering and multi-numbering scenarios may apply, as defined in subclause 9.2.2. The HLR shall not store an ISDN LLC with the MSISDN.

10.2.4.12.2 V.120 Protocol parameters

The following restrictions apply for the parameters relevant for V.120:

- BS 20 NT will use the protocol sensitive asynchronous mode. ~~BS 30 NT will use the protocol sensitive synchronous mode.~~ As a consequence, the rate adaption header shall always be present.
- Only the default logical link will be established, i.e. the LLI negotiation value is "Default, LLI=256 only".
- V.120 recommends the use of the multiple frame acknowledged information transfer procedure for the protocol sensitive mode of operation.
- The IWF shall use the default value for the V.120 window size and the default value for the maximum transmit information field size. It shall be able to receive frames with the default maximum size.

NOTE: V.120 does not specify the values for these and other HDLC-related parameters directly. They are specified in Q.922 (1992) section 5.9. The information field includes the V.120 terminal adaption data field, the rate adaption header and the header extension (Control State octet), if present.

Next section modified

10.2.4.15 Interworking in Frame Tunneling Mode

Figure 14 below shows the protocol stack used for FTM. The interface between the two asynchronous-synchronous conversion functions in the IWF and the remote terminal adapter (TA) is a 64 kbit/s UDI or a 56 kbit/s RDI connection. X.31 flag stuffing is used to adapt the rate between the two conversion functions. Data transparency is provided through bit stuffing.

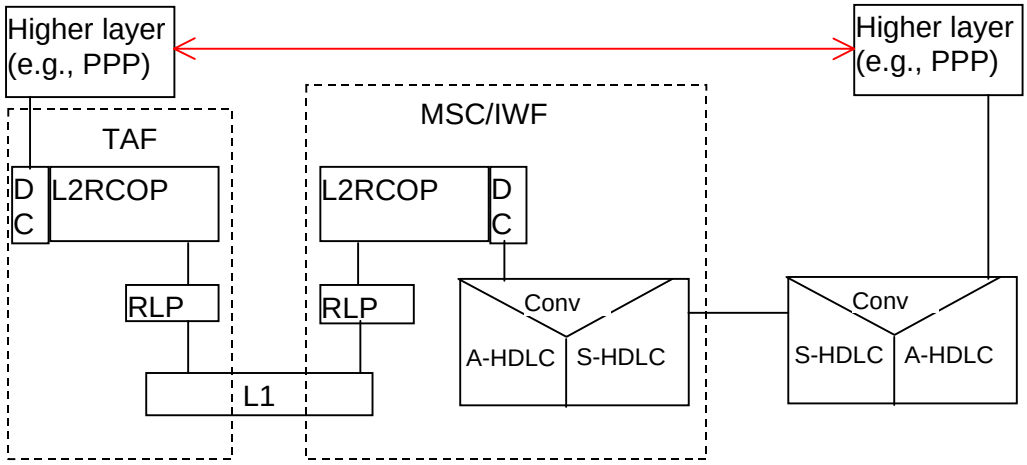


Figure 14: The FTM protocol stack

Data compression between the TAF and the IWF is optionally applied. The asynchronous to synchronous HDLC conversion follows from ISO/IEC 3309[48].

A particular aspect of the asynchronous HDLC protocol is the provision of control character transparency. This means that flags (0x7E) and the control escape character (0x7D) are escaped, by insertion of the control escape character in front of the character to be escaped, and that the 6th bit of the escaped character is complemented (i.e., the escaped character is XOR'ed with 0x20). ISO/IEC 3309 [48] allows additional control characters to be escaped by prior agreement or negotiation between the peer entities. For instance, in PPP [49], a negotiation procedure is defined using an Asynchronous Control Character Map (ACCM). By examining the contents of the HDLC frames that pass through it, the IWF shall identify whether the higher layer protocol is PPP, in which case, it shall detect and interpret the ACCM negotiation result. If PPP is used, the conversion function in the IWF shall apply a default ACCM until another is negotiated.

Next section modified

Annex B (informative): General mapping of V.24 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 V.24 circuit numbers and the status bits in the IWF. A binary 0 corresponds to the ON condition, a binary 1 to the OFF condition. The specific mappings for the various GSM bearer types are given elsewhere in the present document.

Since the V.24 circuits that are outputs from a DCE are inputs to a DTE (and vice versa), this mapping is the reverse of that used in the MT (3GPP TS 27.002, 3GPP TS 27.003).

For example, CT 109 is an output from the modem in the IWF and maps on to SB towards the MT. In the MT, SB is mapped on to CT 109 which is an input to the attached DTE.

Table B1: General mapping scheme at the IWF

Status bit direction: MS to IWF	Status bit direction: IWF to MS	Signal at IWF modem interface
SB		105 (note 3)
	X (note 1)	106
	SA	107
SA		108
	SB	109
X		133 (notes 2 and 3)

NOTE 1: The condition of X towards the MS may also be affected by the state of any transmit buffer in the IWF.

NOTE 2: The condition of CT 133 towards the modem may also be affected by the state of any receive buffer in the IWF or layer 2 flow control condition between the MT and IWF.

NOTE 3: CT105 and CT133 are assigned to the same connector pin on both the standard 25 pin connector (ISO/IEC 2110 [78]) and the commonly used 9 pin connector (annex B). When this pin is used for CT133 at the DTE/MT interface then on the MT side of the interface CT 105 is treated as being always in the ON condition. SB towards the IWF will 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 will 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/UMTS) there should be no conflict.

3GPP TSG-CN WG3, Meeting #14 ***Tdoc N3-000600***
Sophia, France. 14th – 16th November 2000.

CR-Form-v3

CHANGE REQUEST

⌘ **03.10** **CR** **A014** ⌘ **rev** **-** ⌘ **Current vers** **8.3.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network ☐ Core Network **X**

Title:	⌘	Removal of BS 30 NT
Source:	⌘	TSG CN WG3
Work item code:	⌘	TEI4 (CS bearers)
Date:	⌘	08/11/00
Category:	⌘	**C**
Release:	⌘	REL-4

Use one of the following categories:
F *(essential correction)*
A *(corresponds to a correction in an earlier release)*
B *(Addition of feature),*
C *(Functional modification of feature)*
D *(Editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	Removal of BS 30 NT and editorial corrections
Summary of change:	⌘	Update of scope, references and protocol models
Consequences if not approved:	⌘	Inconsistent to 22.002

Clauses affected:	⌘	1, 2, 5.5, 6.1.4, 6.4, 6.5, 6.6, 7.5, A.1, A.2		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	22.002, 27.001, 27.003, 29.007, 04.21
Other comments:	⌘			

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at:
http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.
3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

1 Scope

A GSM PLMN may be described by a limited set of access interfaces (refer to 3GPP TS 04.02 and 02.01) and a limited set of GSM PLMN connection types to support the telecommunication services described in the 3GPP 02-series of specifications. This Global System for Mobile communications Technical Specification (TS) identifies and defines these connection types in so far as they relate to the particular network capabilities for a GSM PLMN.

The basic lower layer capabilities of a GSM PLMN are represented by a set of GSM PLMN connection types. The definition of a set of GSM PLMN connection types provides the necessary input to identify network capabilities of a GSM PLMN. In addition to describing network capabilities of a GSM PLMN, the identification of connection types facilitates the specification of network-to-network interfaces. It may also assist in the allocation of network performance parameters.

This specification should be considered in conjunction with other 3GPP specifications with particular reference to 3GPP TS 01.02, 02.01, 22.002, 02.03, 03.01, 23.002, 04.02 and 04.03.

This specification provides a bridge between the service specification in the 3GPP TS 02 and 22-series of specifications and the more detailed specifications such as the 3GPP TS 03, 04, 23, 24, 27 and 29 series. As such, it establishes a framework for the specification and understanding of the more detailed specifications. It is therefore not a specification against which detailed conformance testing can be performed. However, it shall be considered mandatory for the understanding of the more detailed specifications and used to resolve issues of conflict in these specifications.

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 single asynchronous and synchronous Bearer Services (BS 21..26, BS 31..34)

From R00 onwards the following service is no longer required by a PLMN:

- the synchronous Bearer Service non-transparent (BS 30 NT).

If a PLMN network still provides these services it has to fulfil the specification of GSM R98.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

[1] 3GPP TS 01.02: "Digital cellular telecommunications system (Phase 2+); General description of a GSM Public Land Mobile Network (PLMN)".

[2] 3GPP TS 01.04: "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".

[3] 3GPP TS 02.01: "Digital cellular telecommunications system (Phase 2+); Principles of telecommunications services supported by a GSM Public Land Mobile Network (PLMN)".

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

[5] 3GPP TS 02.03: "Digital cellular telecommunications system (Phase 2+); Teleservices supported by a GSM Public Land Mobile Network (PLMN)".

[6] 3GPP TS 03.01: "Digital cellular telecommunications system (Phase 2+); Network functions".

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

[8] 3GPP TS 23.009: "Handover procedures".

[9] 3GPP TS 23.034: " High Speed Circuit Switched Data (HSCSD) - Stage 2 Service Description".

[10] 3GPP TS 23.040: " Technical realization of the Short Message Service (SMS) Point-to-Point (PP)".

[11] 3GPP TS 23.041: " Technical realization of Short Message Service Cell Broadcast (SMSCB)".

[12] 3GPP TS 03.45: "Digital cellular telecommunications system (Phase 2+); Technical realization of facsimile group 3 transparent".

[13] 3GPP TS 04.01: "Digital cellular telecommunications system (Phase 2+); Mobile Station - Base Station System (MS - BSS) interface General aspects and principles".

[14] 3GPP TS 04.02: "Digital cellular telecommunications system (Phase 2+); GSM Public Land Mobile Network (PLMN) access reference configuration".

[15] 3GPP TS 04.03: "Digital cellular telecommunications system (Phase 2+); Mobile Station - Base Station System (MS - BSS) interface Channel structures and access capabilities".

[16] 3GPP TS 04.05: "Digital cellular telecommunications system (Phase 2+); Data Link (DL) layer; General aspects".

[17] 3GPP TS 04.06: "Digital cellular telecommunications system (Phase 2+); Mobile Station - Base Station System (MS - BSS) interface Data Link (DL) layer specification".

[18] 3GPP TS 24.007: " Mobile radio interface signalling layer 3; General aspects".

[19] 3GPP TS 24.008: " Mobile radio interface layer 3 specification".

[20] 3GPP TS 24.011: "Point-to-Point (PP) Short Message Service (SMS) support on mobile radio interface".

[21] 3GPP TS 24.012: " Short Message Service Cell Broadcast (SMSCB) support on the mobile radio interface".

[22] 3GPP TS 04.21: "Digital cellular telecommunications system (Phase 2+); Rate adaption on the Mobile Station - Base Station System (MS - BSS) interface".

[23] 3GPP 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 - Mobile-services Switching Centre (BSS - MSC) interface".

[24] 3GPP TS 05.01: "Digital cellular telecommunications system (Phase 2+); Physical layer on the radio path General description".

[25] 3GPP TS 05.03: "Digital cellular telecommunications system (Phase 2+); Channel coding".

[26] 3GPP TS 05.08: "Digital cellular telecommunications system (Phase 2+); Radio subsystem link control".

[27] 3GPP TS 06.31: "Digital cellular telecommunications system; Full rate speech; Discontinuous Transmission (DTX) for full rate speech traffic channels".

[28] 3GPP TS 27.001: " General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".

[29] 3GPP TS 27.002: " Terminal Adaptation Functions (TAF) for services using asynchronous bearer capabilities".

[30] 3GPP TS 27.003: " Terminal Adaptation Functions (TAF) for services using synchronous bearer capabilities".

[31] 3GPP TS 08.04: "Digital cellular telecommunications system (Phase 2+); Base Station System - Mobile-services Switching Centre (BSS - MSC) interface Layer 1 specification".

[32] 3GPP TS 08.06: "Digital cellular telecommunications system (Phase 2+); Signalling transport mechanism specification for the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface".

[33] 3GPP TS 08.08: "Digital cellular telecommunications system (Phase 2+); Mobile Switching Centre - Base Station System (MSC - BSS) interface Layer 3 specification".

[34] 3GPP TS 08.20: "Digital cellular telecommunications system (Phase 2+); Rate adaption on the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface".

[35] ~~3GPP TS 29.006: " 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".~~void

[36] 3GPP TS 29.007: "General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN)".

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

[38] ITU-T Recommendation V.110: "Support of Data Terminal Equipments (DTEs) with V-Series interfaces by an integrated services digital network".

[39] ITU-T Recommendation V.21: "300 bits per second duplex modem standardised for use in the general switched telephone network".

[40] ITU-T Recommendation V.22: "1 200 bits per second duplex modem standardised for use in the general switched telephone network and on point-to-point 2-wire leased telephone-type circuits".

[41] ITU-T Recommendation V.22bis: "2 400 bits per second duplex modem using the frequency division technique standardised for use on the general switched telephone network and on point-to-point 2-wire leased telephone-type circuits".

[42] ITU-T Recommendation V.24: "List of definitions for interchange circuits between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE)".

[43] ITU-T Recommendation V.26ter: "2 400 bits per second duplex modem using the echo cancellation technique standardised for use on the general switched telephone network and on point-to-point 2-wire leased telephone-type circuits".

[44] ITU-T Recommendation V.32: "A family of 2-wire, duplex modems operating at data signalling rates of up to 9 600 bit/s for use on the general switched telephone network and on leased telephone-type circuits".

[45] ITU-T Recommendation V.42bis: "Data Compression for Data Circuit terminating Equipment (DCE) using Error Correction Procedures".

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

[47] ITU-T Recommendation X.21: "Interface between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) for synchronous operation on public data networks".

[48] ITU-T Recommendation X.21bis: "Use on public data networks of Data Terminal Equipment (DTE) which is designed for interfacing to synchronous V-series modems".

[49] 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".

[50] ITU-T Recommendation X.28: "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".

[51] ITU-T Recommendation X.30: "Support of X.21, X.21bis and X.20bis based Data Terminal Equipments (DTEs) by an Integrated Services Digital Network (ISDN)".

[52] ITU-T Recommendation X.31: "Support of packet mode terminal equipment by an ISDN".

[53] ITU-T Recommendation X.32: "Interface between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) for terminals operating in the 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".

[54] ITU-T Recommendation V.34 (1994): "A modem operating at data signalling rates of up to 28 800 bits for use on the general switched telephone network and on leased point-to-point 2-wire telephone-type circuits".

[55] ITU-T Recommendation I.440 (1989): "ISDN user-network interface data link layer - General aspects".

[56] ITU-T Recommendation I.450 (1989): "ISDN user-network interface layer 3 General aspects".

[57] ISO/IEC 6429 (1992): "Information technology - Control functions for coded character sets".

[58] 3GPP TS 23.060: " General Packet Radio Service (GPRS)".

[59] 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.

Next section modified

5.5 GSM PLMN connection involving several networks

A GSM PLMN connection may comprise a number of tandem network connections. Figure 5 shows an example in which each end network is a GSM PLMN. The intermediate network(s) must offer the appropriate network capabilities for the service provided by the (overall) GSM PLMN connection. In (overall) GSM PLMN connections involving several networks, each network provides a part of the connection and may be categorized by different attribute values.

The IWF/MSC can interwork with different type of networks, e.g.:

- analogue (A);
- digital circuit (D) with V.110/X.31 in band protocol;
- ~~packet (P) with X.25 in band protocol.~~

Examples of such networks are:

- GSM (D);
- ~~PSPDN (P);~~
- ISDN (A, D, P);
- PSTN (A).

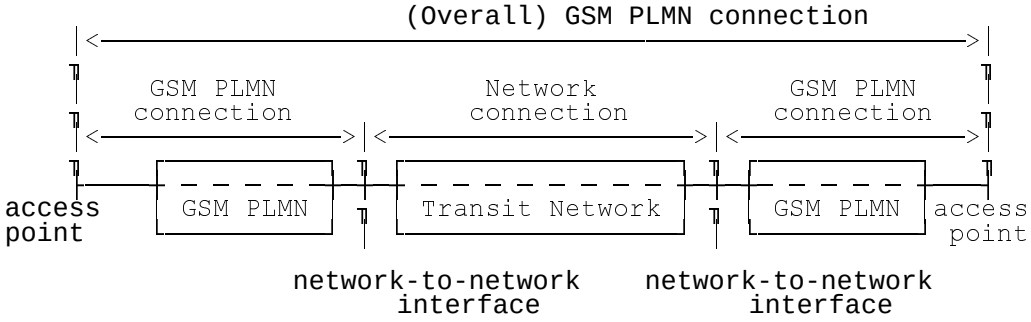


Figure 5: Example of a GSM PLMN connection involving several networks

Next section modified

6.1.4 Resources allocated by the GSM network

Part of the GSM connection concerns the resources allocated by the GSM network on the basis of the attribute values of the connection elements.

For the speech calls, the GSM codec is allocated.

For data calls, resources are provided at the IWF/MSC such as:

- V.110 based rate adaptation for such channel codings as TCH/F 4,8 and TCH/F9,6 and GSM specific rate adaption for channel codings TCH/F14.4, TCH/F28.8, TCH/F43.2 (3GPP TS 04.21, 08.20);
- filtering of status bits (TS 27.001);
- RLP for non-transparent services (TS 24.022);
- Data compression (TS 24.022, 27.002).

These are sufficient for data services such as:

- asynchronous circuit (bearer service series 20), used with unrestricted digital information transfer capability;
- synchronous circuit (bearer service series 30), used with unrestricted digital information transfer capability when interworking with circuit switched digital networks.

In addition to the above listed resources, further resources are allocated in the other cases:

- modems for asynchronous circuit (bearer service series 20) or synchronous circuit (bearer service series 30) used with 3.1 kHz information transfer capability;
- fax adaptor for the fax group 3 (teleservice series 60);
- ~~flag stuffing for synchronous packet using bearer service series 30 with unrestricted digital information transfer capability when interworking with packet switched networks.~~

Next section modified

6.4 Limited set of GSM PLMN connection types (all channel codings excluding TCH/F14.4)

From the two connection elements defined in subclause 6.2, the list of attributes and their possible values given in subclause 6.3, and from the service requirements defined in 3GPP TS 22.002 and 02.03, a limited set of GSM PLMN connection types have been identified (see also table 5 and table 6 for the relationship between connection elements and telecommunication services).

Figure 6 gives the information transfer protocol models for the identified set of GSM PLMN connection types. The S bits correspond to status bits and the D bits to data bits (3GPP TS 04.21); S* indicates that S bits are used only when 3.1 kHz audio ex PLMN. D' bits corresponds to user bits passed in the place of status bits in the non transparent case Moreover, it should be noted that the RLP rate of 6 and 12 kbit/s correspond to the 8 and 16 Kbit/s intermediate rate in the transparent case.

Protocol Models 1 a and b are the models for asynchronous data transmission in the transparent mode. Models 1d and 1e are for multislot transparent asynchronous data configurations.

Protocol Models 2 a and b are the models for synchronous data transmission in the transparent mode. Models 2d and 2e are for multislot transparent synchronous data.

Protocol Models 3 a and b are the models for character "asynchronous" mode data transmission in the non-transparent mode. In this case, L2RCOP represents the protocol used between the Layer 2 Relay functions (L2R) to convey characters between the MS and the IWF (see 3GPP TS 27.002). The data compression function is located in the L2R COP function. Models 3d and 3e are for multislot character "asynchronous" data transmission in the non-transparent mode.

~~Protocol Models 4 a, b, and c are the models for synchronous data transmission using the ITU-T Recommendation X.25 PSPDN access protocol in the non-transparent mode. In this case, L2RBOP represents the protocol used between the Layer 2 Relay functions (L2R) to convey the LAP-B information between the MS and the IWF (see 3GPP TS 27.003).~~

~~Models 4d, 4e, and 4f are for multislot synchronous data transmission using the ITU-T Recommendation X.25 PSPDN access protocol in the non-transparent mode.~~

In all the above models, the a, d and b, e variants indicate alternative access arrangements at the MS, i.e. access at the S interface or at the R interface. The c and f variants indicate a further alternative access arrangement where rate adaptation at the S interface is performed by flag stuffing as defined in ITU-T Recommendation X.31.

Protocol Model 5a is the model for the transparent support of group 3 facsimile transmission. Model 5b is for transparent support of group 3 facsimile transmission in multislot data configurations.

Protocol Models 6 a and b are the models for speech transmission. As in models 1-4, the a and b variants indicate alternative access arrangements at the MS, i.e. access at the S interface or direct access of the telephony teleservice.

Protocol model 7 a is the model for the non-transparent support of group 3 facsimile transmission. Model 7b is for non-transparent support of group 3 facsimile transmission in multislot data configurations.

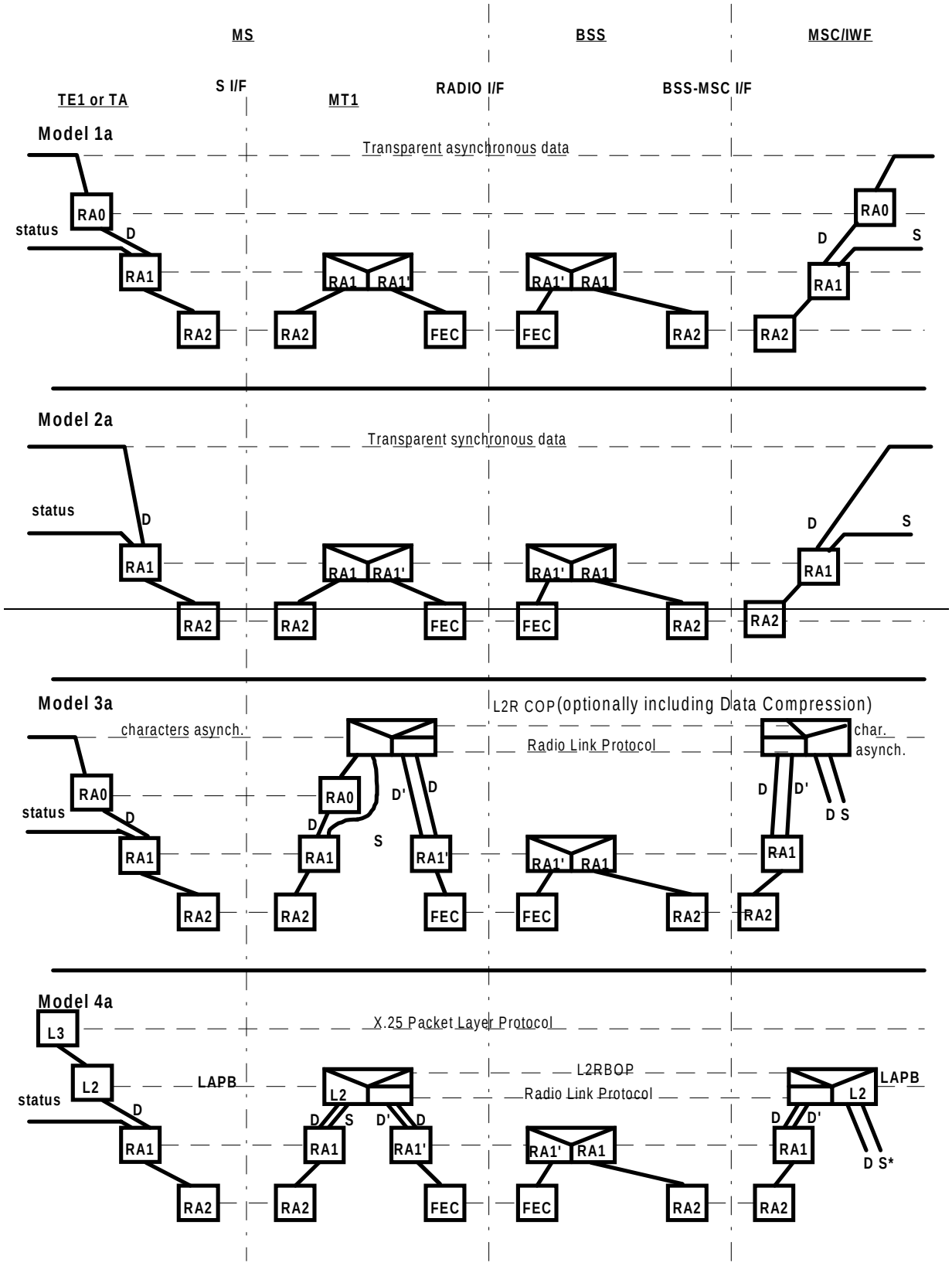
In the multislot-data models the data is split into parallel substreams between the Split/Combine-functions (S/C). These substreams are transmitted through parallel TCH/Fs which are treated as independent channels. Between the S/C-functions parallel RA- and FEC-functions are used.

For all the models, only the minimum functionality of the IWF is shown. Additional functions will be required for various interworking situations. These additional functions are described in specification~~s 3GPP TS 29.006 and~~ 3GPP TS 29.007.

It should be noted that, in Figure 6, the representation of the transcoding and rate adaptation from the intermediate rate on the radio interface to the 64 kbit/s rate required by the MSC is not intended to indicate a particular implementation. The annex B to 3GPP TS 03.10 identifies alternative arrangements.

6.5 Limited set of GSM PLMN connection types (for TCH/F14.4 channel coding)

Figure 7 provides the information transfer protocol models for the identified set of GSM PLMN connection types for support of TCH/F14.4. The description of models given in subclause 6.4 applies also to figure 7.



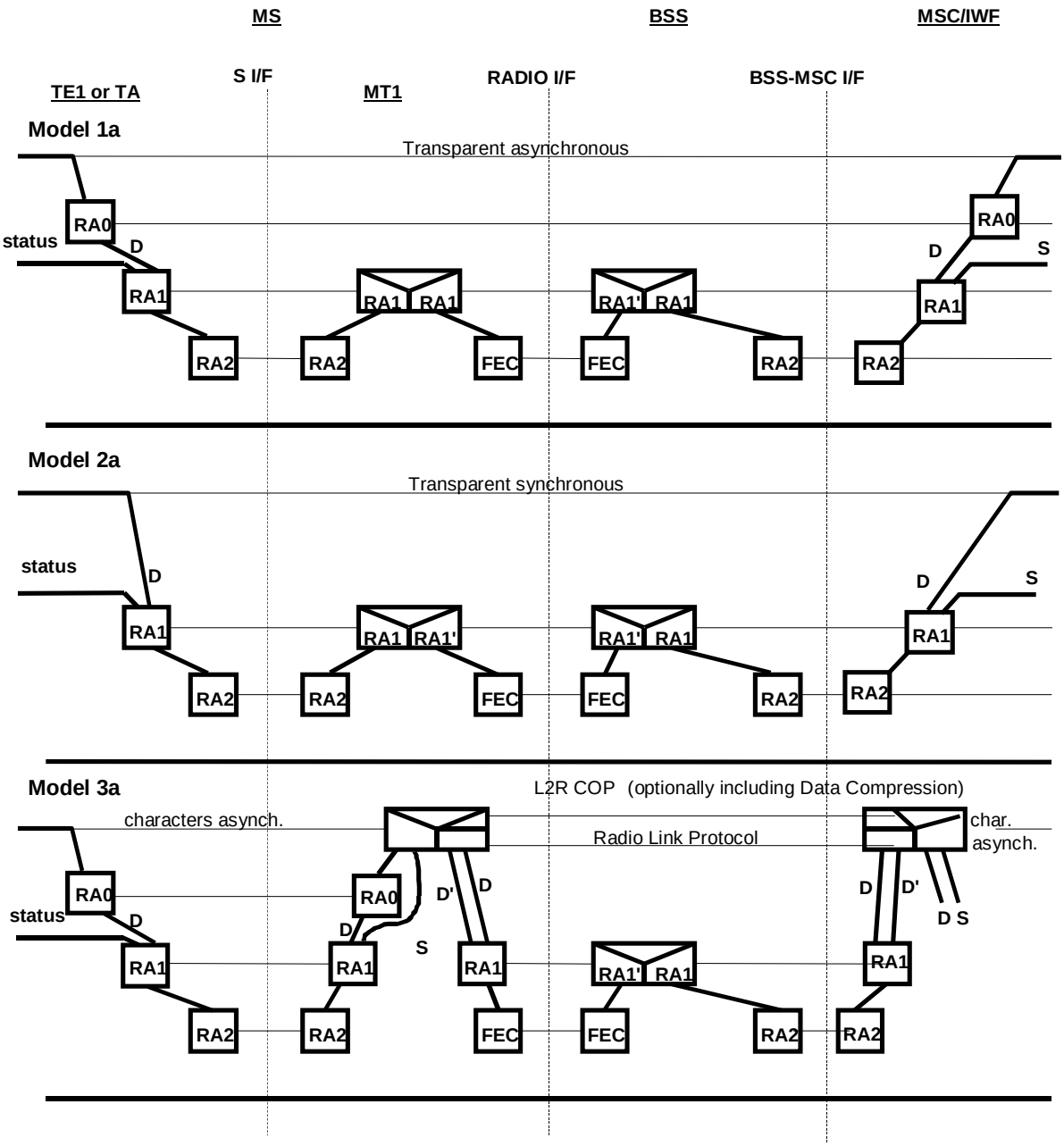
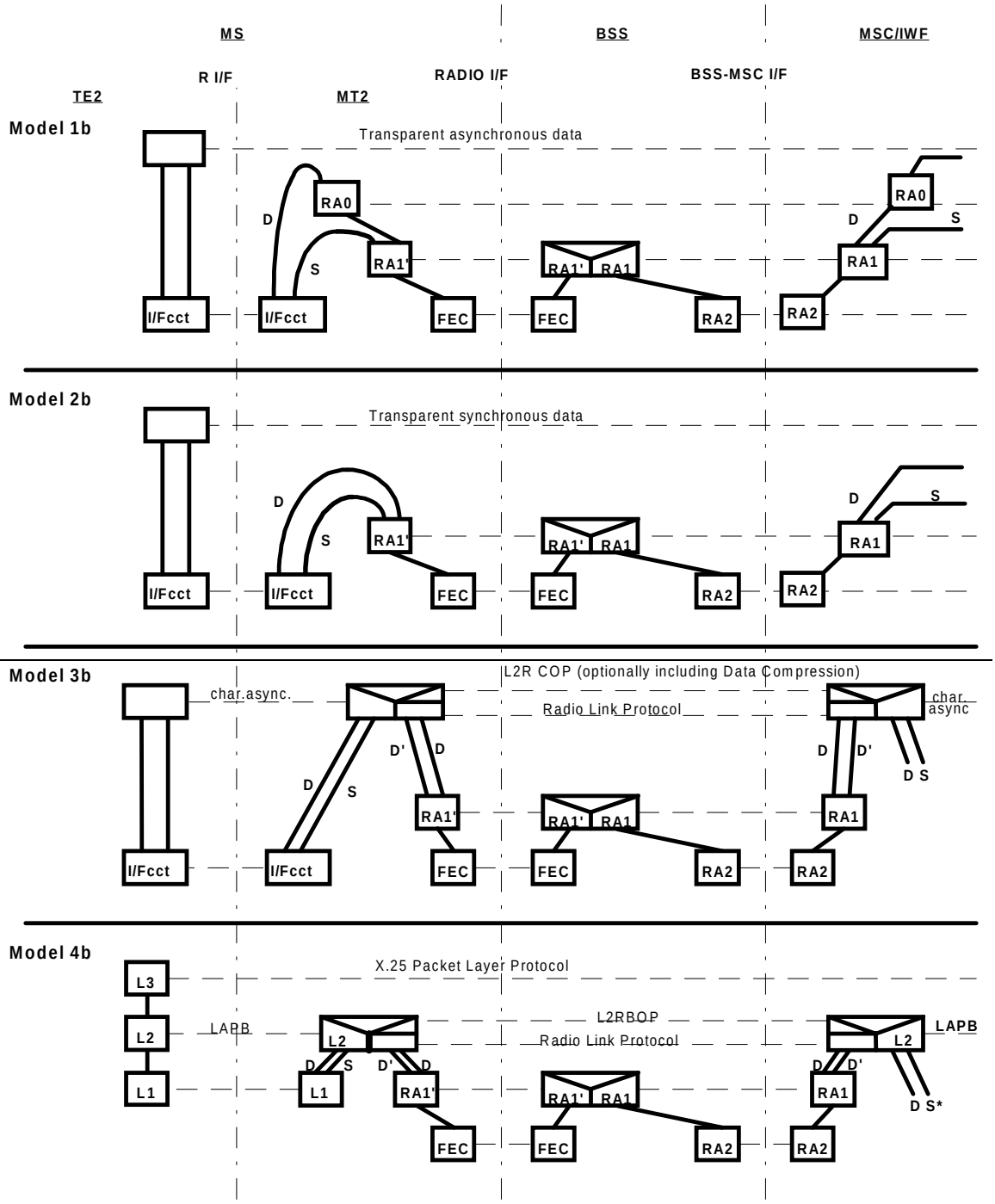


Figure 6: Information transfer protocol models for GSM PLMN connections


MS
BSS
MSC/IWF
R I/F
RADIO I/F
BSS-MSC I/F
TE2
MT2
Model 1b
Transparent asynchronous data
RA0
RA1'
RA1
D
S
I/Fcct
FEC
RA2
Model 2b
Transparent synchronous data
Model 3b
L2R COP (optionally including Data Compression)
char.async.
Radio Link Protocol
char. async
D'
D S
Model 4b
X.25 Packet Layer Protocol
L3
L2
L1
LAPB
L2RBOP
D S*

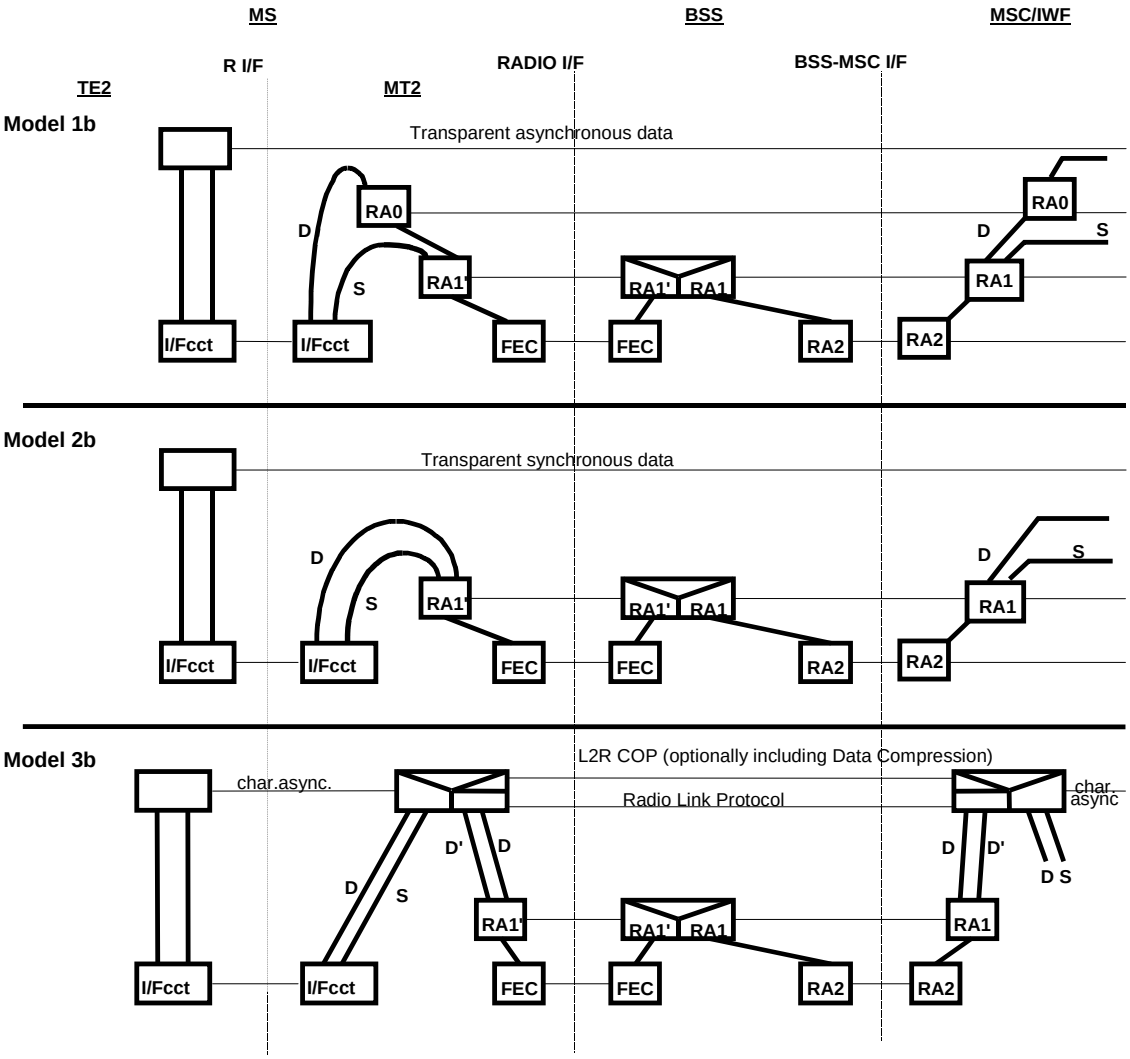
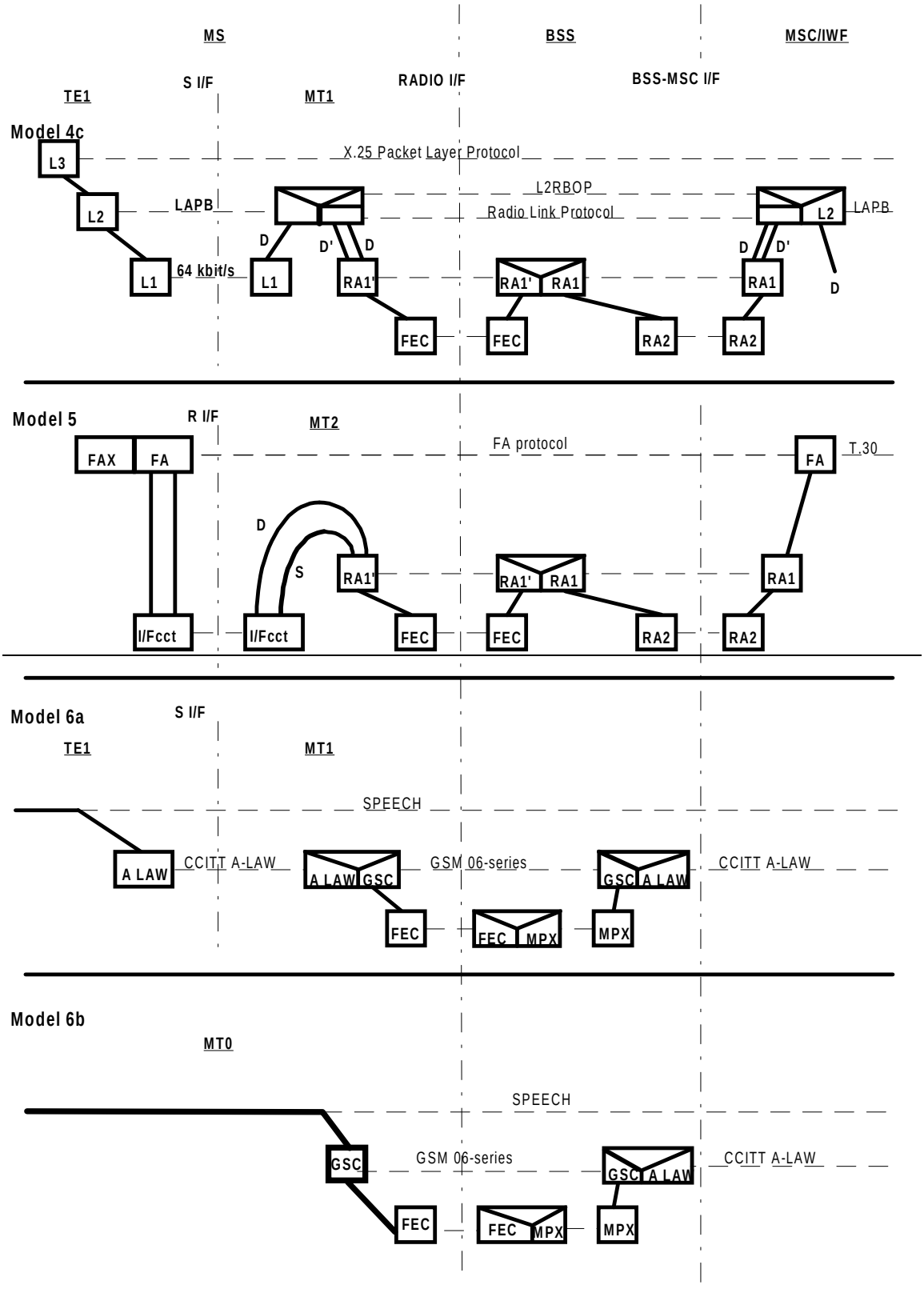


Figure 6 (continued): Information transfer protocol models for GSM PLMN connections


MS
BSS
MSC/IWF
S I/F
RADIO I/F
BSS-MSC I/F
TE1
MT1
Model 4c
L3
X.25 Packet Layer Protocol
L2
LAPB
L2RBOP
Radio Link Protocol
L2
LAPB
D
D'
D
D
D'
L1
64 kbit/s
L1
RA1'
RA1'
RA1
RA1
D
FEC
FEC
RA2
RA2
Model 5
R I/F
MT2
FAX
FA
FA protocol
FA
T.30
D
S
RA1'
RA1'
RA1
RA1
I/Fcct
I/Fcct
FEC
FEC
RA2
RA2
Model 6a
S I/F
TE1
MT1
SPEECH
A LAW
CCITT A-LAW
A LAW
GSC
GSM 06-series
GSC
A LAW
CCITT A-LAW
FEC
FEC
MPX
MPX
Model 6b
MT0
SPEECH
GSC
GSM 06-series
GSC
A LAW
CCITT A-LAW
FEC
FEC
MPX
MPX

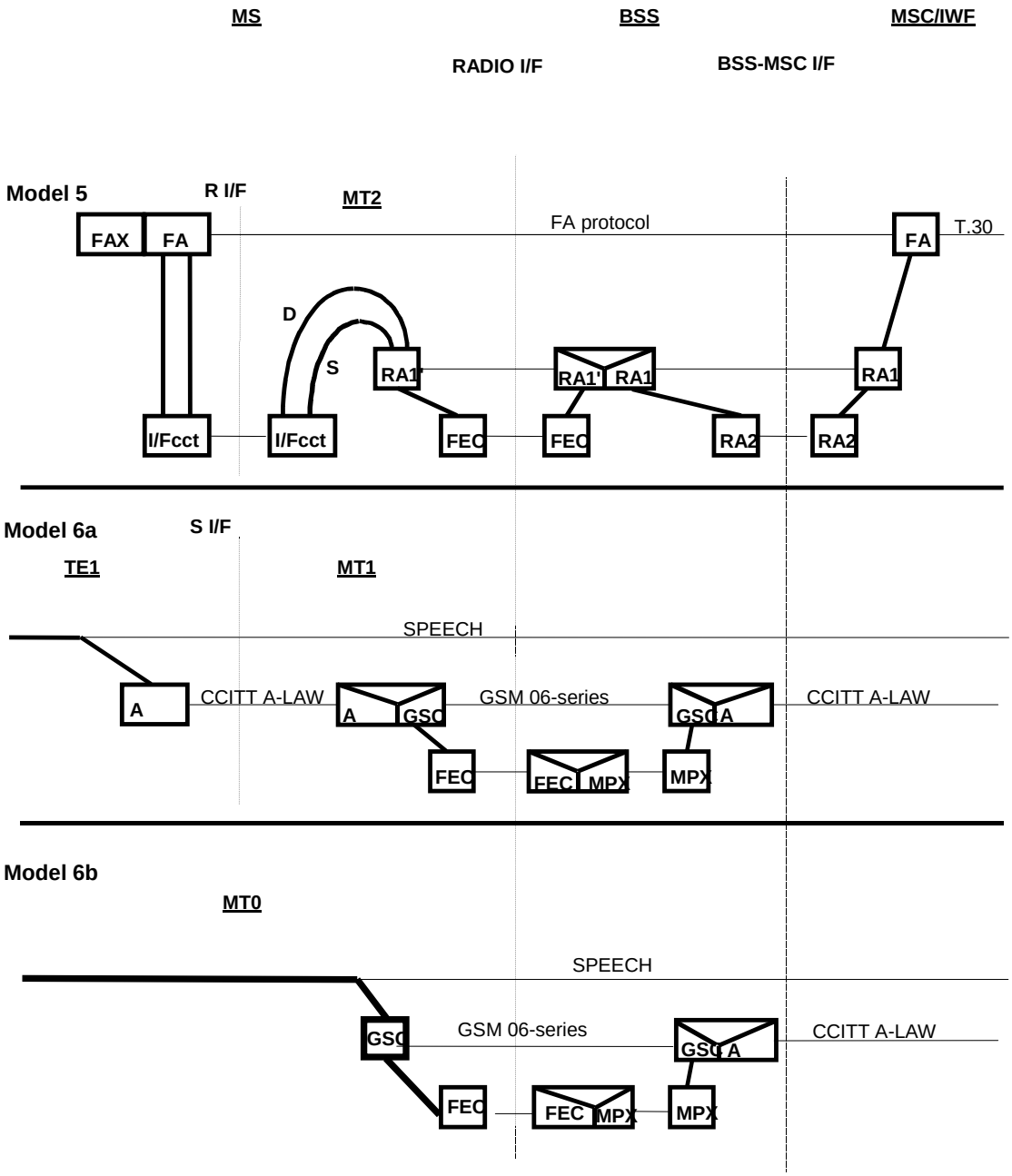
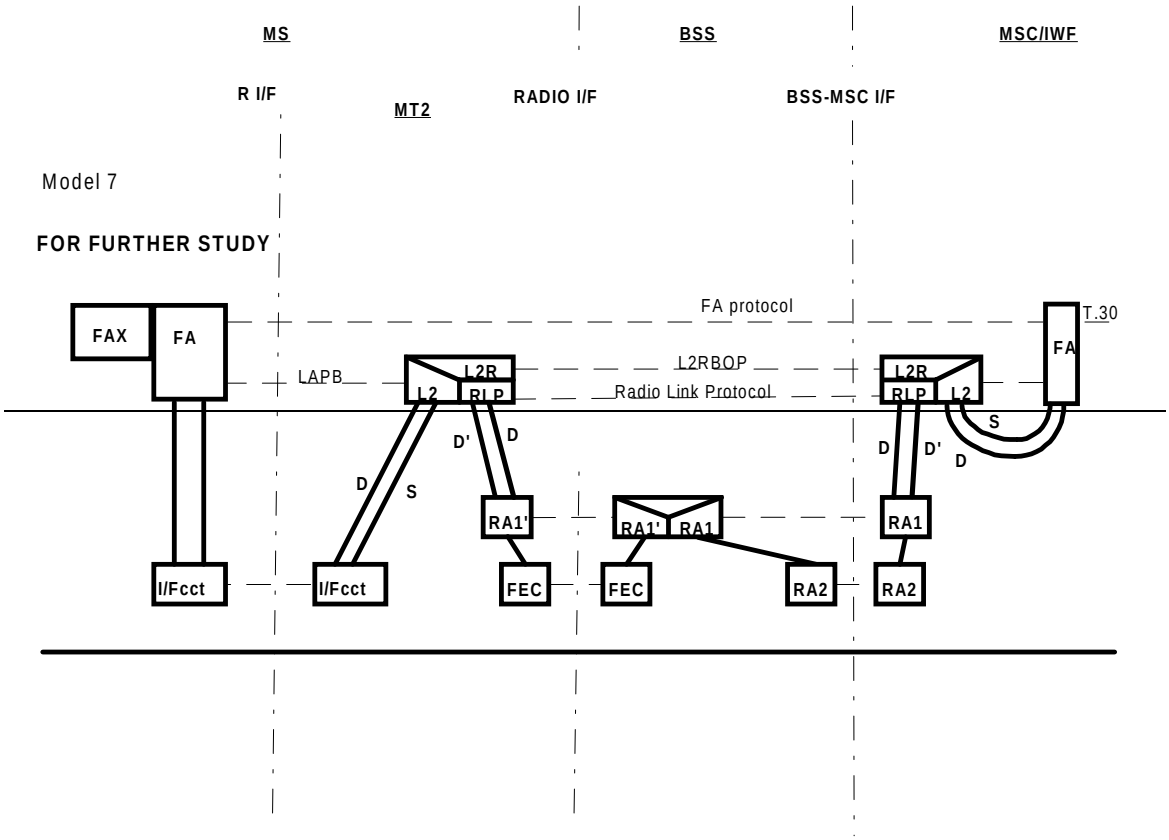


Figure 6 (continued): Information transfer protocol models for GSM PLMN connections


MS
BSS
MSC/IWF
R I/F
MT2
RADIO I/F
BSS-MSC I/F
Model 7
FOR FURTHER STUDY
FA protocol
T.30
FAX
FA
LAPB
L2R
L2
RLP
L2RBOP
Radio Link Protocol
FA
D
D'
D
S
D
D'
D
S
RA1'
RA1'
RA1
RA1
I/Fcct
I/Fcct
FEC
FEC
RA2
RA2

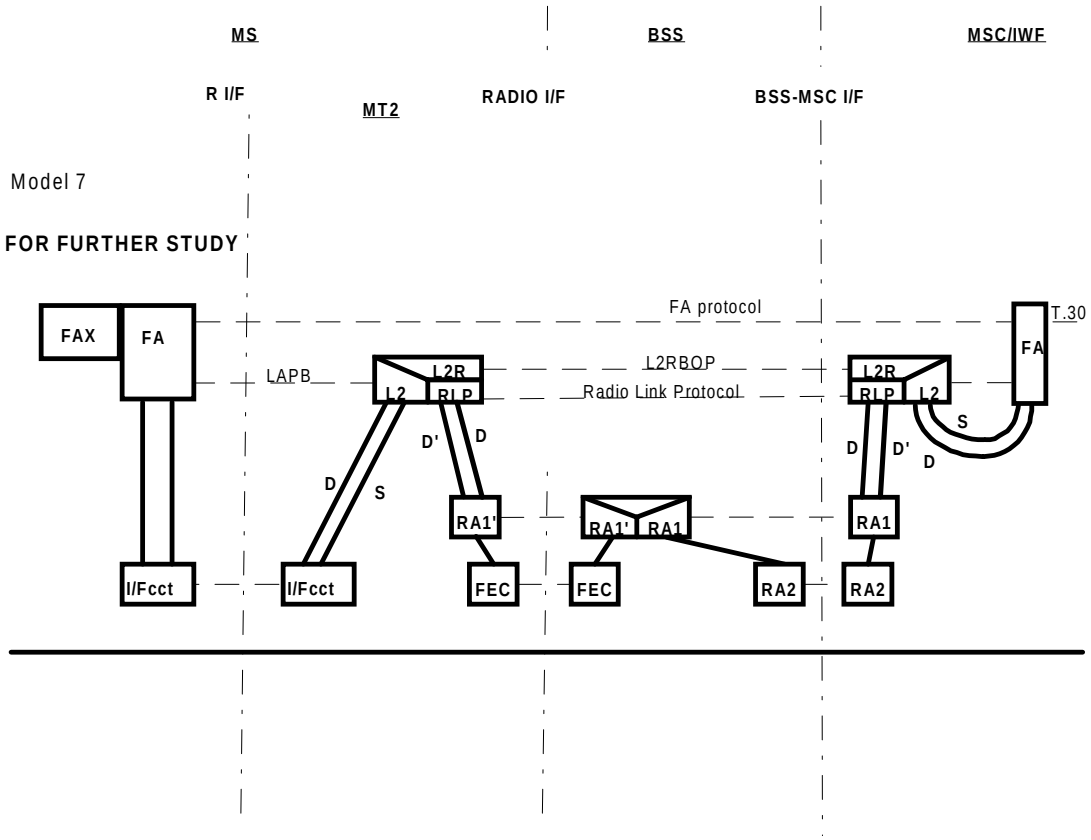
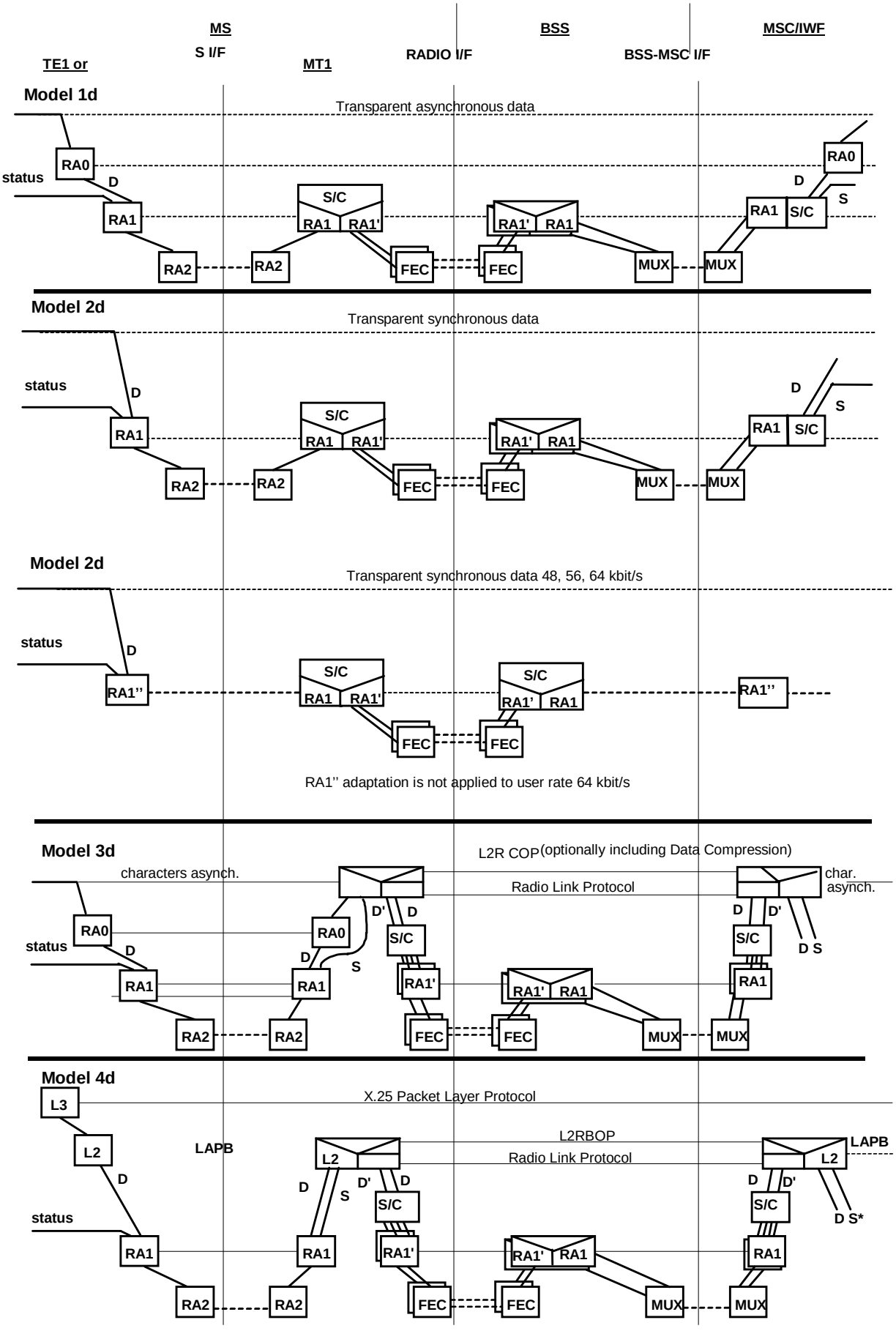


Figure 6 (continued): Information transfer protocol models for GSM PLMN connections


MS
BSS
MSC/IWF
TE1 or
S I/F
MT1
RADIO I/F
BSS-MSC I/F
Model 1d
Transparent asynchronous data
RA0
status
D
RA1
RA2
S/C
RA1
RA1'
FEC
MUX
S
Model 2d
Transparent synchronous data
Model 2d
Transparent synchronous data 48, 56, 64 kbit/s
RA1''
RA1'' adaptation is not applied to user rate 64 kbit/s
Model 3d
characters asynch.
L2R COP(optionally including Data Compression)
Radio Link Protocol
char. asynch.
D'
Model 4d
L3
X.25 Packet Layer Protocol
L2
LAPB
L2RBOP
Radio Link Protocol
D S*

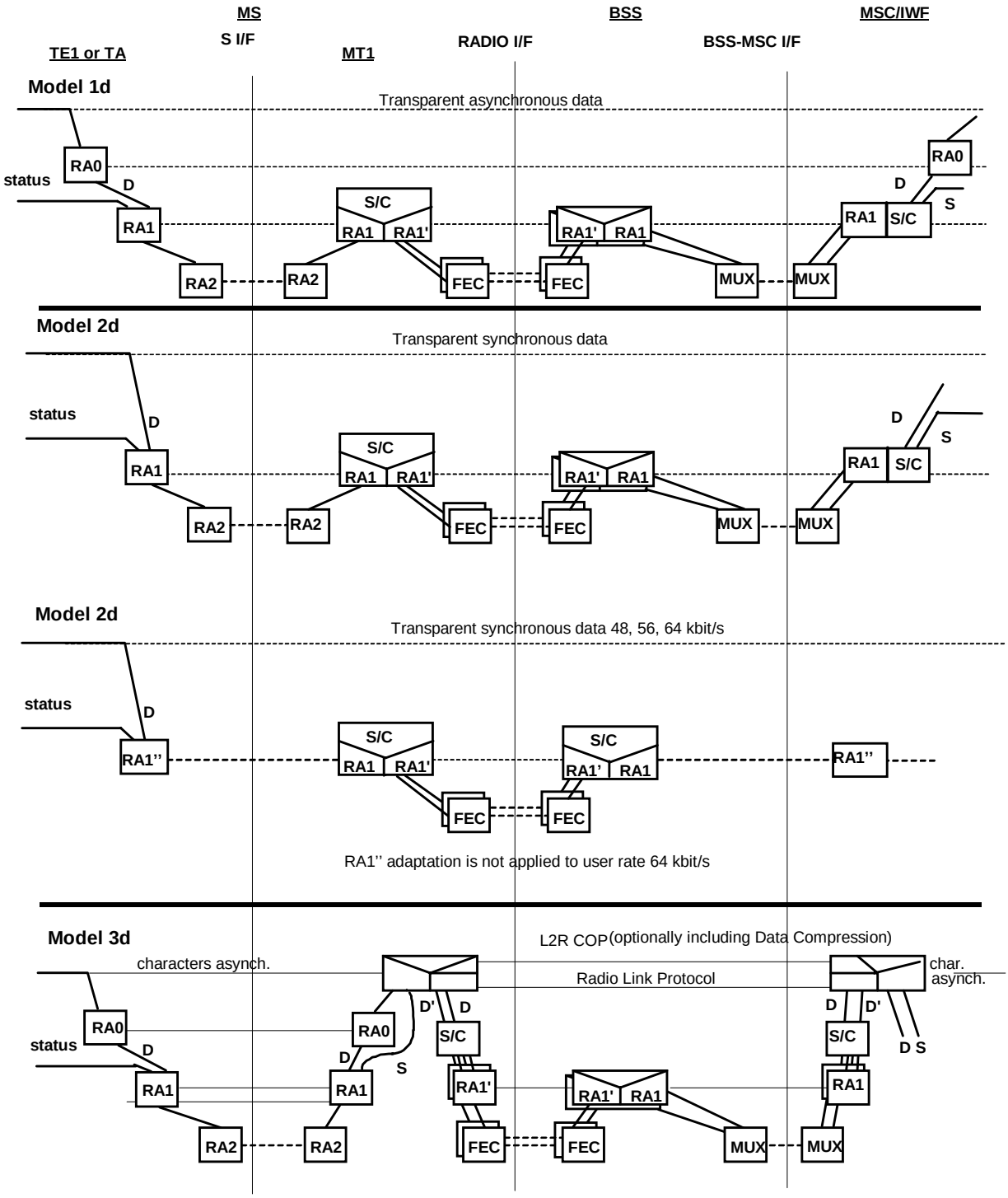
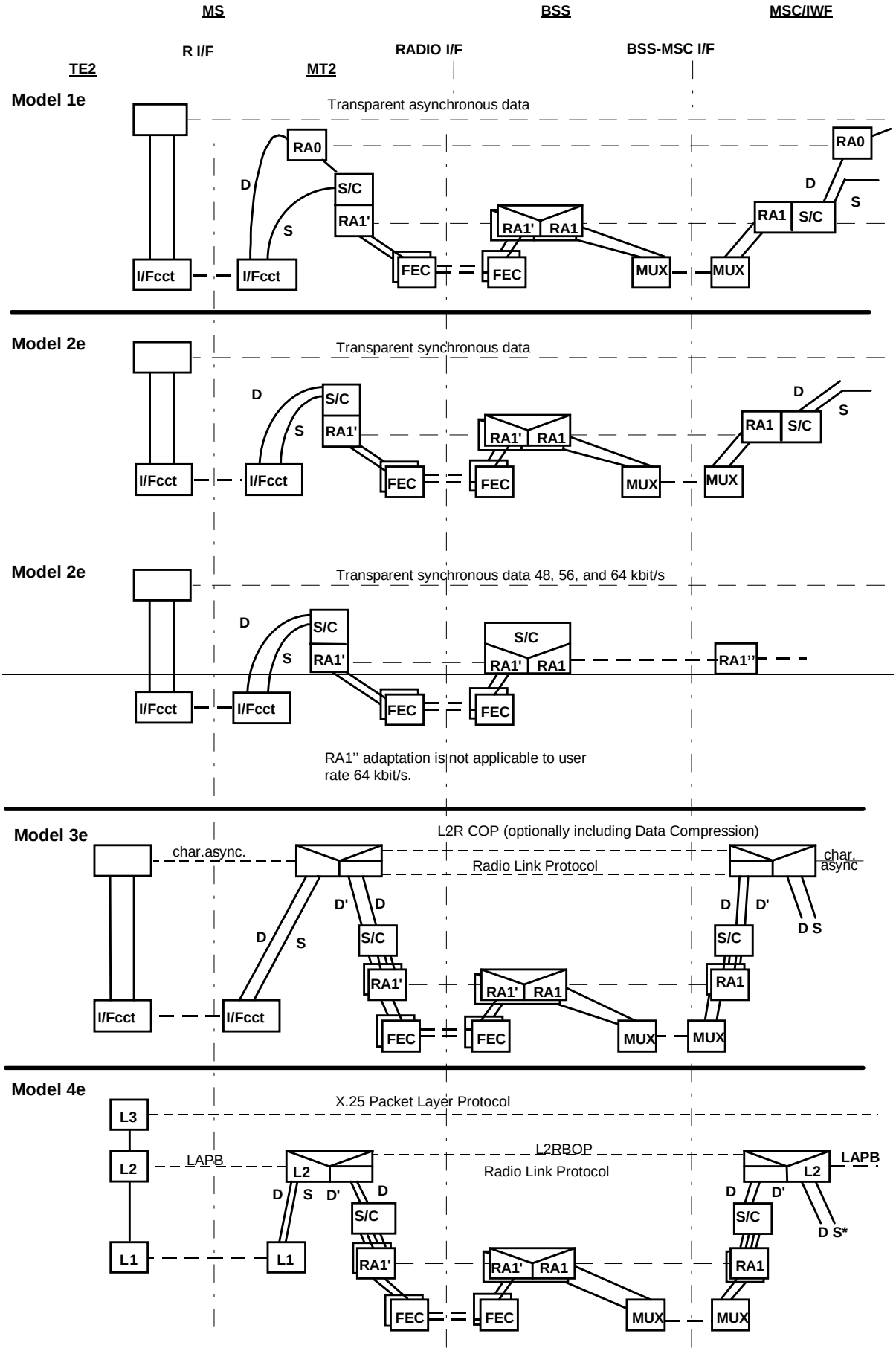


Figure 6 (continued): Information transfer protocol models for GSM PLMN connections


MS
BSS
MSC/IWF
R I/F
RADIO I/F
BSS-MSC I/F
TE2
MT2
Model 1e
Transparent asynchronous data
RA0
D
S/C
S
RA1'
RA1
I/Fcct
FEC
MUX
Model 2e
Transparent synchronous data
Model 2e
Transparent synchronous data 48, 56, and 64 kbit/s
RA1''
RA1'' adaptation is not applicable to user rate 64 kbit/s.
Model 3e
L2R COP (optionally including Data Compression)
char.async.
Radio Link Protocol
char. async
D'
D S
Model 4e
X.25 Packet Layer Protocol
L3
L2
L1
LAPB
L2RBOP
Radio Link Protocol
D S*

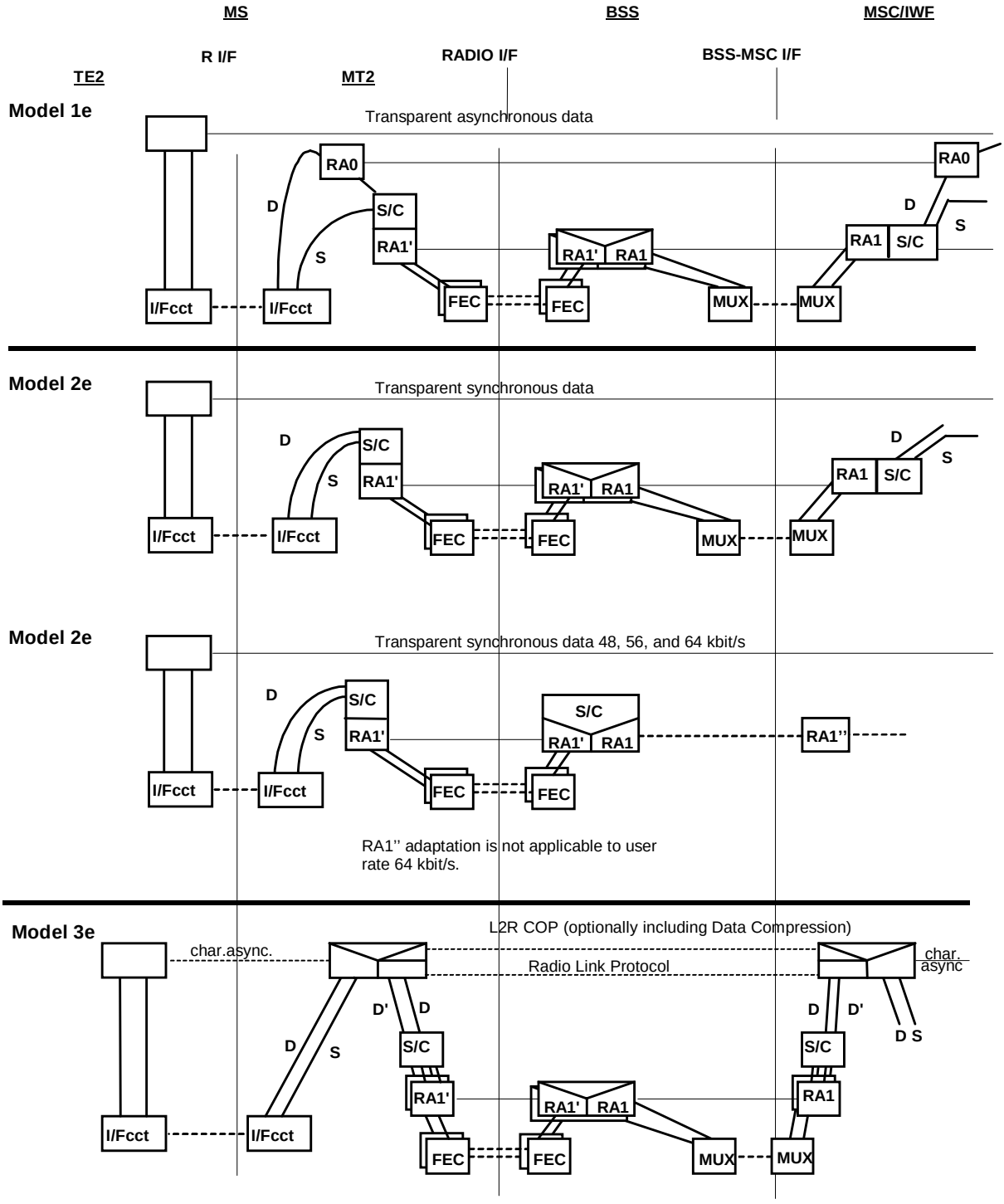
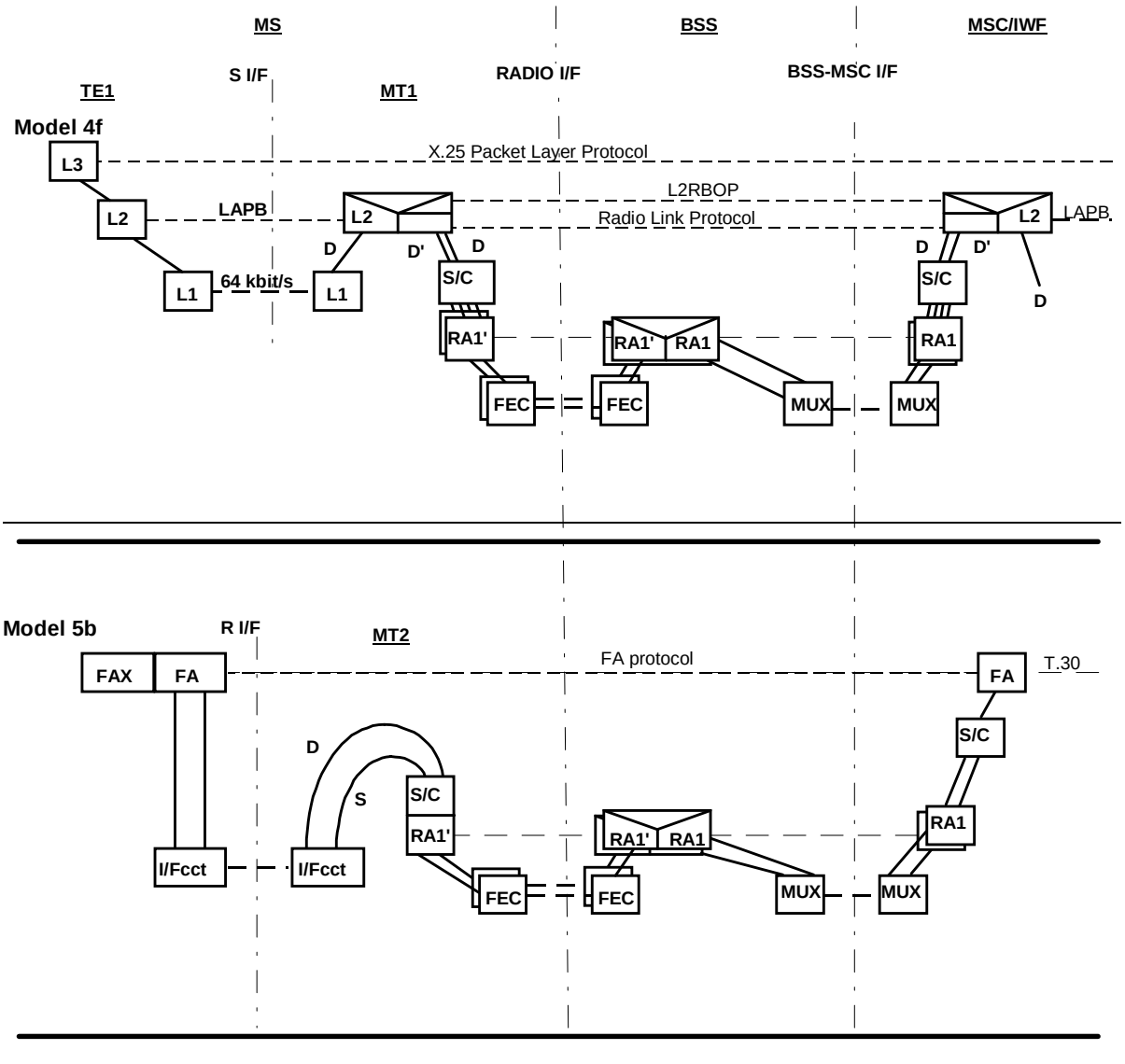


Figure 6 (continued): Information transfer protocol models for GSM PLMN connections



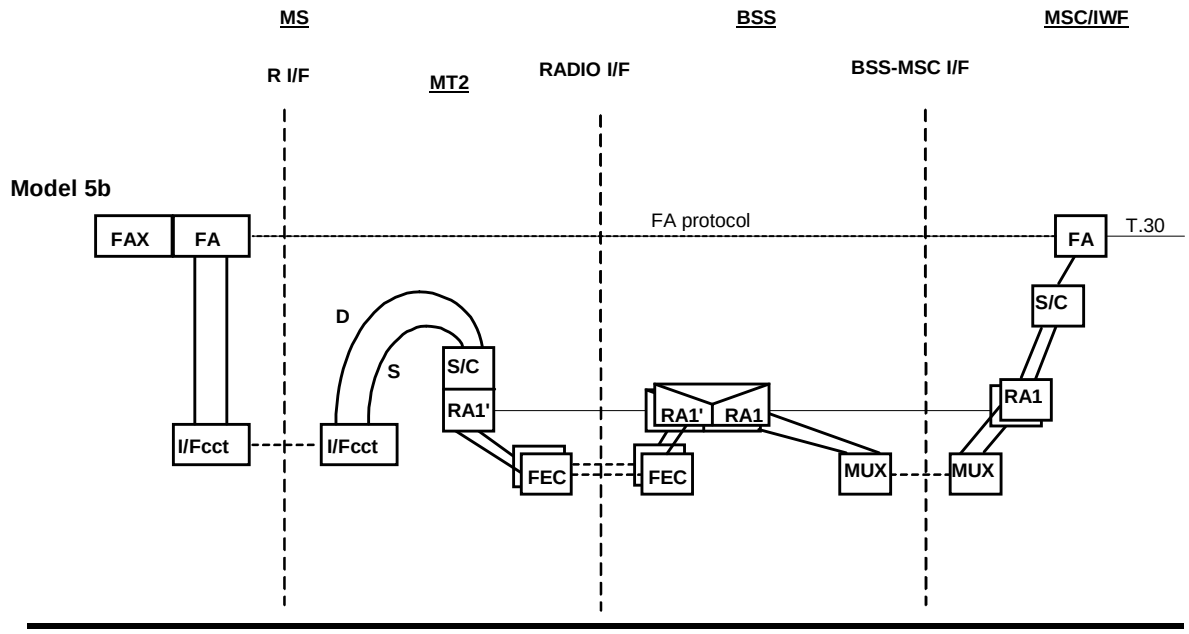


Figure 6 (continued): Information transfer protocol models for GSM PLMN connections

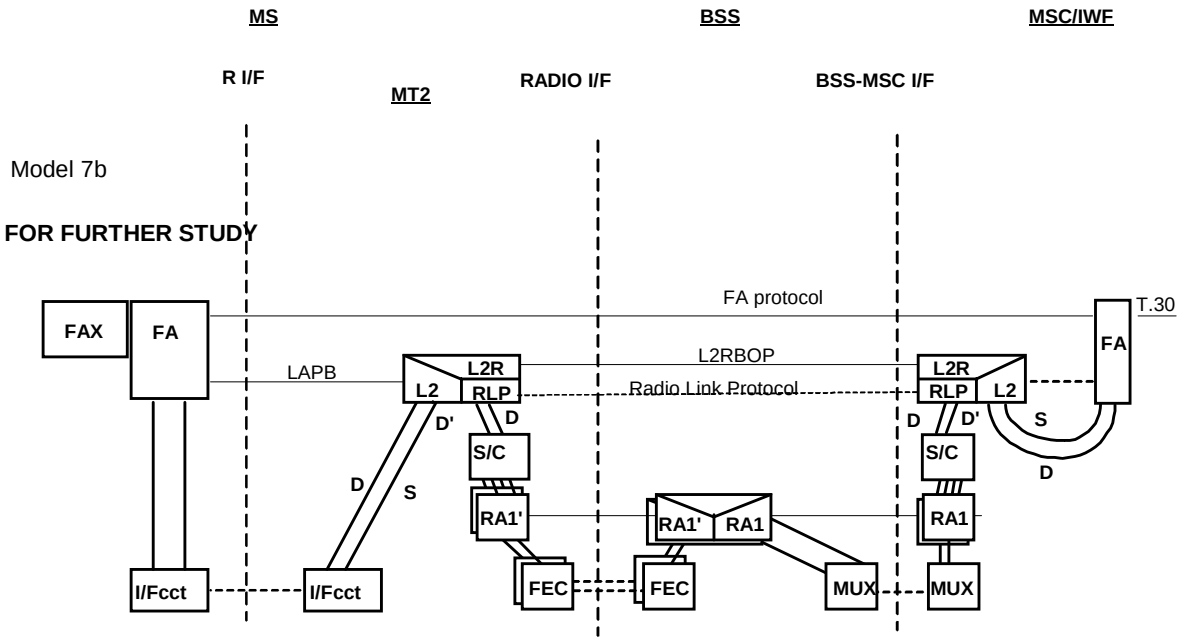
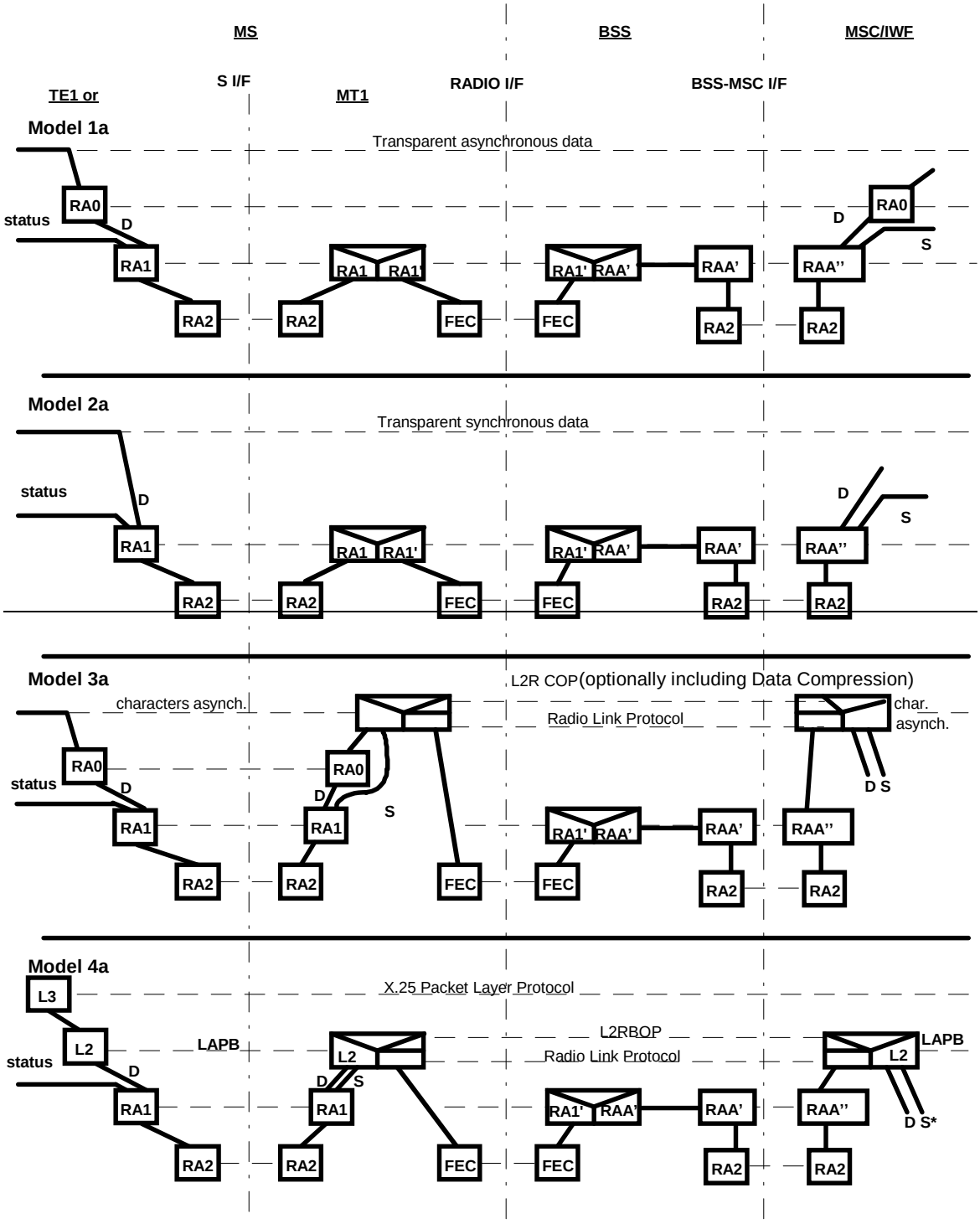


Figure 6 (concluded): Information transfer protocol models for GSM PLMN connections

Legend	**to Figure 6:**
FA	= Fax Adaptor
GSC	= GSM Speech Codec
FEC	= Forward Error Correction
MPX	= Multiplex/Demultiplex
MUX	= Multiplex/Demultiplex
S/C	= Split/ Combine


MS
BSS
MSC/IWF
TE1 or
S I/F
MT1
RADIO I/F
BSS-MSC I/F
Model 1a
Transparent asynchronous data
status
D
RA0
RA1
RA2
RA1'
FEC
RAA'
RAA''
S
Model 2a
Transparent synchronous data
Model 3a
characters asynch.
L2R COP(optionally including Data Compression)
Radio Link Protocol
char. asynch.
Model 4a
L3
X.25 Packet Layer Protocol
L2
LAPB
L2RBOP
S*

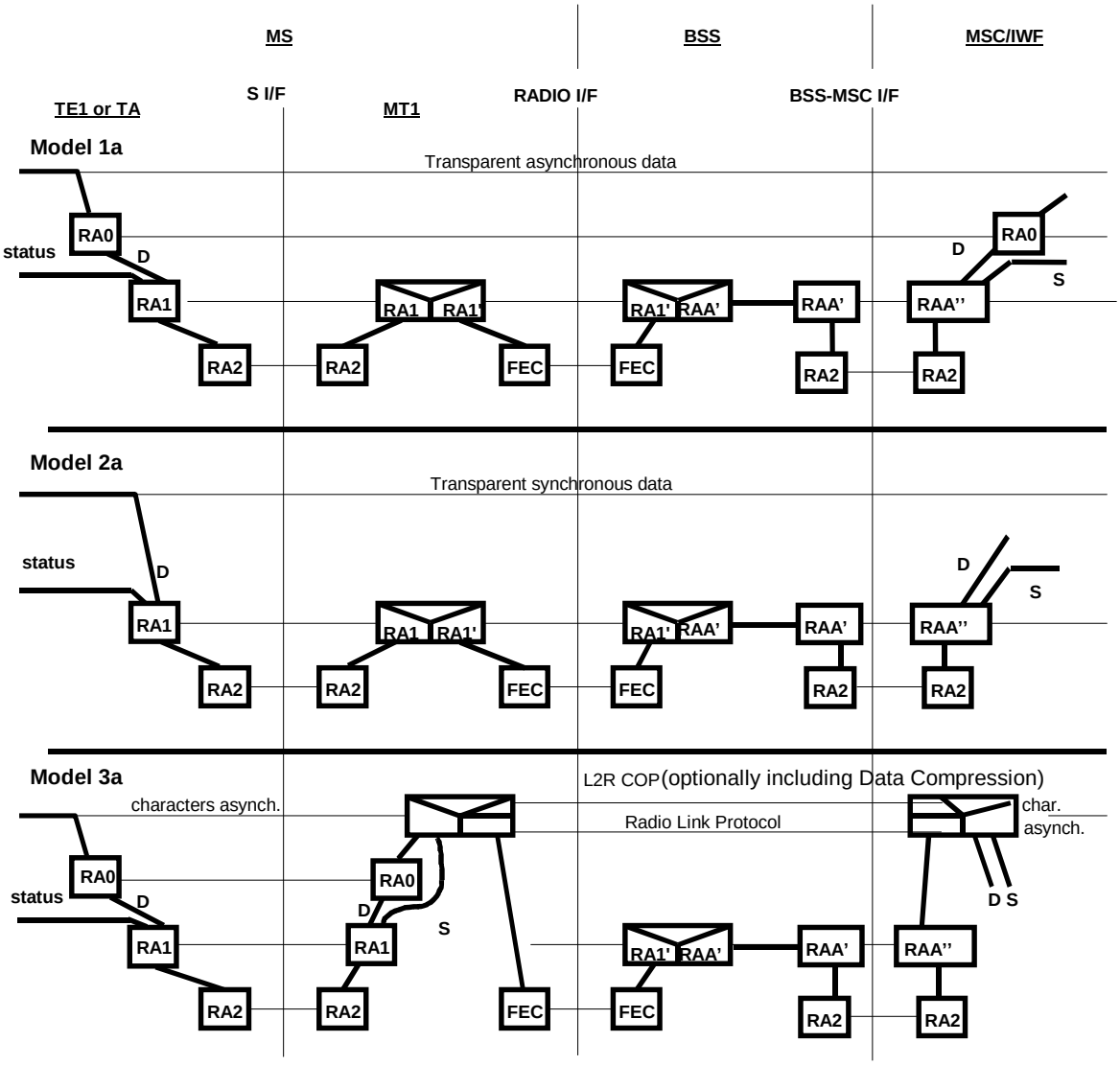
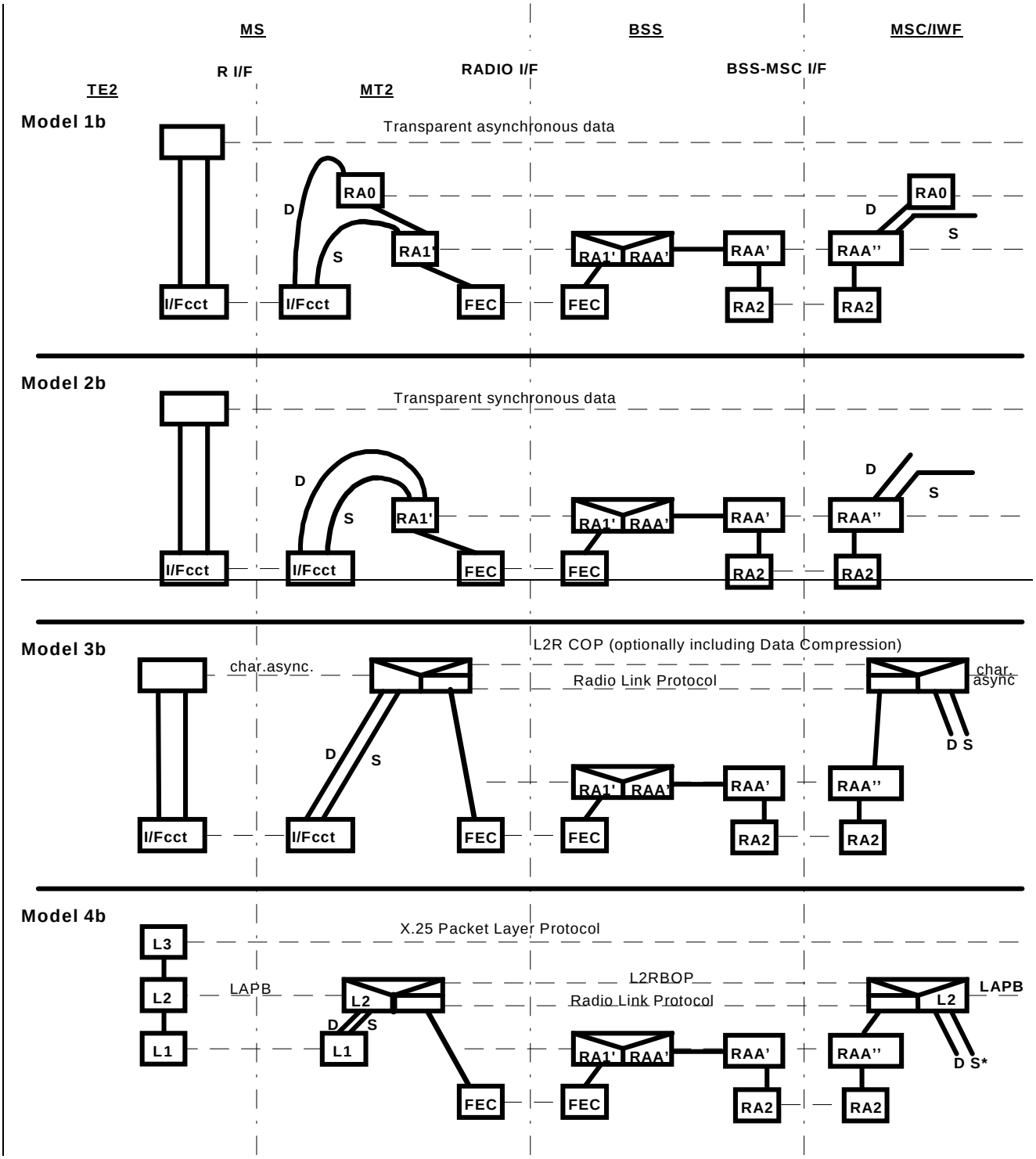


Figure 7: Information transfer protocol models for GSM PLMN connections using 14.4 channels


MS
BSS
MSC/IWF
R I/F
RADIO I/F
BSS-MSC I/F
TE2
MT2
Model 1b
Transparent asynchronous data
RA0
D
S
RA1'
I/Fcct
FEC
RA1'
RAA'
RAA'
RA2
RAA''
Model 2b
Transparent synchronous data
Model 3b
L2R COP (optionally including Data Compression)
char.async.
Radio Link Protocol
char. async
Model 4b
X.25 Packet Layer Protocol
L3
L2
L1
LAPB
L2RBOP
Radio Link Protocol
LAPB
D S*

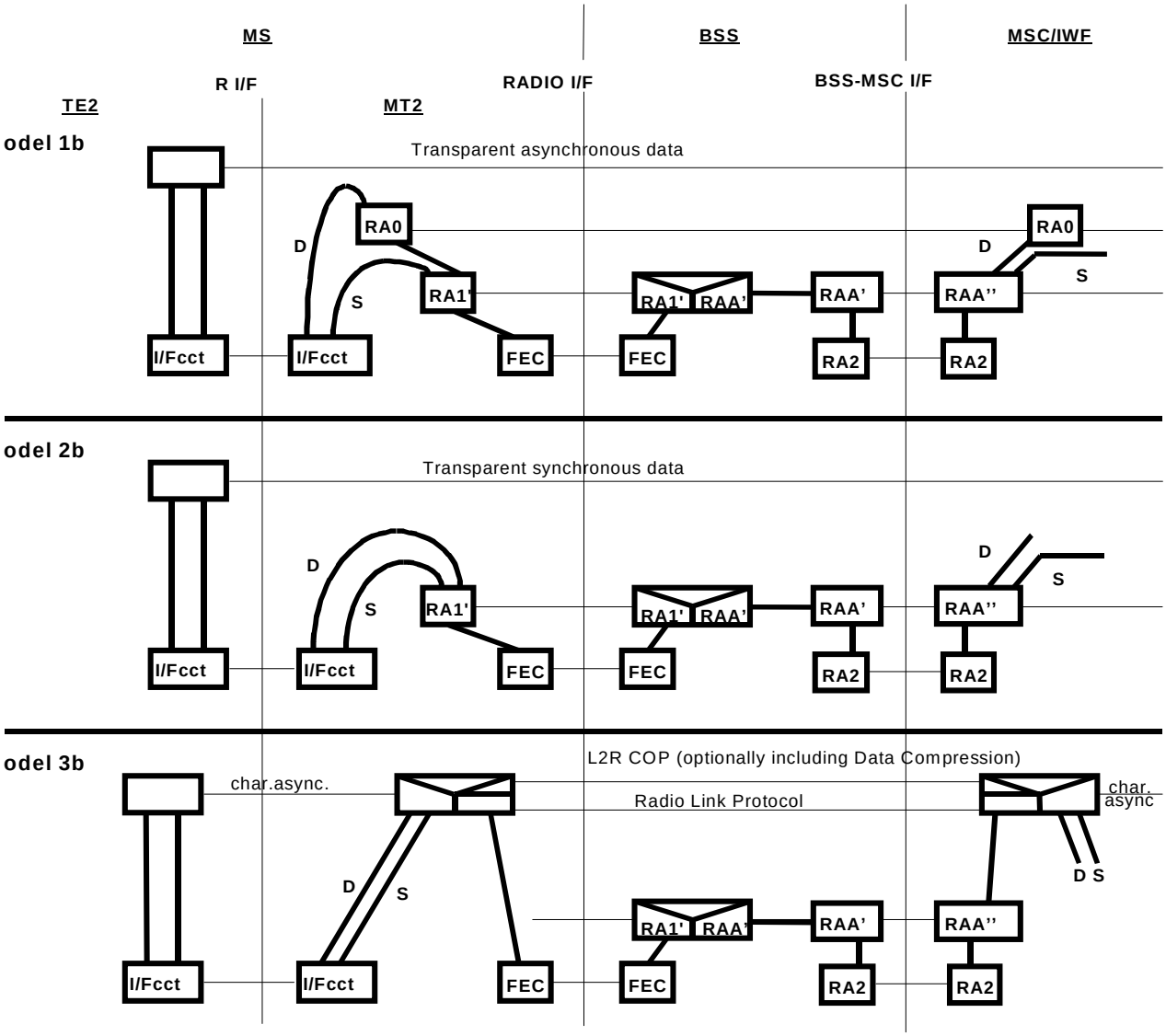
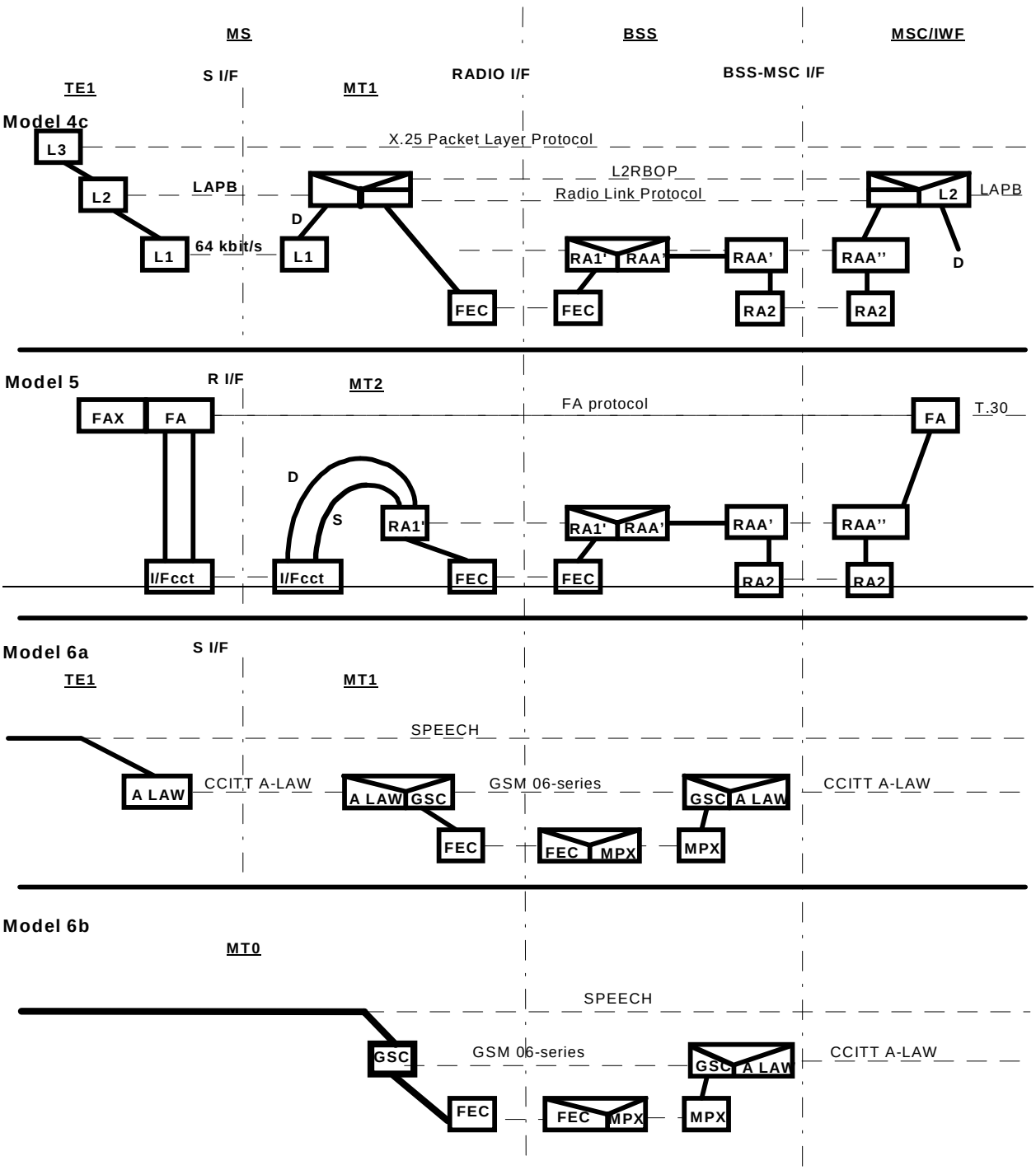


Figure 7 (continued) : Information transfer protocol models for GSM PLMN connections using 14.4 channels


MS
BSS
MSC/IWF
S I/F
RADIO I/F
BSS-MSC I/F
TE1
MT1
Model 4c
X.25 Packet Layer Protocol
L3
L2
LAPB
L2RBOP
Radio Link Protocol
L2
LAPB
D
L1
64 kbit/s
L1
RA1'
RAA'
RAA'
RAA''
D
FEC
FEC
RA2
RA2
Model 5
R I/F
MT2
FAX
FA
FA protocol
FA
T.30
D
S
RA1'
RA1'
RAA'
RAA'
RAA''
I/Fcct
I/Fcct
FEC
FEC
RA2
RA2
Model 6a
S I/F
TE1
MT1
SPEECH
A LAW
CCITT A-LAW
A LAW
GSC
GSM 06-series
GSC
A LAW
CCITT A-LAW
FEC
FEC
MPX
MPX
Model 6b
MT0
SPEECH
GSC
GSM 06-series
GSC
A LAW
CCITT A-LAW
FEC
FEC
MPX
MPX

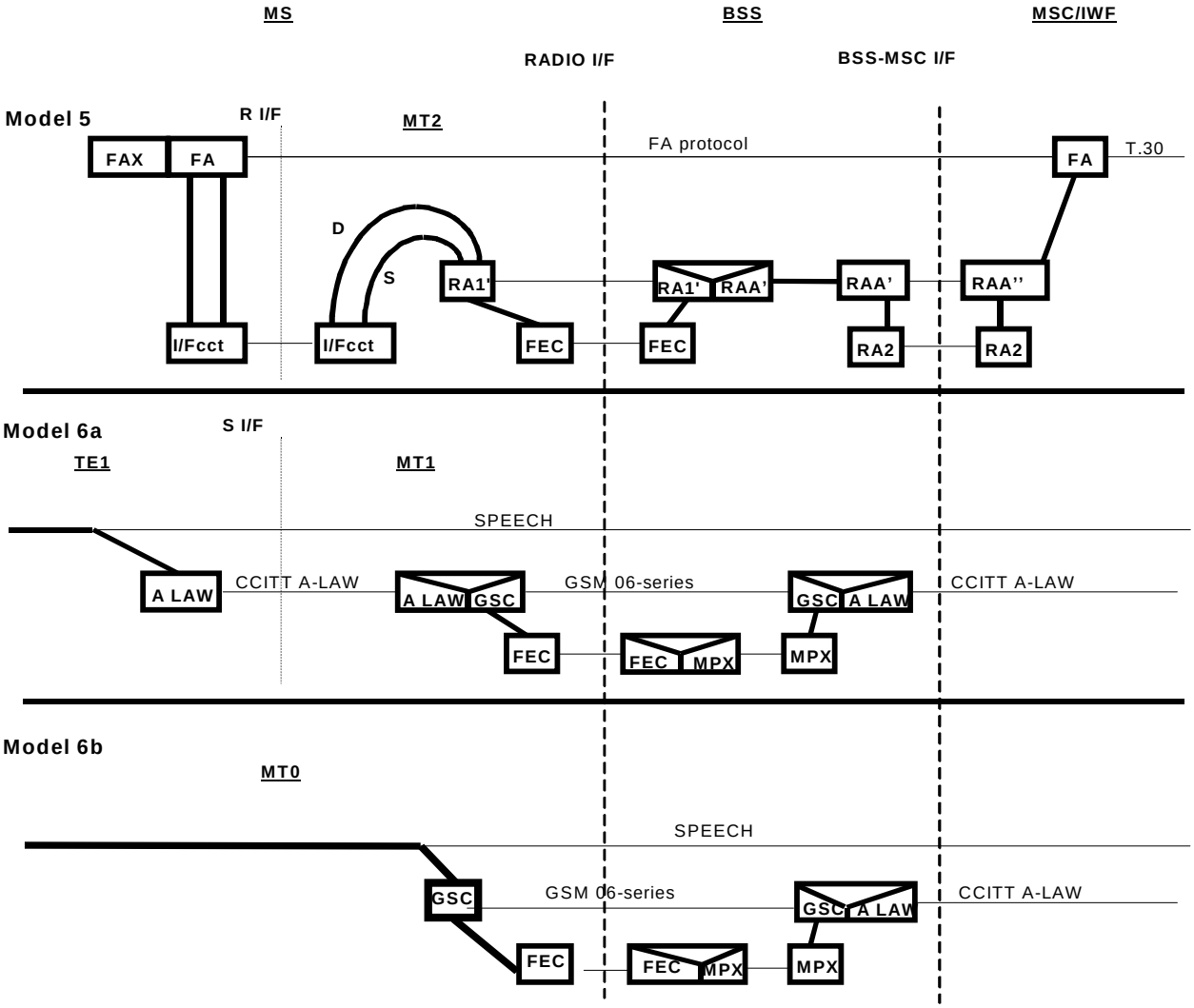


Figure 7 (continued) : Information transfer protocol models for GSM PLMN connections using 14.4 channels

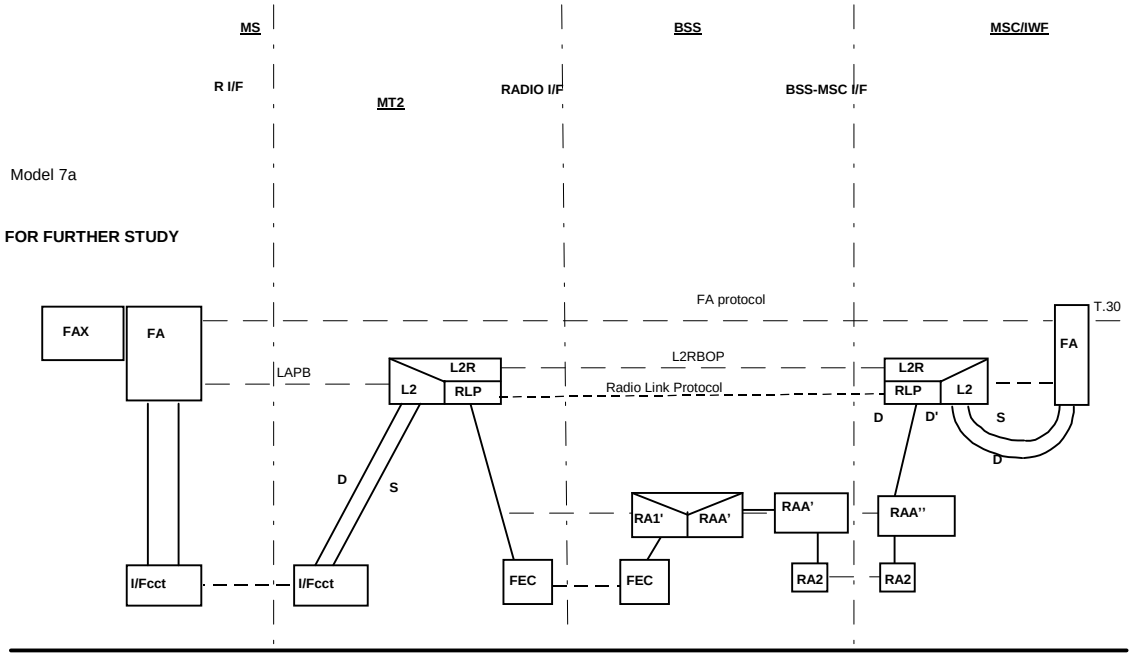
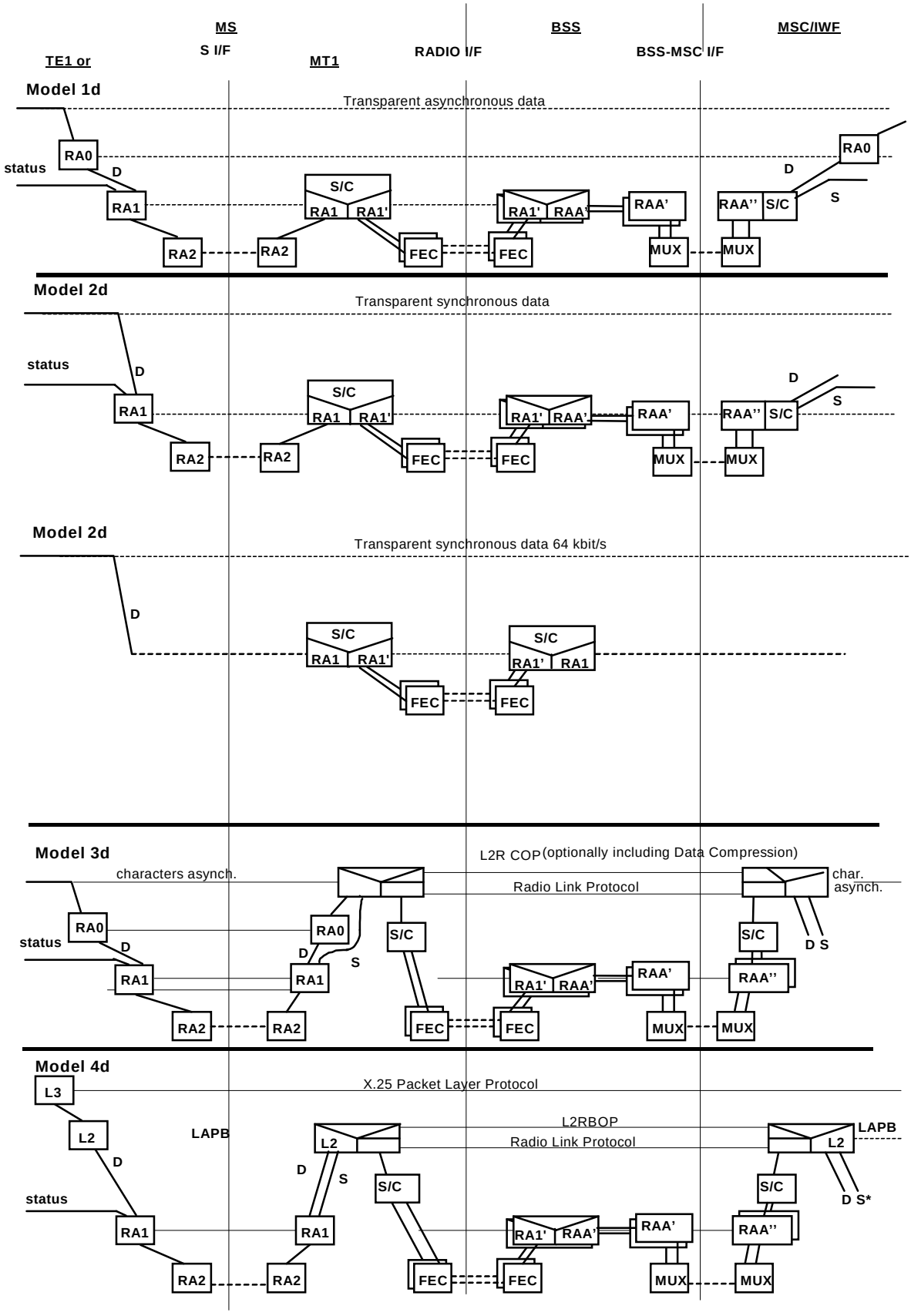


Figure 7 (continued) : Information transfer protocol models for GSM PLMN connections using 14.4 channels


MS
BSS
MSC/IWF
TE1 or
S I/F
MT1
RADIO I/F
BSS-MSC I/F
Model 1d
Transparent asynchronous data
RA0
status
D
RA1
RA2
S/C
RA1
RA1'
FEC
RA1'
RAA'
RAA'
MUX
RAA''
S/C
RA0
D
S
Model 2d
Transparent synchronous data
Model 2d
Transparent synchronous data 64 kbit/s
Model 3d
characters asynch.
L2R COP (optionally including Data Compression)
Radio Link Protocol
char. asynch.
Model 4d
X.25 Packet Layer Protocol
L3
L2
LAPB
L2RBOP
D S*

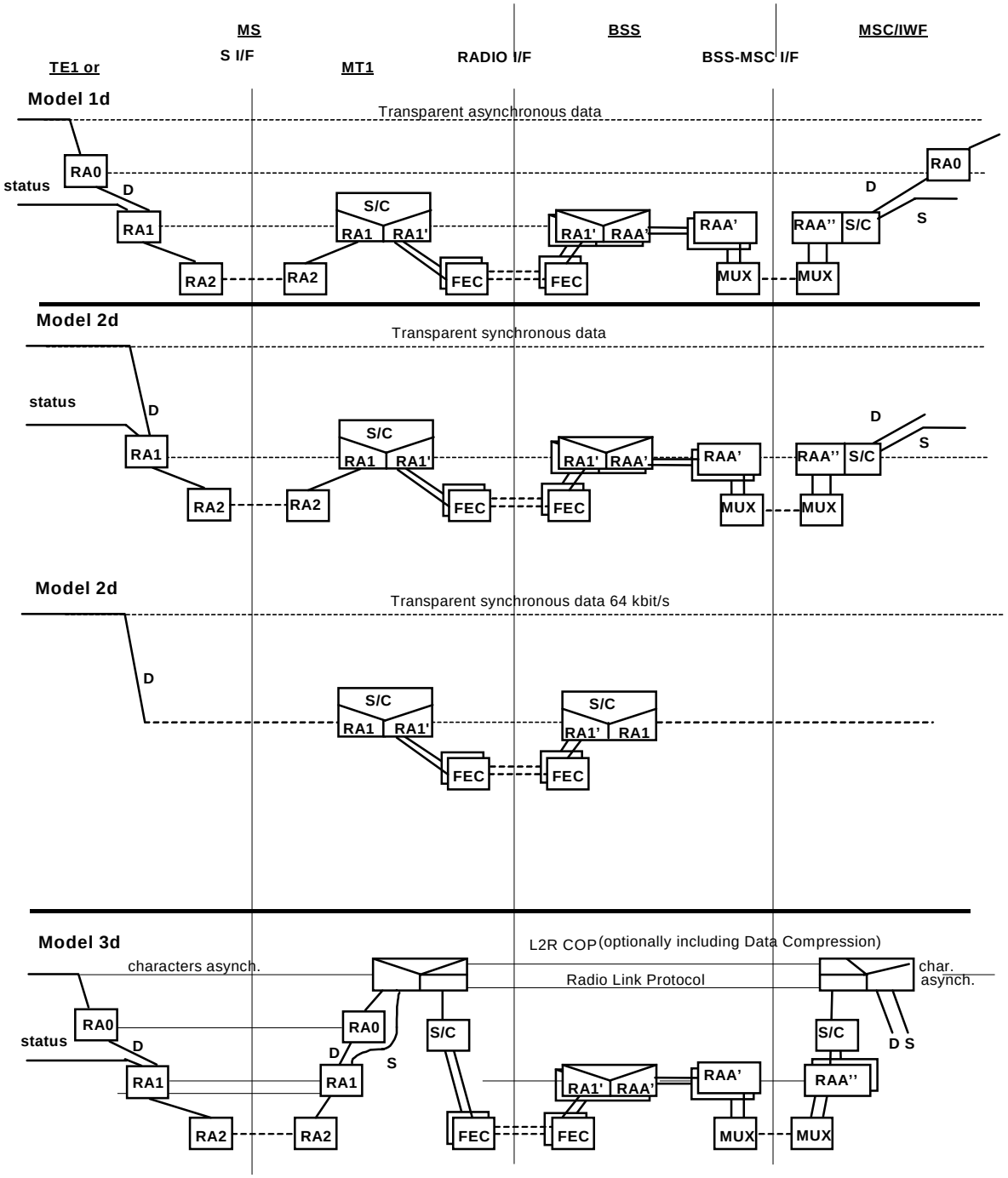
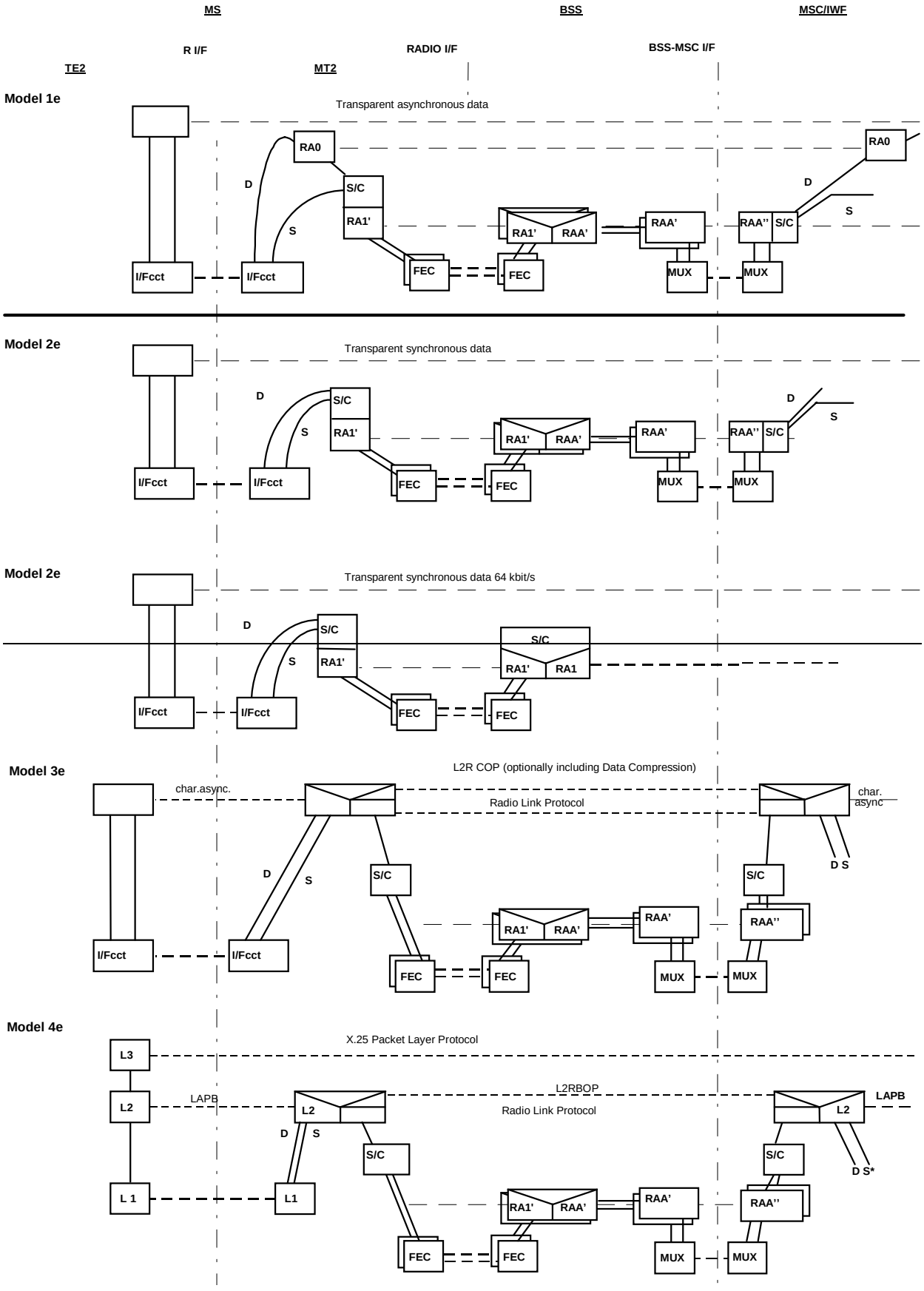


Figure 7 (continued) : Information transfer protocol models for GSM PLMN connections using 14.4 channels


MS
BSS
MSC/IWF
R I/F
RADIO I/F
BSS-MSC I/F
TE2
MT2
Model 1e
Transparent asynchronous data
RA0
D
S/C
RA1'
S
I/Fcct
FEC
RA1'
RAA'
RAA'
MUX
RAA''
S/C
Model 2e
Transparent synchronous data
Model 2e
Transparent synchronous data 64 kbit/s
Model 3e
L2R COP (optionally including Data Compression)
char.async.
Radio Link Protocol
char. async
D S
Model 4e
X.25 Packet Layer Protocol
L3
L2
LAPB
L2RBOP
Radio Link Protocol
LAPB
L 1
L1
D S*

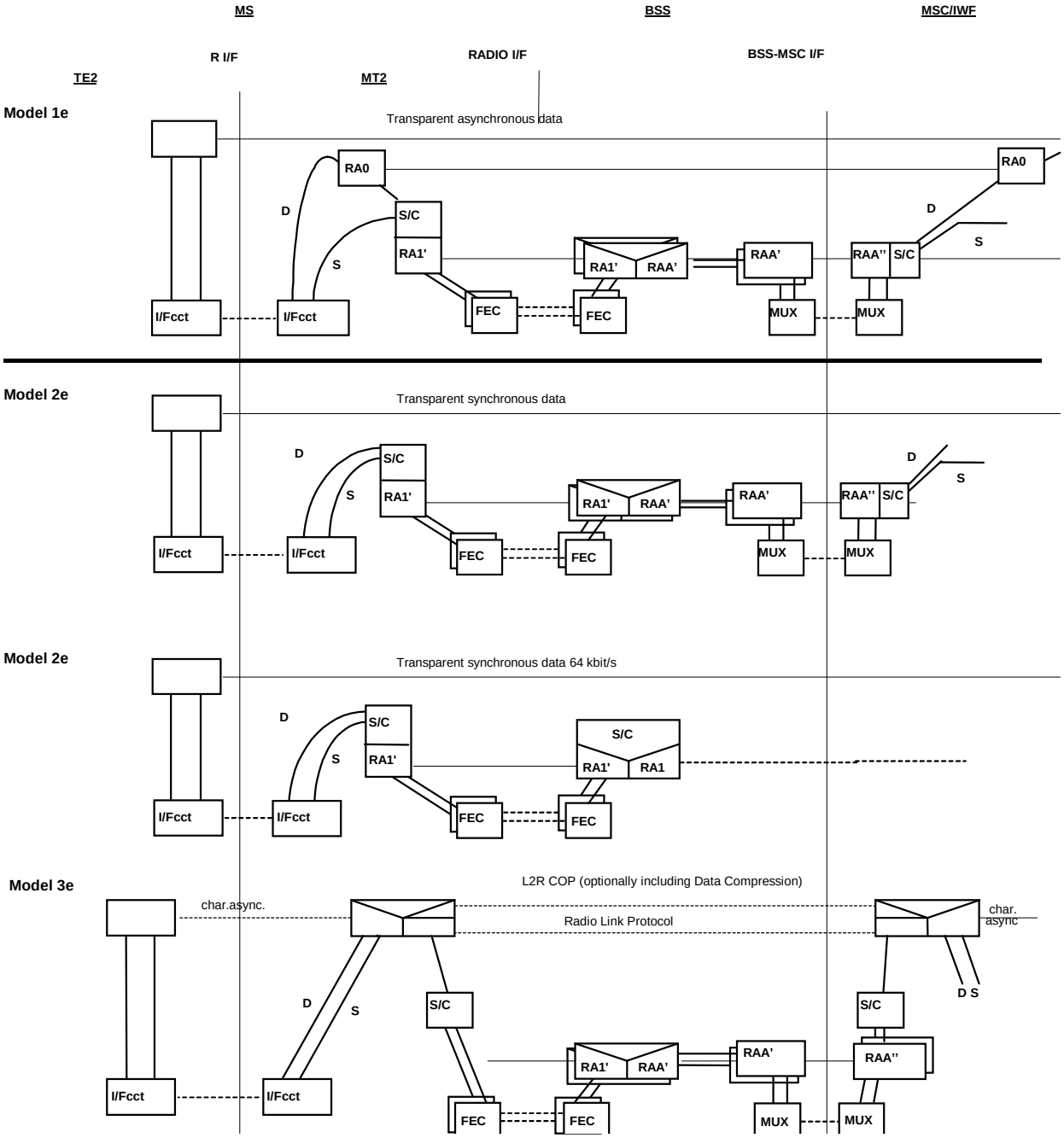


Figure 7 (continued) : Information transfer protocol models for GSM PLMN connections using 14.4 channels

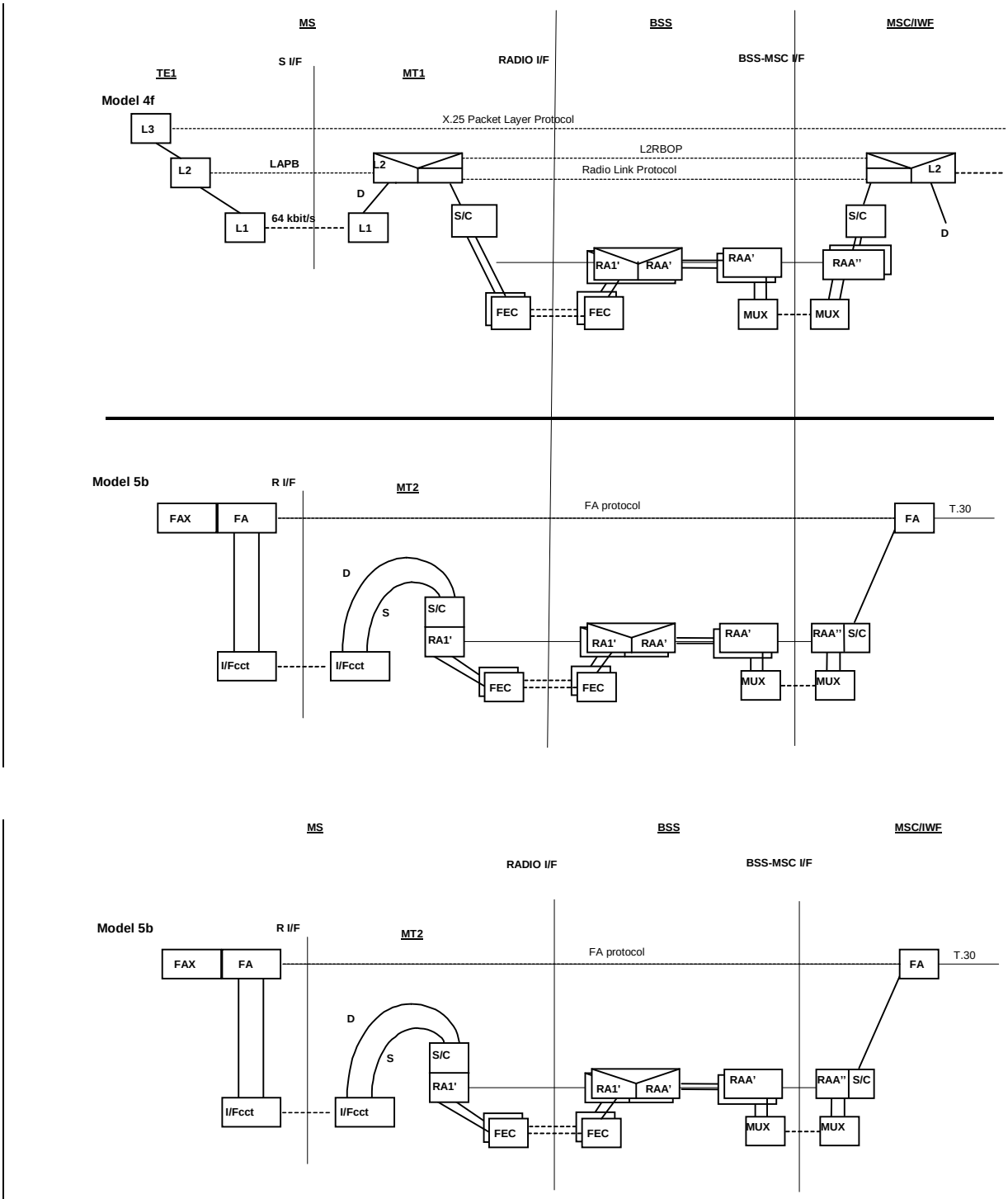


Figure 7 (continued) : Information transfer protocol models for GSM PLMN connections using 14.4 channels

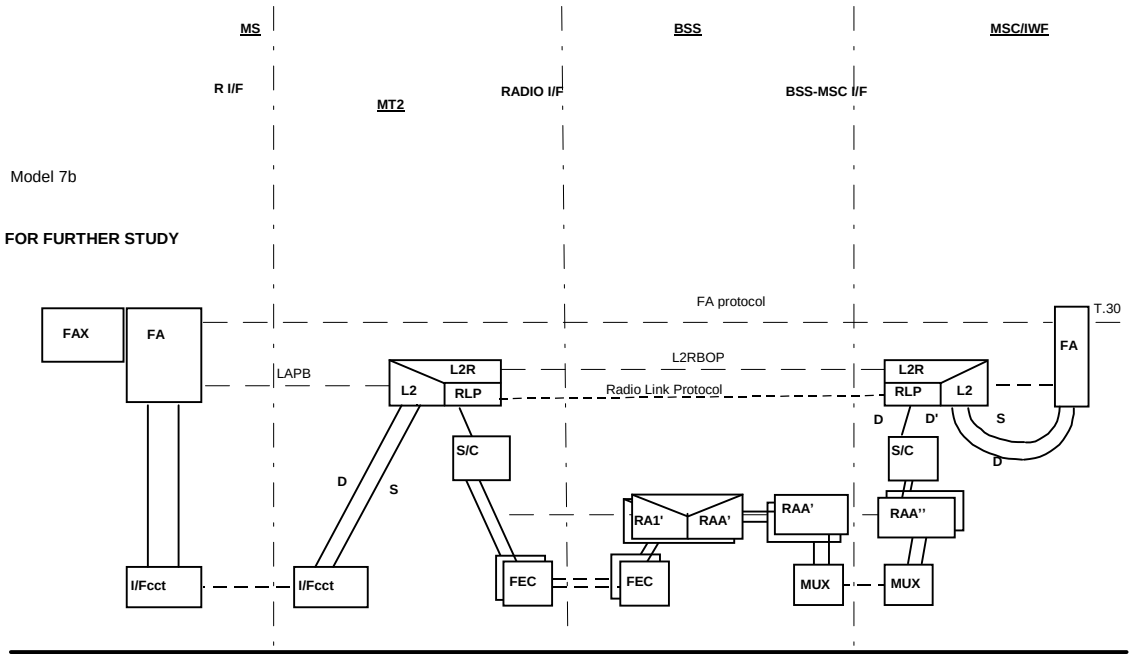


Figure 7 (concluded) : Information transfer protocol models for GSM PLMN connections using 14.4 channels

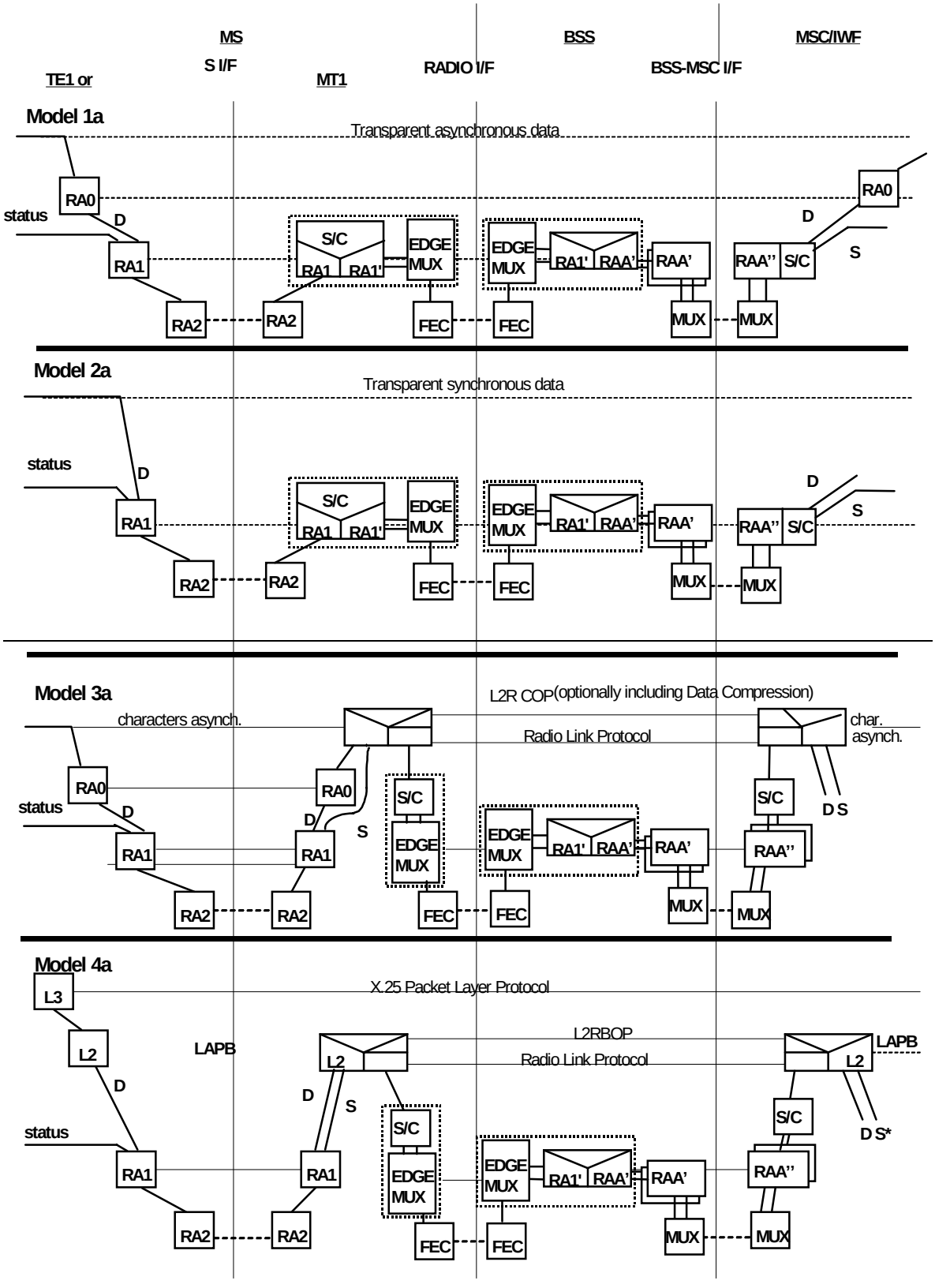
Legend	to Figure 7:
FA	= Fax Adaptor
GSC	= GSM Speech Codec
FEC	= Forward Error Correction
MPX	= Multiplex/Demultiplex
MUX	= Multiplex/Demultiplex
S/C	= Split/ Combine

6.6 Limited set of GSM PLMN connection types (for EDGE channels)

Figure 8 provides the information transfer protocol models for the identified set of GSM PLMN connection types for support of TCH/F28.8 or TCH/F43.2. The description of models given in subclause 6.4 applies also to figure 8.

When a TCH/F28.8 channel is used in multislot configurations, multiple EDGE multiplexing functions are applied on both sides of the air-interface; i.e. one multiplexing function — on each side of the air interface — is associated with each air-interface channel.

When TCH/F32.0 channels are used in double slot configurations, no rate adaptation is applied as the PLMN offers a '64 kbit/s pipe' between TE and an external network. When TCH/F32.0 channels are used in single slot configurations, the ITU-T I.460 rate adaptation is applied. (For details refer to 3GPP TS 04.21).


MS
BSS
MSC/IWF
S I/F
RADIO I/F
BSS-MSC I/F
TE1 or
MT1
Model 1a
Transparent asynchronous data
RA0
status
D
RA1
RA2
S/C
RA1
RA1'
EDGE MUX
FEC
RA1' RAA'
RAA'
MUX
RAA'' S/C
S
Model 2a
Transparent synchronous data
Model 3a
L2R COP(optionally including Data Compression)
characters asynch.
Radio Link Protocol
char. asynch.
RAA''
D S
Model 4a
X.25 Packet Layer Protocol
L3
L2
LAPB
L2RBOP
D S*

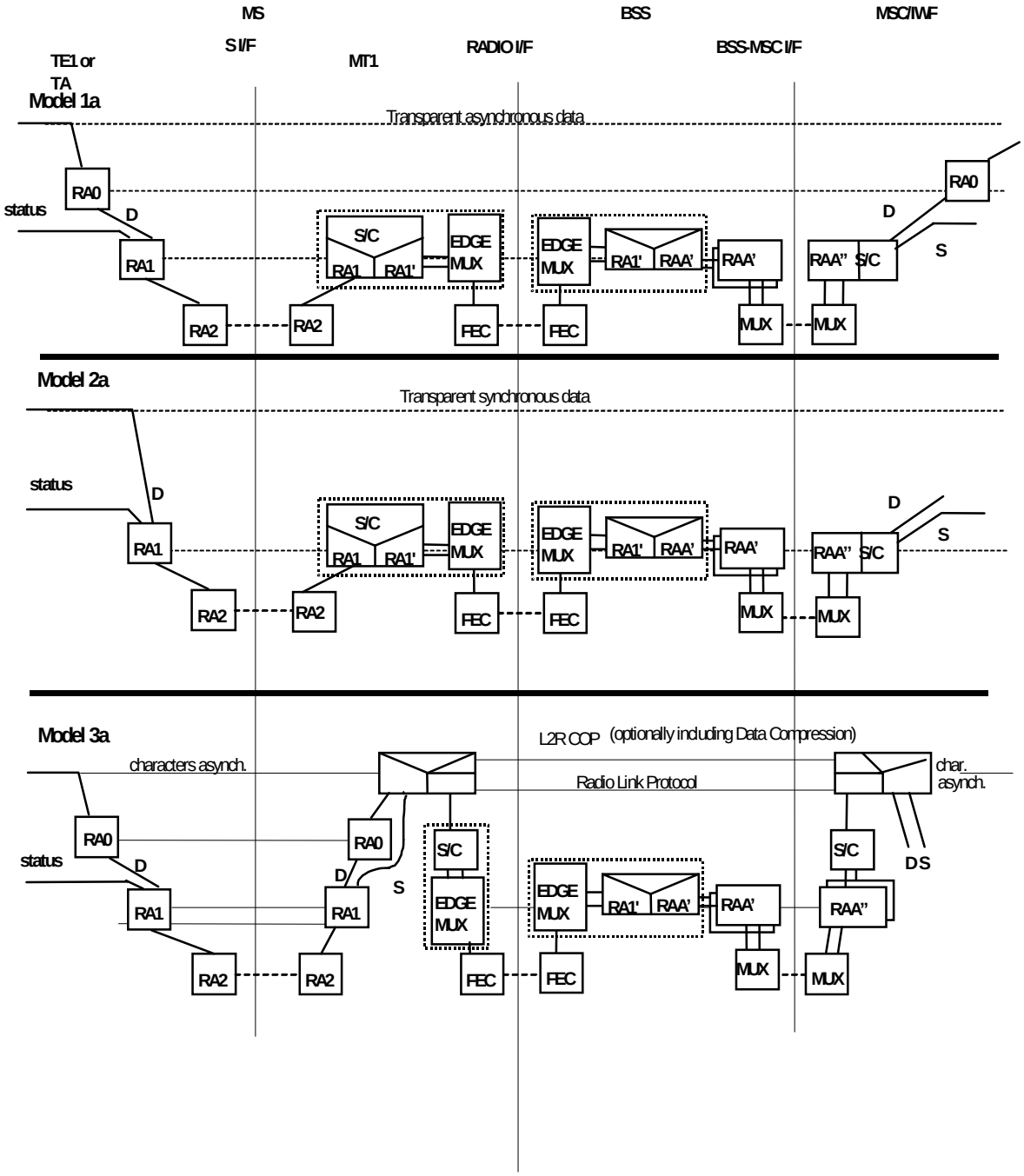
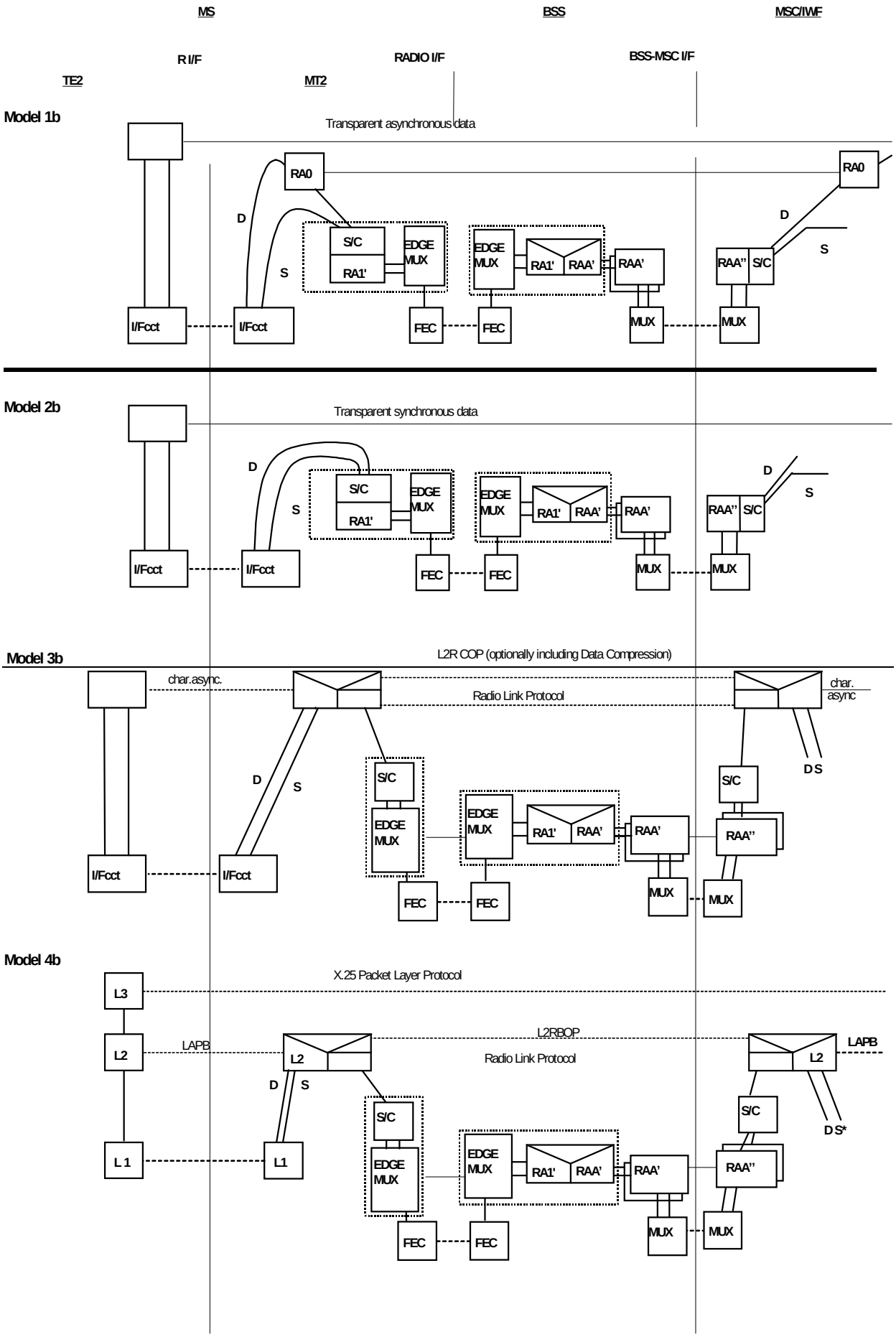


Figure 8 (continued) : Information transfer protocol models for GSM PLMN connections using EDGE channels


MS
BSS
MSC/IWF
R I/F
RADIO I/F
BSS-MSC I/F
TE2
MT2
Model 1b
Transparent asynchronous data
RA0
D
S
S/C
RA1'
EDGE MUX
RA1'
RAA'
RAA'
RA0
D
S
RAA''
S/C
I/Fcct
I/Fcct
FEC
FEC
MUX
MUX
Model 2b
Transparent synchronous data
D
S
S/C
RA1'
EDGE MUX
RA1'
RAA'
RAA'
D
S
RAA''
S/C
I/Fcct
I/Fcct
FEC
FEC
MUX
MUX
Model 3b
L2R COP (optionally including Data Compression)
char.async.
Radio Link Protocol
char. async
D
S
S/C
EDGE MUX
RA1'
RAA'
RAA'
S/C
RAA''
D S
I/Fcct
I/Fcct
FEC
FEC
MUX
MUX
Model 4b
X.25 Packet Layer Protocol
L3
L2
LAPB
L2
L2RBOP
Radio Link Protocol
L2
LAPB
D
S
S/C
EDGE MUX
RA1'
RAA'
RAA'
S/C
RAA''
D S*
L1
L1
FEC
FEC
MUX
MUX

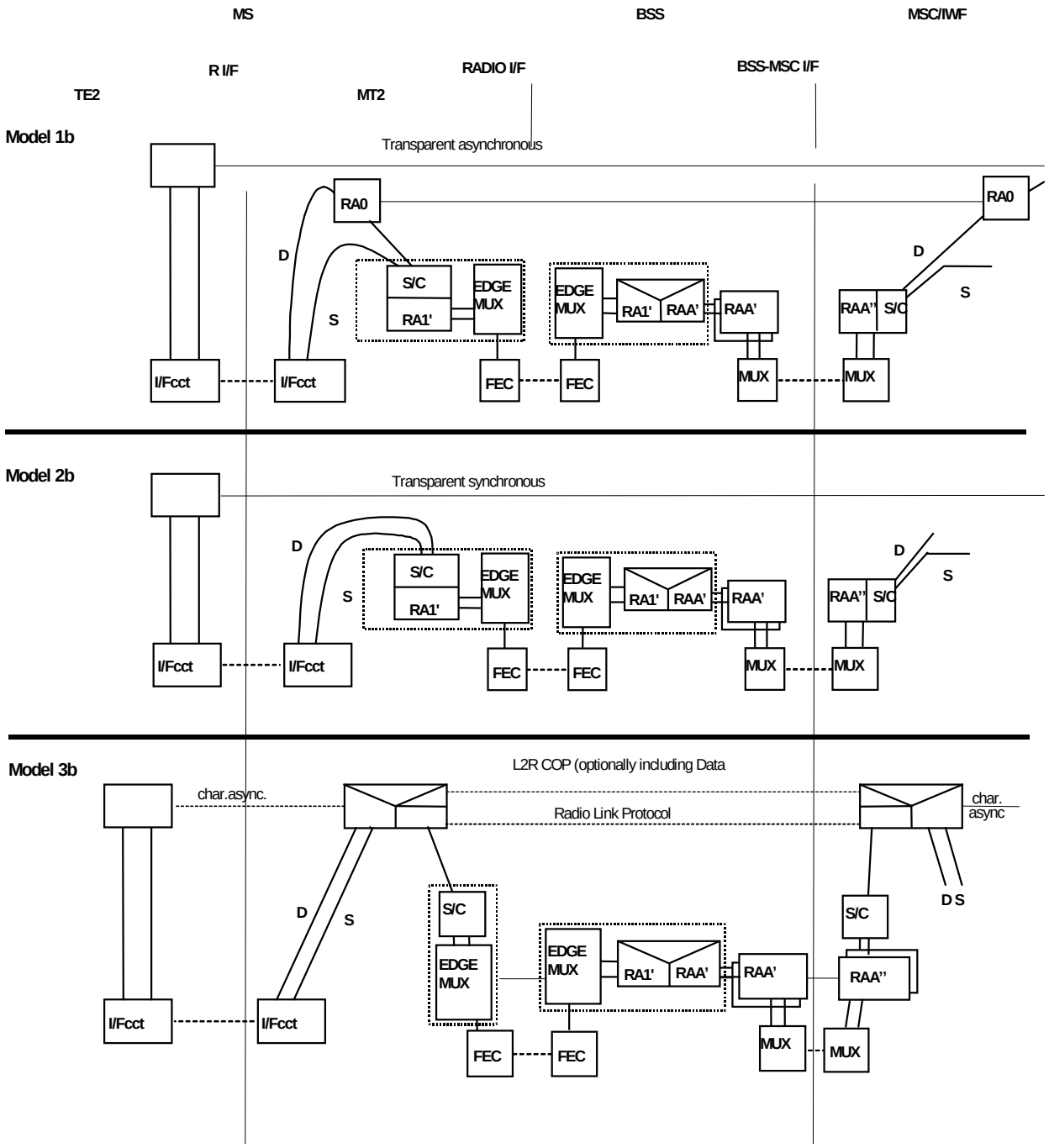


Figure 8 (continued) : Information transfer protocol models for GSM PLMN connections using EDGE channels

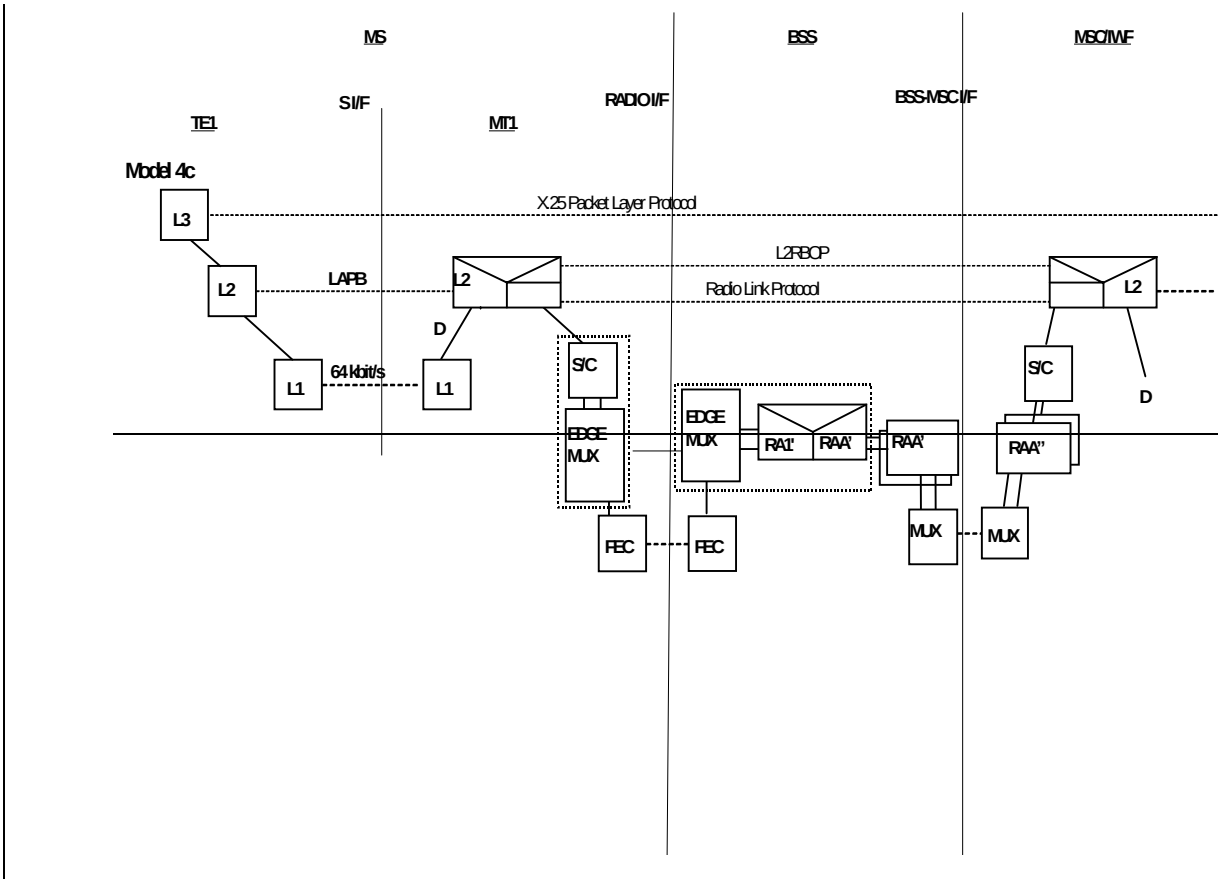


Figure 8 (continued) : Information transfer protocol models for GSM PLMN connections using EDGE channels

Next section modified

7.5 Network capability to support channel mode modification

Specification 3GPP TS 03.45 (Technical Realization of the Group 3 Facsimile Teleservice) identifies a need for a GSM PLMN to support channel mode modification within the facsimile phase of the alternate speech and facsimile group 3 service. The network capability to support channel modification is described in 3GPP TS 24.008. Channel mode modification is not possible for other services. A channel mode modification results in a change of connection element over the radio interface with resultant change in access at the mobile station.

Table 5: Relationship between Bearer services and GSM PLMN Connection elements

Connection description	**Bearer service user data rate**	**Radio interface connection element**	**Intermediate rate at the BSS-MSC interface**	**BSS-MSC connection element**	**Protocol model in figure 6, 7 or 8**
Circuit mode unstructured with unrestricted digital capability transparent.	Data circuit duplex async n × 4 800 (n ≤ 4) or n × 9 600 bit/s (n ≤ 4). Data circuit duplex sync n × 4 800 (n ≤ 4) or n × 9 600 bit/s (n ≤ 5) or n × 1 1200 bit/s (n = 5 or 6).	cct mode unstructured unrestricted n × 6 kbit/s (n ≤ 4) or n × 12 kbit/s (n ≤ 6) on n full rate channels.	8 or 16 kbit/s per TCH/F. For data connections using 5 or 6 TCH/Fs no intermediate rate(s) .	cct mode unstructured unrestricted 64 kbit/s.	Fig 6 :1 d, 1 e, 2 d, 2 e
	Data circuit duplex async n × 14 400 bit/s (n ≤ 3). Data circuit duplex sync n × 14 400 bit/s (n ≤ 5)	cct mode unstructured unrestricted n x 14.5 kbit/s (n ≤ 5) on n full rate channels	16 kbit/s per TCH/F.	cct mode unstructured unrestricted 64 kbit/s.	Fig 7 : 1 d, 1 e, 2 d, 2 e
	Data circuit duplex async 28 800 bit/s. Data circuit duplex sync 28 800 bit/s Data circuit duplex Sync 32 000 bit/s Data circuit duplex sync 64 000 bit/s	cct mode unstructured unrestricted 29.0 kbit/s on full rate channel cct mode unstructured unrestricted 32 kbit/s on full rate channel cct mode unstructured unrestricted 2 x 32.0 kbit/s on full rate channels	16 kbit/s per TCH/F. 32 kbit/s No intermediate rate for the 64 000 bit/s rate	cct mode unstructured unrestricted 64 kbit/s.	Fig 8 : 1 a, 1 b, 2 a, 2 b None
	Data circuit duplex async 14 400 bit/s Data circuit duplex sync 14 400 bit/s	cct mode unstructured unrestricted 14.5 kbit/s on full rate Channel	16 kbit/s	cct mode unstructured unrestricted 64 kbit/s.	Fig 7 : 1 a, 1 b 2 a, 2 b
	Data circuit duplex async 9 600 bit/s. Data circuit duplex sync 9 600 bit/s.	cct mode unstructured unrestricted 12 kbit/s on full rate channel.	16 kbit/s.	cct mode unstructured unrestricted 64 kbits/s.	Fig 6 :1 a, 1 b Fig 6 2 a, 2 b
	Data circuit duplex async 4 800 bit/s. Data circuit duplex sync 4 800 bit/s.	cct mode unstructured unrestricted 6 kbit/s on full rate channel and half rate channel.	8 kbit/s.	cct mode unstructured unrestricted 64 kbits/s.	Fig 6 1 a, 1 b Fig 6 2 a, 2 b
	Data circuit duplex async 300. Data circuit duplex async 1 200. Data circuit duplex async 2 400. Data circuit duplex sync 1 200. Data circuit duplex sync 2 400.	cct mode unstructured unrestricted 3.6 kbit/s on full rate channel and half rate channel.	8 kbit/s.	cct mode unstructured unrestricted 64 kbits/s.	Fig 6 : 1 a, 1 b Fig 6 1 a, 1 b Fig 6 1 a, 1 b Fig 6 2 a, 2 b Fig 6

					2 a, 2 b

Connection description	**Bearer service user data rate**	**Radio interface connection element**	**Intermediate rate at the BSS-MSC interface**	**BSS-MSC connection element**	**Protocol model in figure 6, 7 or 8**
Circuit mode unstructured with unrestricted digital capability non transparent.	Data circuit duplex async n × 4 800 (n ≤ 4) or n × 9 600 bit/s (n ≤ 4).	cct mode SDU unrestricted n × 6 kbit/s (n ≤ 4) or n × 12 kbit/s (n ≤ 4) on full rate channels.	8 or 16 kbit/s per TCH/F.	cct mode unstructured unrestricted 64 kbit/s.	Fig 6 3 d, 3 e
	Data circuit duplex async n × 14 400 bit/s (n ≤ 4).	cct mode SDU unrestricted n × 14.5 kbit/s (n ≤ 4) on full rate channels.	16 kbit/s	cct mode unstructured unrestricted 64 kbit/s.	Fig 7 : 3 d, 3e
	Data circuit duplex async n x 28 800 bit/s (n ≤ 2). Data circuit duplex async 43 200 bit/s	cct mode SDU unrestricted n × 29.0 kbit/s (n ≤ 2) on full rate channels. cct mode SDU unrestricted 43.5 kbit/s on a full rate channel.	16 kbit/s per TCH/F. 16 kbit/s per TCH/F.	cct mode unstructured unrestricted 64 kbit/s.	Fig 8 : 3a, 3 b
	Data circuit duplex async 14 400 bit/s	cct mode SDUunrestricted 14.5 kbit/s on full rate channel	16 kbit/s	cct mode unstructured unrestricted 64 kbit/s.	Fig 7 : 3 a, 3 b
	Data circuit duplex async 9 600 bit/s.	cct mode SDU unrestricted 12 kbit/s on full rate channel.	16 kbit/s.	cct mode unstructured unrestricted 64 kbits/s.	Fig 6 : 3 a, 3 b
	Data circuit duplex async 4 800 bit/s.	cct mode SDU unrestricted full rate channel, 12 kbit/s or half rate channel, 6 kbit/s.	16 kbit/s FR 8 kbit/s HR.	cct mode unstructured unrestricted 64 kbits/s.	Fig 6 : 3 a, 3 b
	Data circuit duplex async 300. Data circuit duplex async 1 200. Data circuit duplex async 2 400.	cct mode SDU unrestricted full rate channel, 12 kbit/s or half rate channel, 6 kbit/s.	16 kbit/s FR 8 kbit/s HR.	cct mode unstructured unrestricted 64 kbits/s.	Fig 6: 3 a, 3 b Fig 6 : 3 a, 3 b Fig 6 3 a, 3 b

Connection description	Bearer service user data rate	Radio interface connection element	Intermediate rate at the BSS-MSC interface	BSS-MSC connection element	Protocol model in figure 6, 7 or 8
Circuit mode unstructured with 3.1 kHz audio ex PLMN transparent.	Data circuit duplex async n × 4 800 bit/s (n ≤ 4) or n × 9 600 bit/s (n ≤ 3). Data circuit duplex sync n × 4 800 bit/s (n ≤ 4) or n × 9 600 bit/s (n ≤ 3).	cct mode unstructured unrestricted n × 6 kbit/s (n ≤ 4) or n × 12 kbit/s (n ≤ 3) on n full rate channels.	8 or 16 kbit/s TCH/F.	cct mode unstructured unrestricted 64 kbit/s.	Fig 6 : 1 d, 1 e, 2 d, 2 e
	Data circuit duplex async n × 14 400 bit/s (n ≤ 2). Data circuit duplex sync n × 14 400 bit/s (n ≤ 2)	cct mode unstructured unrestricted x 14.5 kbit/s (n ≤ 2) on n full rate channels	16 kbit/s per TCH/F	cct mode unstructured unrestricted 64 kbit/s.	Fig 7 : 1 d, 1 e, 2 d, 2e
	Data circuit duplex async 28 800 bit/s. Data circuit duplex sync 28 800 bit/s	cct mode unstructured unrestricted 29.0 kbit/s on a full rate channel	16 kbit/s per TCH/F.	cct mode unstructured unrestricted 64 kbit/s.	Fig 8 : 1 a, 1 b, 2 a, 2 b
	Data circuit duplex asynch 14 400 bit/s synch 14 400 bit/s	cct mode unstructured unrestricted 14.5 kbit/s on full rate channels	16 kbit/s	cct mode unstructured unrestricted 64 kbit/s.	Fig 7 : 1 a, 1 b for async Fig 7 2 a 2 b for synch
	Data circuit duplex async 9.6 kbit/s sync 9.6 kbit/s.	cct mode unstructured unrestricted 12 kbit/s full rate channel.	16 kbit/s.	cct mode unstructured unrestricted 64 kbit/s.	Fig 6 : 1 a, 1 b for asynch. Fig 6 : 2 a, 2 b for synch.
	Data circuit duplex async 4.8 kbit/s sync 4.8 kbit/s.	cct mode unstructured unrestricted 6 kbit/s full and half rate channel.	8 kbit/s.		
	Data circuit duplex async ≤ 2 400 sync ≤ 2 400.	cct mode unstructured unrestricted 3.6 kbit/s full and half rate channel.	8 kbit/s.		

Connection description	Bearer service user data rate	Radio interface connection element	Intermediate rate at the BSS-MSC interface	BSS-MSC connection element	Protocol model in figure 6, 7 or 8
Circuit mode unstructured with 3.1 kHz audio ex PLMN non transparent.	Data circuit duplex async n × 4 800 (n ≤ 4) or n × 9 600 (n ≤ 4) bit/s. ~~Data circuit duplex sync n × 4 800 (n ≤ 4) or n × 9 600 bit/s (n ≤ 4).~~	cct mode SDU unrestricted n × 6 kbit/s (n ≤ 4) or n × 12 kbit/s (n ≤ 4) on full rate channels.	8 or 16 kbit/s per TCH/F.	cct mode unstructured unrestricted 64 kbits/s.	Fig 6 : 3 d, 3 e for async. ~~Fig 6 : 4 d, 4 e, 4 f for sync.~~
	Data circuit duplex async n × 14 400 bit/s (n ≤ 4). ~~Data circuit duplex sync n × 14 400 bit/s (n ≤ 4)~~	cct mode SDU unrestricted n x 14.5 kbit/s (n ≤ 4) on n full rate channels	16 kbit/s per TCH/F	cct mode unstructured unrestricted 64 kbits/s.	Fig 7 : 3 d, 3 e for asynch ~~Fig 7 : 4 d, 4 e 4 f for synch~~
	Data circuit duplex async 28 800 bit/s. Data circuit duplex async 43 200 bit/s	cct mode SDU unrestricted 29.0 kbit/s on a full rate channel. cct mode SDU unrestricted 43.5 kbit/s on a full rate channel.	16 kbit/s per TCH/F. 16 kbit/s per TCH/F.	cct mode unstructured unrestricted 64 kbits/s.	Fig 8 : 3a, 3 b
	~~Data circuit duplex sync 28 800 bit/s~~	~~cct mode SDU unrestricted 29.0 kbit/s on a full rate channel.~~	~~16 kbit/s per TCH/F.~~	~~cct mode unstructured unrestricted 64 kbits/s.~~	~~Fig 8 : 4a, 4 b, 4c~~
	Data circuit duplex asynch 14 400 bit/s ~~synch 14 400 bit/s~~	cct mode SDU unrestricted 14.5 kbit/s full rate channel	16 kbit/s	cct mode unstructured unrestricted 64 kbits/s.	Fig 7 : 3a, 3b for asynch ~~Fig 7 : 4 a, 4 b, 4 c for synch~~
	Data circuit duplex async 9.6 kbit/s sync 9.6 kbit/s.	cct mode SDU unrestricted 12 kbit/s full rate channel.	16 kbit/s.	cct mode unstructured unrestricted 64 kbit/s.	Fig 6 : 3 a, 3 b for asynch. ~~Fig 6 : 4 a, 4 b, 4 c for synch.~~
	Data circuit duplex async 4.8 kbit/s ~~sync 4.8 kbit/s.~~	cct mode SDU unrestricted half rate channel, 6 kbit/s or full rate channel, 12 kbit/s.	16 kbit/s FR 8 kbit/s HR.		
	Data circuit duplex async ≤ 2 400 sync ≤ 2 400.	cct mode SDU unrestricted half rate channel, 6 kbit/s or full rate channel, 12 kbit/s.			

Table 5 (continued): Relationship between Bearer services and GSM PLMN Connection elements

Connection description	Bearer service user data rate	Radio interface connection element	Intermediate rate at the BSS-MSC interface	BSS-MSC connection element	Protocol model in figure 6, 7 or 8
Packet services basic access transparent.	Data circuit duplex sync n × 4 800 (n ≤ 4) or n × 9 600 bit/s (n ≤ 5) or n × 11200 bit/s (n = 5 or 6).	cct mode unstructured unrestricted n × 6 kbit/s (n ≤ 4) or n × 12 kbit/s (n ≤ 6) on n full rate channels.	8 or 16 kbit/s per TCH/F. For data connections using 5 or 6 TCH/Fs no intermediate rate(s).	cct mode unstructured unrestricted 64 kbit/s.	Fig 6 : 2 d, 2 e
	Data circuit duplex sync n × 14 400 bit/s (n ≤ 5)	cct mode unstructured unrestricted n × 14.5 kbit/s (n ≤ 5) on n full rate channels.	16 kbit/s per TCH/F	cct mode unstructured unrestricted 64 kbits/s.	Fig 7 : 2 d, 2 e
	Data circuit duplex synch 14 400 bit/s	cct mode unstructured unrestricted 14.5 kbit/s on full rate channel.	16 kbit/s.	cct mode unstructured unrestricted 64 kbit/s.	Fig 7 : 2 a, 2 b
	Data circuit duplex sync 9 600 bit/s.	cct mode unstructured unrestricted 12 kbit/s on full rate channel.	16 kbit/s.	cct mode unstructured unrestricted 64 kbit/s.	Fig 6 : 2 a, 2 b
	Data circuit duplex sync 4 800 bit/s.	cct mode unstructured unrestricted 6 kbit/s on full rate channel and half rate channel.	8 kbit/s.	cct mode unstructured unrestricted 64 kbit/s.	Fig 6 : 2 a, 2 b
	Data circuit duplex sync 2 400 bit/s.	cct mode unstructured unrestricted 3.6 kbit/s on full rate channel and half rate channel.	8 kbit/s.	cct mode unstructured unrestricted 64 kbit/s.	Fig 6 : 2 a, 2 b

Connection description	Bearer service user data rate	Radio interface connection element	Intermediate rate at the BSS-MSC interface	BSS-MSC connection element	Protocol model in figure 6, 7 or 8
Packet services basic access non transparent.	Data circuit duplex sync n × 4 800 (n ≤4) or n × 9 600 bit/s (n ≤ 4).	cct mode SDU unrestricted n × 6 kbit/s (n ≤ 4) or n × 12 kbit/s (n ≤ 4) on full rate channels.	8 or 16 kbit/s per TCH/F.	cct mode unstructured unrestricted 64 kbits/s.	Fig 6 : 4 d, 4 e, 4 f
	Data circuit duplex sync n × 14 400 bit/s (n ≤ 4).	cct mode SDU unrestricted n × 14.5 kbit/s (n ≤ 4) on full rate channels	16 kbit/s per TCH/F	cct mode unstructured unrestricted 64 kbits/s.	Fig 7 : 4 d, 4 e, 4 f
	Data circuit duplex sync n × 28 800 bit/s (n ≤ 2).	cct mode SDU unrestricted n × 29.0 kbit/s (n ≤ 2) on full rate channels	16 kbit/s per TCH/F	cct mode unstructured unrestricted 64 kbits/s.	Fig 8 : 4 a, 4 b, 4 c
	Data circuit duplex sync 43 200 bit/s.	cct mode SDU unrestricted 43.5 kbit/s on a full rate channel	16 kbit/s per TCH/F		Fig 8 : 4 a, 4 b, 4 c
	Data circuit duplex synch 14 400 bit/s	cct mode SDU unrestricted 14.5 kbit/s on full rate channel	16 kbit/s	cct mode unstructured unrestricted 64 kbits/s.	Fig 7 : 4 a, 4 b, 4 c
	Data circuit duplex sync 9 600 bit/s.	cct mode SDU unrestricted 12 kbit/s on full rate channel.	16 kbit/s.	cct mode unstructured unrestricted 64 kbit/s.	Fig 6 : 4 a, 4 b, 4 c
	Data circuit duplex sync 4 800 bit/s.	cct mode SDU unrestricted full rate channel, 12 kbit/s or half rate channel, 6 kbit/s.	16 kbit/s FR 8 kbit/s HR.	cct mode unstructured unrestricted 64 kbit/s.	4 a,b,c
	Data circuit duplex sync 2 400 bit/s.	cct mode SDU unrestricted full rate channel, 12 kbit/s or half rate channel, 6 kbit/s.	16 kbit/s FR 8 kbit/s HR.	cct mode unstructured unrestricted 64 kbit/s.	4 a,b,c

Table 6: Relationship between Teleservices and GSM PLMN connection types

Teleservice in GSM PLMN	Access at mobile station	Radio interface connection element	Intermediate rate at the BSS-MSC interface	BSS-MSC connection element	Protocol model in figure 6 or 7
Telephony.		cct mode speech.	NA.	cct mode structured 64 kbit/s speech.	Fig 6 : 6 a or 6 b
Emergency calls.		cct mode speech.	NA.	cct mode structured 64 kbit/s speech.	Fig 6 : 6 a or 6 b
Alternate Speech/ Facsimile Group 3.	Data cct duplex synchronous access alternate speech/ group 3 fax.	cct mode speech alternating with unstructured unrestricted 3.6 or 6 or 12 kbit/s or n × 6 kbit/s (n ≤ 3) or n × 12 kbit/s (n ≤ 2) on FR transparent.	Speech NA 8 or 16 kbit/s per TCH/F.	cct mode structured 64 kbit/s alternate speech/unrestricted.	Fig 6 : 5, 5b and 6 a or 6 b
		cct mode speech alternating with unstructured unrestricted 14.5 kbit/s or n × 14.5 kbit/s (n ≤ 2) on FR transparent	Speech NA 16 kbit/s per TCH/F.		Fig 7 : 5 and 5 b and 6 a or 6 b
Automatic Facsimile Group 3.	Data cct duplex synchronous access group 3 fax.	cct mode unstructured unrestricted 3.6 or 6 or 12 kbit/s or n × 6 kbit/s (n ≤ 3) or n × 12 kbit/s (n ≤ 2) on FR transparent.	8 or 16 kbit/s per TCH/F.	cct mode structured 64 kbit/s unrestricted.	Fig 6 : 5, 5b
		cct mode unstructured unrestricted 14.5 kbit/s or n × 14.5 kbit/s (n ≤ 2) on FR transparent	16 kbit/s per TCH/F.		
Alternate speech/ Facsimile Group 3.	Data cct duplex synchronous access alternate speech/ group 3 fax.	cct mode speech alternating with SDU unrestricted 6 or 12 kbit/s or n × 6 kbit/s (n ≤ 3) or n × 12 kbit/s (n ≤ 2) on FR non transparent.	Speech NA 8 or 16 kbit/s per TCH/F.	cct mode structured 64 kbit/s alternate speech/unrestricted.	Fig 6 : 6 a or 6 b, 7 a and 7 b
		cct mode speech alternating with SDU unrestricted 14.5 kbit/s or n × 14.5 kbit/s (n ≤ 2) on FR non transparent.	16 kbit/s per TCH/F.		Fig 7 : 6 a or 6 b and 7 a and 7 b
Automatic Facsimile Group 3.	Data cct duplex synchronous access group 3 fax.	cct mode SDUunrestricted 6 or 12 kbit/s or n × 6 kbit/s (n ≤ 3) or n × 12 kbit/s (n ≤ 2) on FR non transparent.	8 or 16 kbit/s per TCH/F.	cct mode structured 64 kbit/s unrestricted.	Fig 6 : 7 a and 7 b
		cct mode SDU unrestricted 14.5 kbit/s or n × 14.5 kbit/s (n ≤ 2) on FR non transparent.	16 kbit/s per TCH/F.		Fig 7 : 7 a and 7 b

NA: Not Applicable

NOTE: The multislot data connections and the connections using TCH/F14.4 coding belong to the General Bearer Services (Classes 20 and 30 in 3GPP TS 22.002).

Annex A (informative): List of definitions of GSM PLMN connection type attributes and values

A.1 Attribute definition and their values

Information transfer mode:

This attribute describes the operational mode for transferring (transportation and switching) user information through a GSM PLMN connection in the network.

Value: - Circuit

Information transfer capability:

This attribute describes the capability associated with the transfer of different types of information through a GSM PLMN connection.

Values: - Unrestricted digital information

- Speech

- Group 3 facsimile

- 3.1 kHz audio ex PLMN

- Restricted digital information (Note: this value is signalled in the "Other ITC" element, due to a lack of further code points in the "ITC" element.)

Information transfer rate:

This attribute describes either the bit rate (circuit mode) or the throughput (packet mode, for further study). It refers to the transfer of digital information on a GSM PLMN connection.

Values: - Appropriate bit rate

- Throughput rate

Establishment of connection:

This attribute describes the mode of establishment used to establish and release GSM PLMN connections.

Value: - Demand

Symmetry:

This attribute describes the relationship of information flow between two (or more) access points or reference points involved in a GSM PLMN connection.

Values: - Bidirectional symmetric

- Bidirectional asymmetric (Multislot configurations for data)

Connection configuration:

This attribute describes the spatial arrangement for transferring information on a given GSM PLMN connection.

Value: - Point-to-point

Structure:

This attribute refers to the capability of a GSM PLMN connection to deliver information to the destination access point or reference point in a structure that was presented in a corresponding signal structured at the origin (access point or reference point).

Values: - Service data unit integrity (see note 1)

- Unstructured (see note 2)

NOTE 1: Applicable for connection element "non transparent".

NOTE 2: Applicable for connection element "transparent".

Channel rate:

This attribute describes the channels and their bit rate used to transfer the user information and/or signalling information.

Value: - Name of channel (designation) and/or the corresponding bit rate

NOTE 3: This attribute can be used several times for connection characterization.

Connection control protocol, information transfer coding/protocol (layer 1 to 3):

These attributes characterize the protocols on the connection control and/or user information transfer channel.

Value: - Appropriate protocol for each layer

NOTE 4: This attribute can be used several times for connection characterization.

Synchronous/Asynchronous:

This attribute describes the type of transmission between the reference access points.

Values: - Synchronous

- Asynchronous

Negotiation:

This attribute describes the possibility of inband parameter exchange (according to V.110) between reference access points.

Value: - In band negotiation not possible

User Rate:

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

Values: - 0.3 kbit/s

- 1.2 kbit/s

- 2.4 kbit/s

- 4.8 kbit/s

- 9.6 kbit/s

Intermediate rate:

This attribute defines the intermediate rate (according to 3GPP TS 08.20 and ITU-T V.110) at the A interface connection element part.

Values: - 8 kbit/s

- 16 kbit/s

Fixed network user rate FNUR:

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

Values: - 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

Acceptable channel coding(s) ACC:

This attribute indicates the channel codings acceptable to the MS. This parameter is given at call set-up and it is non negotiable.

Values: 4.8 kbit/s

and/or 9.6 kbit/s

and/or 14.4 kbit/s

and/or 28.8 kbit/s

and/or 32.0 kbit/s

and/or 43.2 kbit/s

Maximum number of TCH/Fs (Multislot configurations for data):

This attribute is given at call set-up and it enables the mobile user to limit the number of TCH/Fs used during the call.

Values: 1

2

3

4

5

6

7 (note 5)

8 (note 5)

NOTE 5: Not used by the currently specified services.

Wanted air interface user rate (AIUR):

This attribute is applicable to non-transparent services only, and it gives the AIUR that the mobile user wants and which the network tries to achieve but which it is not allowed to exceed.

Values: 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

User initiated modification indication (Multislot configurations for data):

This element is relevant between the MT and the IWF.

Values: - User initiated modification not requested

- User initiated modification up to 1 TCH/F requested

- User initiated modification up to 2 TCH/F requested

- User initiated modification up to 3 TCH/F requested

- User initiated modification up to 4 TCH/F requested

The parameters where it is indicated that they are related to Multislot configurations for data are optional.

For 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" take precedence over the "user rate" and "modem type", except for modem types “autobauding”, “modem for undefined interface” or “none”.
- 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	16 kbit/s (on the A interface but 32 kbit/s inside the MS)

- 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
TCH/F14.4	14.4 kbit/s

For CE: T, the padding procedure described in 3GPP TS 04.21 can be applied.

Network independent clocking on Tx:

This attribute defines the usage of NIC at the reference access point in the transmit direction.

Values: - Not required

- Required

Network independent clocking on Rx:

This attribute defines the usage of NIC at the reference access point in the receive direction.

Values: - Not accepted

- Accepted

Number of stop bits:

This attribute describes the number of stop bits for the asynchronous type of transmission between reference access points.

Values: - 1 bit

- 2 bit

Number of data bits excluding parity if present:

This attribute describes the number of data bits for a character oriented mode of transmission between reference access points.

Values: - 7 bit

- 8 bit

Parity information:

This attribute describes the type of parity information for a character oriented mode of transmission between the reference access points.

Values: - Odd

- Even

- None

- Forced to 0

- Forced to 1

Duplex mode:

This attribute describes the kind of transmission of the GSM PLMN between reference access points.

Value: - Full duplex

Modem type:

This attribute describes the modem allocated by the IWF/MSC in the case of a 3.1 kHz audio used outside the GSM PLMN information transfer capability.

Values: - V.21

- V.22

- V.22bis

- V.26ter

- V.32

- Autobauding type 1

- None

Other Modem Type (OMT):

This element is relevant between the MS and IWF.

Values: - No other modem type

- V.34

Compression

This attribute describes the possible usage of data compression between the reference access points. In the network to MS direction, it indicates the possibility of using data compression. In the MS to network direction, it indicates the allowance of data compression.

Values: - Data compression not possible/not allowed

- Data compression possible/allowed (see note 6)

NOTE 6: Only applicable for the asynchronous transmission between the reference access points, if connection element is "non transparent".

Radio channel requirement:

This attribute describes the available channels for the transfer of the user information between the reference access points.

Values: - Full rate channel (Bm)

- Half rate channel (Lm)

- dual rate/full rate preferred

- Dual rate/half rate preferred

Negotiation of Intermediate Rate Requested (NIRR)

This attribute indicates if 6 kbit/s radio interface rate is requested.

Values: - NIRR not requested/not accepted

- NIRR requested/accepted

Connection element:

This attribute describes the possible usage of GSM layer 2 protocol between the reference access points.

Values: - Transparent

- Non-transparent (RLP)

- Both, transparent preferred

- Both, non transparent preferred

User information layer 2 protocol:

This attribute describes the layer 2 relay protocol used between the reference access points in non-transparent transmissions.

Values: - ISO 6429, code set 0

- X.25 (note 7)

- Character oriented protocol with no flow control

NOTE 7: This value was used by services defined for former GSM releases and does not need to be supported.

Signalling access protocol:

This attribute characterizes the protocol on the signalling or user information transfer channel at the mobile reference access point.

Values: - I.440/450

- X.21 (note 7)

- X.28, dedicated PAD, individual NUI (note 7)

- X.28, dedicated PAD, universal NUI(note 7)

- X.28, non dedicated PAD (note 7)

- X.32 (note 7)

~~- X.32~~

NOTE 7: This value was used by services defined for former GSM releases and does not need to be supported.

Rate adaptation:

This attribute describes the rate adaptation used at the fixed reference access point.

Values: - V.110/X.30

- X.31 flag stuffing (note 7)

- No rate adaptation

- V.120 (Note: This value is signalled in the "Other Rate Adaption" element, due to a lack of further code points in the "Rate Adaptation" element.)

NOTE 7: This value was used by services defined for former GSM releases and does not need to be supported.

Coding standard:

This attribute refers to the structure of the BC-IE defined in the 3GPP TS 24.008.

Value: - GSM

User information layer 1 protocol:

This attribute characterizes the layer 1 protocol to be used at the Um interface according to the 3GPP TS 05.01.

Value: - Default

Rate adaption header/no header:

This attribute 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 attribute 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 attribute 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 attribute 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 attribute 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 attribute 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.

A.2 Definition of values

Unrestricted digital data information:

Transfer of information sequence of bits at its specified bit rate without alteration.

This implies: - bit sequence independence;

- digit sequence integrity;

- bit integrity.

Speech:

Digital representation of speech coded according to a specified encoding rule (e.g. A Law, 3GPP TS 06-series).

Demand connection:

A GSM PLMN connection is set up at any time on demand via a digital channel in response to signalling information received from subscriber, other MSCs or other networks, i.e. on a per call basis.

Bidirectional symmetric:

This value applies when the information flow characteristics provided by the GSM PLMN connection are the same between two (or more) access points or reference points in the forward and backward directions.

Bidirectional asymmetric (Multislot configurations for data):

This value applies when the information flow characteristics provided by the GSM PLMN connection differ between two (or more) access points or reference points in the forward and backward directions on one or more TCH/Fs. In Multislot configurations for data the asymmetry is downlink biased, i.e. the MS may receive at a greater rate than it transmits.

Point-to-point connection:

This value applies when only two end points are provided by the connection.

Service data unit integrity:

This value applies when:

i) at each user-network interface, protocols provide a mechanism for identifying the boundaries of service data units ~~(e.g. X.25 complete packet sequence)~~; and

ii) all bits submitted within a single service data unit are delivered in a corresponding service data unit.

Unstructured:

This value is applicable when the GSM PLMN connection neither provides structural boundaries nor preserves structural integrity.

3GPP TSG-CN3 Meeting #14 ***N3-000601***
Sophia Antipolis, France, 14 – 16 November

CR-Form-v3

CHANGE REQUEST

⌘ **04.21** **CR** **A022** ⌘ rev **-** ⌘ Current version: **8.3.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☒ Radio Access Network ☐ Core Network ☒

Title:	⌘	Removal of BS30 NT
Source:	⌘	TSG CN WG3
Work item code:	⌘	TEI4 (CS bearers)
Date:	⌘	2000-11-16
Category:	⌘	**C**
Release:	⌘	REL-4

Use one of the following categories:
F *(essential correction)*
A *(corresponds to a correction in an earlier release)*
B *(Addition of feature),*
C *(Functional modification of feature)*
D *(Editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change:	⌘	Removal of BS30 NT from REL-4
Summary of change:	⌘	References to the removed BS30 NT are removed.
Consequences if not approved:	⌘	The specification does not comply with other specifications.

Clauses affected:	⌘	2, 12		
Other specs affected:	⌘	☒ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	22.002, 27.001, 27.003, 29.007, 03.10
Other comments:	⌘			

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.
3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

2 References, Definitions and Abbriviations

2.1 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] 3GPP TS 01.04: "Digital cellular telecommunication system (Phase 2+); Abbreviations and acronyms".

[2] 3GPP TS 02.34: "Digital cellular telecommunications system (Phase 2+); High Speed Circuit Switched Data (HSCSD) -Stage 1".

[3] 3GPP TS 03.10: "Digital cellular telecommunication system (Phase 2+); GSM Public Land Mobile Network (PLMN) connection types".

[4] 3GPP TS 03.34: "Digital cellular telecommunications system (Phase 2+); High Speed Circuit Switched Data (HSCSD) - Stage 2 Service Description".

[5] 3GPP TS 05.03: "Digital cellular telecommunications system (Phase 2+); Channel coding".

[6] 3GPP TS 07.01: "Digital cellular telecommunication system (Phase 2+); General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".

[7] 3GPP TS 07.02: "Digital cellular telecommunications system (Phase 2+); Terminal Adaptation Functions (TAF) for services using asynchronous bearer capabilities".

[8] Void~~3GPP TS 07.03: "Digital cellular telecommunications system (Phase 2+); Terminal Adaptation Functions (TAF) for services using synchronous bearer capabilities"~~.

[9] 3GPP TS 08.20: "Digital cellular telecommunication system (Phase 2+); Rate adaption on the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface".

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

[11] CCITT Recommendation X.30: "Support of X.21,X.21 bis and X.20 bis based terminal equipments (DTEs) by integrated services digital network (ISDN)".

12.1 Support of non-transparent operation for TCH/F9.6 and TCH/F4.8 channel codings

This access results in the use of a modified CCITT V.110 60 bit frame for non-transparent services (figure 11). In this case, the RA1' function also provides for alignment of four modified CCITT V.110 60 bit frames sent on the same radio slot corresponding with each complete 240 bit frame to be encoded by the radio subsystem as a single unit (see 3GPP TS 05.03). The difference between the non-transparent 60 bit frame and the 60 bit frame for the transparent service is that the bit positions used for status in a transparent frame are used to carry data (designated as D' bits in figure 11).

NOTE: The status bits SA, SB, and the X bit are embedded in the L2R-PDU frames (see 3GPP TS 07.01~~,~~ and 07.02~~, and 07.03~~).

The first bit of each RLP frame to be transmitted will correspond to the first bit (D1) of the first 60 bit frame in a four frame sequence and the last bit will correspond to the last bit (D'12) of the last 60 bit frame in a four frame sequence. Each 60 bit frame is filled from left to right starting at D1 (see figure 11).

The radio subsystem provides for the synchronous transmission and reception of 240 bit RLP frames through a connection consisting of up to four TCH/Fs. An RLP-frame is received/sent from/to a particular radio channel every 20 ms (12 kbit/s radio interface rate) or every 40 ms (6 kbit/s radio interface rate) irrespective of the user rate.

The request to use 6 kbit/s radio interface rate on a Full Rate Channel is indicated in the BC-IE by setting the NIRR bit to 6 kbit/s (Negotiation procedure see 3GPP TS 07.01) and selecting a Full Rate Channel and Non-Transparent service. If the entity receiving the BC-IE is unable to support this request then the 12 kbit/s radio interface rate shall be provided automatically.

Occasions may arise when there is no RLP frame ready to be transmitted. In this case a frame of 240 zeroes will be transmitted. This frame will be discarded by the distant RLP function, due to FCS failure, but will allow physical link synchronization to be maintained between the MS and the MSC.

In the case of an asymmetric connection the BTS shall send V110 idle frames towards the MSC on the channels which are unused in the direction from the MS towards the MSC. This will ensure that the IWF does not interprete V110 frames which are not originated from the MS as complete RLP frames.

3GPP TSG-CN3 Meeting #14 ***Tdoc N3-000605***
ETSI/Sophia Antipolis, France, 14th – 16th November 2000

CR-Form-v3

CHANGE REQUEST

⌘	27.001	CR	043	⌘ rev	-	⌘ Current vers	4.1.0	⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM [ ] ME/UE [X] Radio Access Network [ ] Core Network [X]

Title:	⌘	Removal of Bearer Service 30 Non-transparent
Source:	⌘	TSG CN WG3
Work item code:	⌘	TEI4 (CS bearers)
Date:	⌘	15/11/00
Category:	⌘	C
Release:	⌘	REL-4

Use one of the following categories:
- ***F*** *(essential correction)*
- ***A*** *(corresponds to a correction in an earlier release)*
- ***B*** *(Addition of feature),*
- ***C*** *(Functional modification of feature)*
- ***D*** *(Editorial modification)*

Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change:	⌘	Deletion of BS 30 NT and editorial changes.
Summary of change:	⌘	Changes throughout the whole document
Consequences if not approved:	⌘	Inconsistent with decision in SA1

Clauses affected:	⌘	The whole document		
Other specs affected:	⌘	[X] Other core specifications [ ] Test specifications [ ] O&M Specifications	⌘	22.002, 27.003, 29.007, 03.10, 04.21
Other comments:	⌘			

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at:
http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.
3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

3GPP TS 27.001 V4.1.0 (2000-09

Technical Specificatio

3rd Generation Partnership Project;
Technical Specification Group Core Network;
General on Terminal Adaptation Functions (TAF)
for Mobile Stations (MS)
(Release 4)

Keywords
UMTS, GSM, terminal, adaption, network

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 equipment to the Mobile Termination (MT). The target of the present document is to outline the functions needed for the terminal adaptation.

In the 3GPP 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~~3GPP TS ~~04.02~~24.002. The various connection types used in the GSM PLMN are presented in ~~GSM~~3GPP TS 03.10. Terminology used in the present document is presented in ~~GSM~~3GPP TS 01.04 ~~(ETR 350)~~, 3GPP TR 21.905 and 3GPP TS 29.990. For support of data services between a PLMN and other networks see 3GPP 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 required 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.

From R00 onwards the following service is no longer required by a PLMN:

- the synchronous Bearer Service non-transparent (BS 30 NT).

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~~3GPP TS 01.04: "Digital cellular telecommunication system (Phase 2+); Abbreviations and acronyms".

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

[3] ~~GSM~~3GPP TS ~~02.03~~22.003: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Circuit Teleservices supported by a Public Land Mobile Network (PLMN)

~~Digital cellular telecommunication system (Phase 2+); Teleservices supported by a GSM Public Land Mobile Network (PLMN)~~".

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

[5] ~~GSM~~3GPP TS 03.10: "Digital cellular telecommunication system (Phase 2+); GSM Public Land Mobile Network (PLMN) connection types".

[6] ~~GSM~~3GPP TS ~~04.02~~24.002: "3rd Generation Partnership Project; Technical Specification Group TSGN; GSM - UMTS Public Land Mobile Natwork (PLMN) access reference configuration".

~~Digital cellular telecommunication system (Phase 2+); GSM Public Land Mobile Network (PLMN) access reference configuration".~~

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

[8] ~~GSM~~3GPP TS 04.21: "Digital cellular telecommunication system (Phase 2+); Rate adaption on the Mobile Station - Base Station System (MS - BSS) interface".

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

[10] ~~GSM~~3GPP TS 05.05: "Digital cellular telecommunication system (Phase 2+); Radio transmission and reception".

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

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

[13] ~~3GPP 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)".~~Void.

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

[15] Void.

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

[17] Void.

[18] Void.

[19] Void.

[20] ~~GSM 09.06: "~~Void.

~~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] 3GPP TS 29.007: "General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN)".

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

[23] ~~3GPP 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)".~~Void.

[24] ~~3GPP TS 29.011: "Signalling interworking for supplementary services".~~Void.

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

[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".~~Void.

[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] Void.

[32] ITU-T Recommendation V.250: "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~~463: "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".~~Void.

[40] ~~IrDA "IrPHY Physical signalling standard".~~Void.

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

[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~~3GPP TS ~~03.34~~23.034:" 3rd Generation Partnership Project; Technical Specification Group Core Network; High Speed Circuit Switched Data (HSCSD) - Stage 2 ".

~~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".~~Void.

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

[46] 3GPP TR 21.905: "3G Vocabulary".

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

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

[49] ~~3GPP TS 25.415: "UTRAN Iu interface user plane protocols".~~Void.

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

[51] ITU-T Recommendation V.80: "In-band DCE control and synchronous data modes for asynchronous DTE".

[52] 3GPP TS 03.45 " Digital cellular telecommunications system (Phase 2+);Technical realization of facsimile group 3 transparent".

[53] 3GPP TS 05.01 " 3rd Generation Partnership Project; Technical Specification Group GERAN;Digital cellular telecommunications system (Phase 2+); Physical layer on the radio path; General description".

[54] 3GPP TS 22.034 " 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; High Speed Circuit Switched Data (HSCSD); Stage 1".

[55] 3GPP TS 23.107 " 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; QoS Concept and Architecture".

[56] 3GPP TS 08.20 " Digital cellular telecommunications system (Phase 2+); Rate adaption on the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface ".

[57] 3GPP TS 22.001" Digital cellular telecommunications system (Phase 2+); Technical Specification Group Services and System Aspects; Principles of circuit telecommunication services supported by a Public Land Mobile Network (PLMN)".

[58] ITU-T Recommendation I.440 " (see ITU-T Rec. Q.920) ".

[59] ITU-T Recommendation I.450 " (see ITU-T Rec. Q.930) ".

[60] ITU-T Recommendation H.223 " Multiplexing protocol for low bit rate multimedia communication".

[61] ITU-T Recommendation H.245 " Control protocol for multimedia communication ".

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

[63] ITU-T Recommendation V.22 " 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".

[64] ITU-T Recommendation V.22bis" 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 ".

[65] ITU-T Recommendation V.26ter" 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".

[66] ITU-T Recommendation V.31" Electrical characteristics for single-current interchange circuits using optocouplers".

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

[68] ITU-T Recommendation V.34" A modem operating at data signalling rates of up to 33 600 bit/s for use on the general switched telephone network and on leased point-to-point 2-wire telephone-type circuits ".

[69] ITU-T Recommendation V.42" Error-correcting procedures for DCEs using asynchronous-to-synchronous conversion".

[70] ITU-T Recommendation X.30" Support of X.21, X.21 bis and X.20 bis based Data Terminal Equipments (DTEs) by an Integrated Services Digital Network (ISDN)".

~~[71] ITU-T Recommendation X.75" Packet-switched signalling system between public networks~~ providing data transmission services ".

[71~~2~~] ITU-T Recommendation Q.920" ISDN user-network interface data link layer - General aspects ".

[72~~3~~] ITU-T Recommendation Q.930" ISDN user-network interface layer 3 - General aspects ".

3 Definitions and 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 3GPP TR 21.905.

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

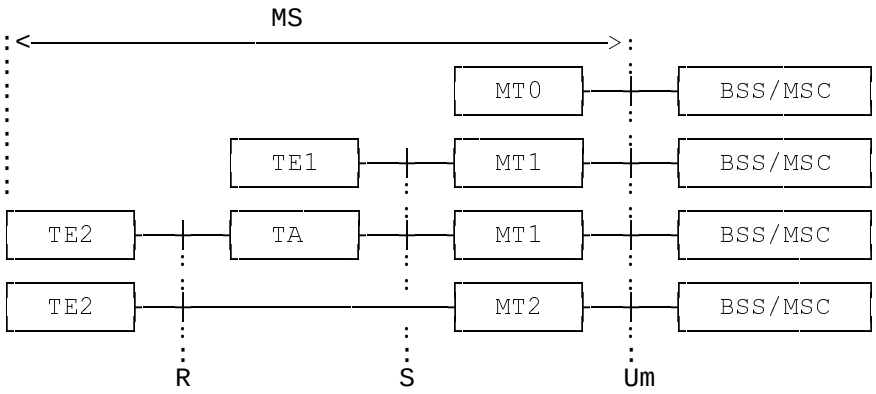
3.2 Abbreviations

In addition to those below, abbreviations used in the present document are listed in ~~GSM~~ 3GPP TS 01.04, 3GPP TR 21.905 or 3GPP 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~~3GPP TS ~~04.02~~24.002).



┼ :	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.

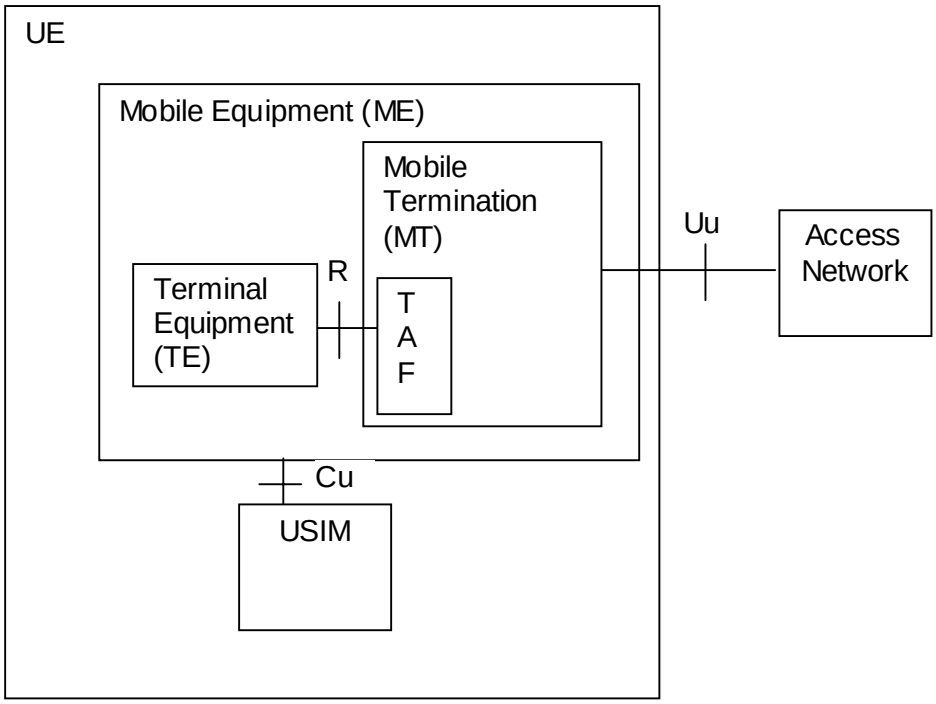


Figure 2: UMTS PLMN Access Reference Configuration

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~~3GPP TS 04.21) and data formatting for the transmission SAP (3GPP 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 Recommendation. V.250 (although the use of other autocalling/auto-answering procedures are not prohibited provided that mapping in a functionally equivalent way to 3GPP TS 24.008 call control is also provided).

Other functional entities ~~can~~ may 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 shall be~~are 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~~ shall 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.

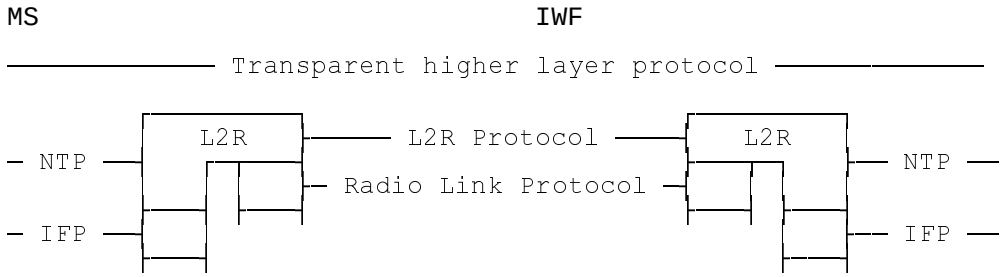
6 Support of non transparent Bearer Services

In order to support asynchronous 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 asynchronous non transparent bearer services are contained in the appropriate 3GPP 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. asynchronous 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 asynchronous 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~~3GPP TS 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~~ is 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~~ is 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.

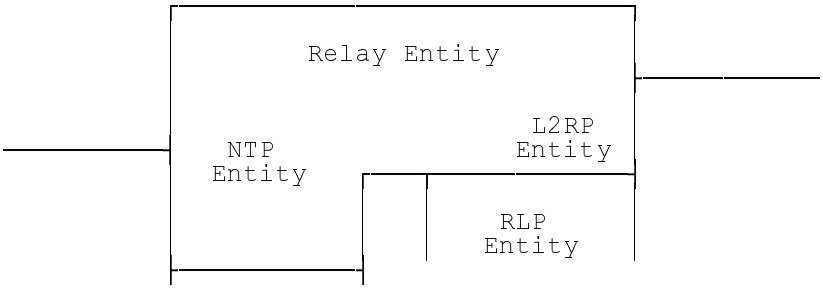


Figure 3

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~~ is not ~~be~~ specified by ~~GSM~~3GPP.~~,~~ The~~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~~are specified elsewhere, e.g. ITU-T Recommendations ~~X.25 Layer 2 and 1~~V.110 or V.120. Thus the main specification for the L2R ~~will~~ consists 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~~ 3GPP TS 24.022 (Radio Link Protocol).

6.3 Flow Control - General Description

A flow control active condition ~~can~~ may 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~~ may 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~~ undesirable 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.~~,~~ S~~s~~ubsequently, 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~~ is a layer management matter and ~~are~~ is 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~~ may assign an AIUR matching the WAIUR using up to mTCH traffic channels, provided that the resources are available (3GPP 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~~ shall 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~~3GPP TS ~~04.08~~24.008). 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 3GPP TS 27-series of Specifications

The structure of the Specifications is as follows:

3GPP TS 27.001 _____ General on Terminal Adaptation Functions for Mobile Stations.

3GPP TS 27.002 _____ Terminal Adaptation Functions for Services using Asynchronous Bearer Capabilities.
~~The~~ This ~~present~~ document defines the interfaces and terminal adaption functions integral to a MT which enable the attachment of Asynchronous Terminals to a MT.

3GPP TS 27.003 _____ Terminal Adaptation Functions for Services using Synchronous Bearer Capabilities.
~~The~~ This ~~present~~ document 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~~ shall 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~~shall 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~~ D~~d~~uring the call control phases (set-up and clear), the procedures at the V.-series and X.-series DTE interfaces ~~can~~ may 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 in this case 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~~3GPP 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~~3GPP TS 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 3GPP TS 04.21) 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~~ 3GPP TS 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 bits 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

Void.

8.1.1.3.3 S interface (I.420)

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~~ shall be changed from "OFF" to "ON". From this time the information from/to the RLP, including status changes, ~~will~~ shall be mapped by the L2R entity applicable to the particular bearer capability (3GPP TS 27.002~~, 27.003~~ "L2R functionality").

8.1.2.2 X.-series interface

Void.

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

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

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 shall be~~is 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 shall~~ authorizes the DTE to send data; if wrongly set, loss of data may occur.

ON-OFF transition at the MS ~~will shall~~ causes 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 shall~~ authorizes 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 shall~~ causes 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

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~~3GPP TS 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 3GPP TS 24.008 applies, particularly clause B.3, subclauses 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 (3GPP 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:

- Radio Channel Requirement;
- 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~~ shall 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 3GPP TS 29.007 and 3GPP 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~~ may either accept the possibility of a fallback to speech by responding with two BC-IE~~e~~s, or with no BC-IE~~e~~s, 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~~ shall 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~~ may 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~~3GPP TS 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~~3GPP TS 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 a~~n~~ 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 MS receives a BC-IE in the SETUP message containing the parameters 'fixed network user rate', 'other modem type', the MS may include these parameters in the BC-IE of the CALL CONFIRMED message (i.e., octets 6d, 6e, 6f, and 6g, ref. ~~to~~ 3GPP TS 24.008), with parameter values negotiated according to Annex B. If no BC-IE is received in the SETUP message, the MS may include these parameters in the CALL CONFIRMED message. However, in this case, the network may release the call if it does not support these parameters.

If FNUR = 33.6 kbit/s is agreed on in the setup of a 3.1 kHz multimedia call, the modems may handshake to 31.2 or 28.8 kbit/s. In this case the MS receives a MODIFY message from the MSC to indicate the new data rate, and shall respond with a MODIFY COMPLETE message (ref. to 3GPP TS 24.008), if it supports the requested modification. If the MS does not support the requested modification, it shall respond with a MODIFY REJECT message. The MT shall indicate the new data rate to the TE (e.g. using the ITU-T V.80 inband signaling) in order to cause the TE to use stuffing to adapt the 31.2 or 28.8 kbit/s data rate to the 33.6 kbit/s traffic channel between the TE and IWF.

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~~ shall 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~~ 3GPP TS 29.007 and 3GPP TS 24.008).

If the set-up message requests a "single service", the network ~~must~~ shall 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~~ shall 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~~ does not contain the parameters fixed network user rate' and 'other modem type' or no BC-IE ~~will be~~ is 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~~3GPP TS 04.21).

If FNUR = 33.6 kbit/s is agreed on in the setup of a 3.1 kHz multimedia call, the modems may handshake to 31.2 or 28.8 kbit/s. In this case the MS receives a MODIFY message from the MSC to indicate the new data rate, and shall respond with a MODIFY COMPLETE message (ref. to 3GPP TS 24.008), if it supports the requested modification. If the MS does not support the requested modification, it shall respond with a MODIFY REJECT message. The MT shall indicate the new data rate to the TE (e.g. using the ITU-T V.80 inband signaling) in order to cause the TE to use stuffing to adapt the 31.2 or 28.8 kbit/s data rate to the 33.6 kbit/s traffic channel between the TE and IWF.

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

8.5.1 In case of GSM

This alternate service may be initiated by a manual procedure where CT106, CT107, CT108.2 and CT109 are set in the OFF condition.

Selection of the data phase (from the speech phase) ~~will~~ may be by manual intervention via the MS causing ICM by means of CT108.2 going to ON condition, refer to ~~GSM~~3GPP TS 03.~~-~~45. The ensuing data phase shall follow all the operational procedures as described in 3GPP 27-series.

Selection of the speech phase (from the data phase) ~~will~~ may 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~~shall be maintained in the OFF condition.

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

8.5.2 In case of UMTS

Refer to section 9.2.1.1 and 9.2.2.1 in 3G TS 23.146.

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 3GPP 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~~3GPP TS 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~~3GPP TS 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~~3GPP TS 04.21 and ~~GSM~~3GPP TS 08.20). These functions distribute data between the substreams and radio channels.

8.8 Seamless data rate change

If the modems change the data rate during an ongoing multimedia call (using the ITU-T V.34 seamless data rate change mechanism), the MSC initiates a MODIFY message (ref. to 3GPP TS 24.008) to indicate the new data rate to the MS. The MT shall indicate the new data rate to the TE (e.g. using the ITU-T V.80 inband signaling) in order to cause the TE to use stuffing to adapt the 31.2 or 28.8 kbit/s data rate to the 33.6 kbit/s traffic channel between the TE and IWF.

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 validity 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 3GPP 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.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 3GPP 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~~ 3GPP TS 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 ITU-T 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 ITU-T 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 ITU-T 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 ITU-T V.120 rate adaptation.

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

NOTE 8: A connection over which protocol negotiation ~~will be~~is 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 ITU-T 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 ITU-T 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~~are interpreted by the network as 38.4 kbit/s in this version of the protocol, ref. 3GPP -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 multimedia 32, 56 and 64 kbit/s and 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 (note 11)
- 8 TCH (note 11)

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~~3GPP TS 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~~3GPP TS ~~02.02~~22.002 and ~~GSM~~3GPP TS ~~02.03~~22.003 ~~as well as the~~and 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 the present 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 3GPP TS 24.008.

With respect to the individual parameter settings at the MS the following cases may be distinguished (ref. 3GPP TS 27.002 and 3GPP 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 3GPP TS 22.002 and 3GPP 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~~ shall 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]
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~~ shall 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 2) Duplex mode Configuration Establishment Negotiation of Intermediate Rate Requested Compression
5	Rate adaption Signalling access protocol 2)
5a	Other ITC 2) 7) Other rate adaption
5b	Rate adaption header / no header 2) 3) Multiple frame establishment support in data link Mode of operation Logical link identifier negotiation Assignor / assignee In-band / out-band negotiation
6	User information layer 1 protocol 2) Synchronous / asynchronous
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 4) Acceptable channel codings
6f	Wanted air interface user rate 4) User initiated modification indication
6g	Acceptable Channel codings 5) Asymmetry preference indication 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 ITU-T 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-band (3)	none
number of data bits	7 or 8	7 or 8	7 or 8
user information layer 2 protocol	ISO 6429 (1)	NAV	COPnoFlCt (2)

1) ISO6429 stands for "ISO/IEC 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 ITU-T V.42 in case of PSTN or ITU-T V.110 in case of ISDN.
If the ITU-T V.110 flow control mechanism is not supported, where required, the call pending shall be terminated.
If the ITU-T V.42 functionality is not supported by the modem in the IWF or in the fixed network, the call ~~will be~~shall be supported with a fallback to the non- ITU-T V.42 mode. In this case the IWF ~~will~~ shall 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 ITU-T V.42 functionality is not provided by the IWF or the fixed network modem. As ITU-T V.42 does not apply to ITU-T 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.1.3.1.6.

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.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)

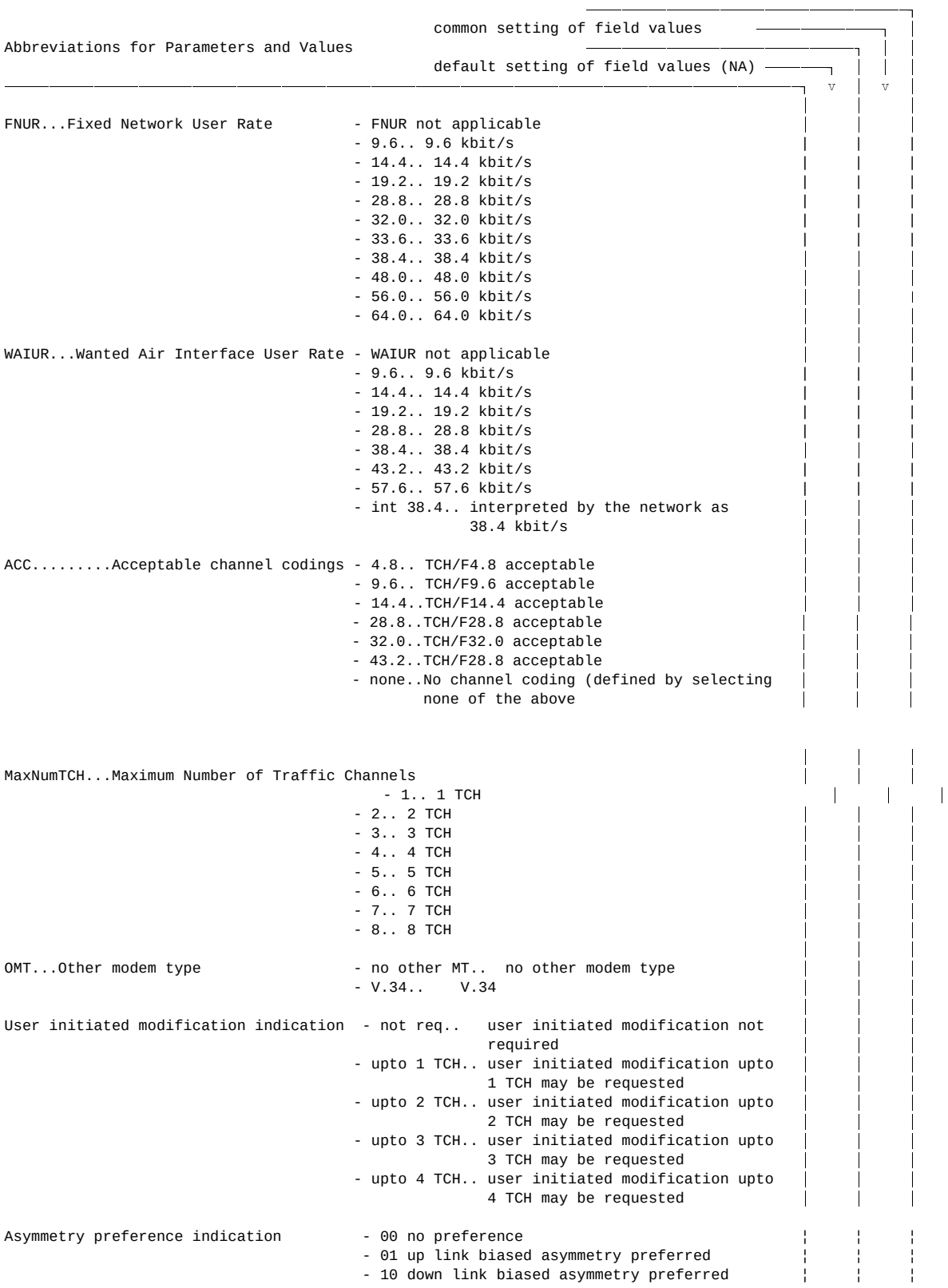


Table B.5a: Differences in parameter value validity in GSM and UMTS

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 (Note 1)
Maximum number of traffic channels / *any*	valid	ignored (Note 1)
User initiated modification indication / *any*	valid	ignored
Asymmetry preference 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 kbit/s	Invalid for CE = NT	valid
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	valid
PIAFS	invalid	valid

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

NOTE 1: This parameter is relevant in UMTS for NT calls for deciding which RLP version to negotiate in order to avoid renegotiation of RLP version in case of handover, see 3GPP TS 24.022 [9]. It is otherwise irrelevant for specifying the UTRAN radio access bearer.

Table B.6: Channel combinations

Single Bearer and Teleservices

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

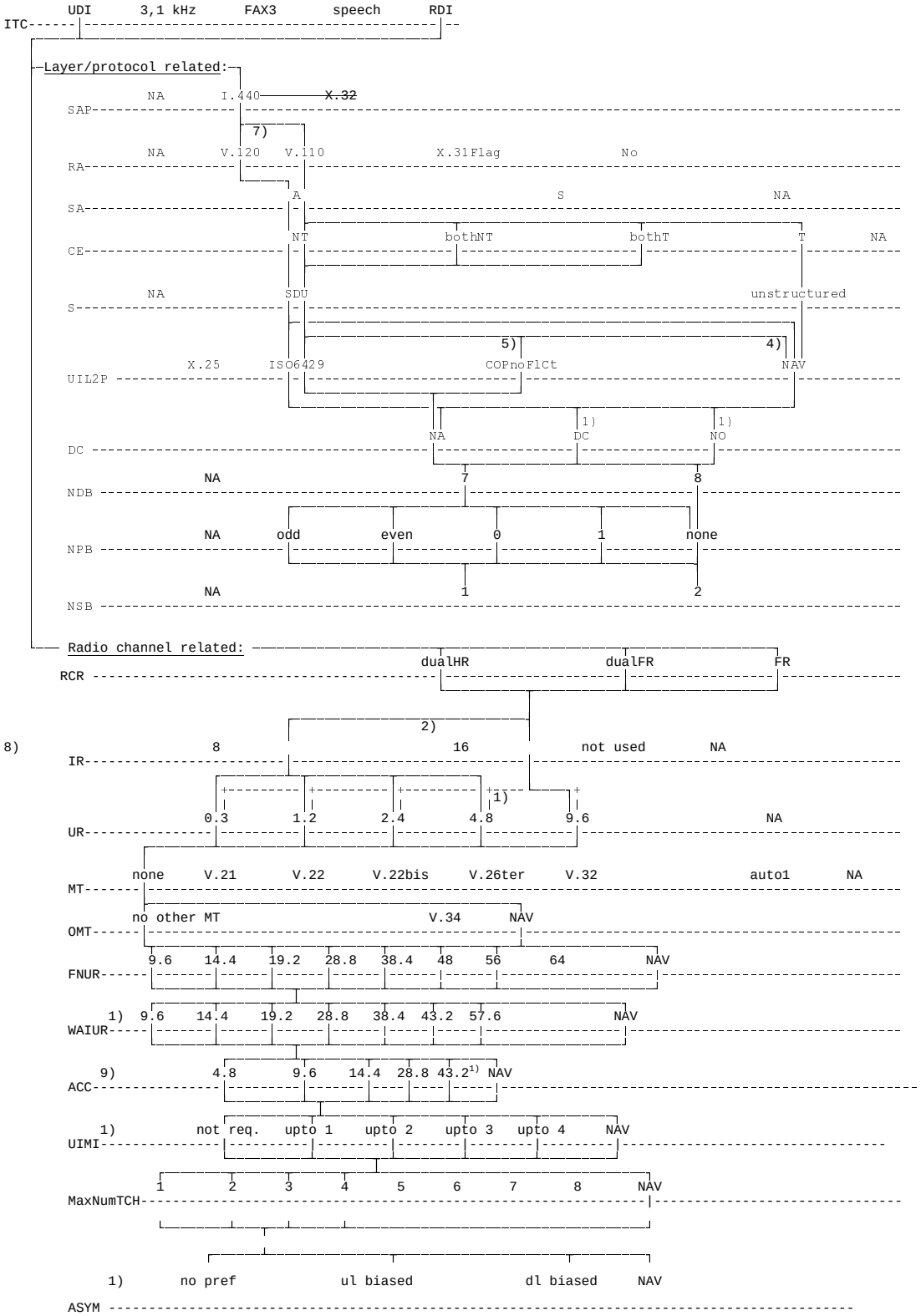
Subscription	SETUP	CALL CONFIRMED
TS61	TS61 s/f	TS61 s/f or TS61 f/s or TS62
	TS61 f/s	TS61 s/f or TS61 f/s or TS62
	TS62	TS62
	no BC	TS61 s/f or TS61 f/s or TS62
TS62	TS62	TS62
	no BC	TS62 (note)

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~~3GPP TS ~~02.01~~22.001 and 3GPP TS 29.007).

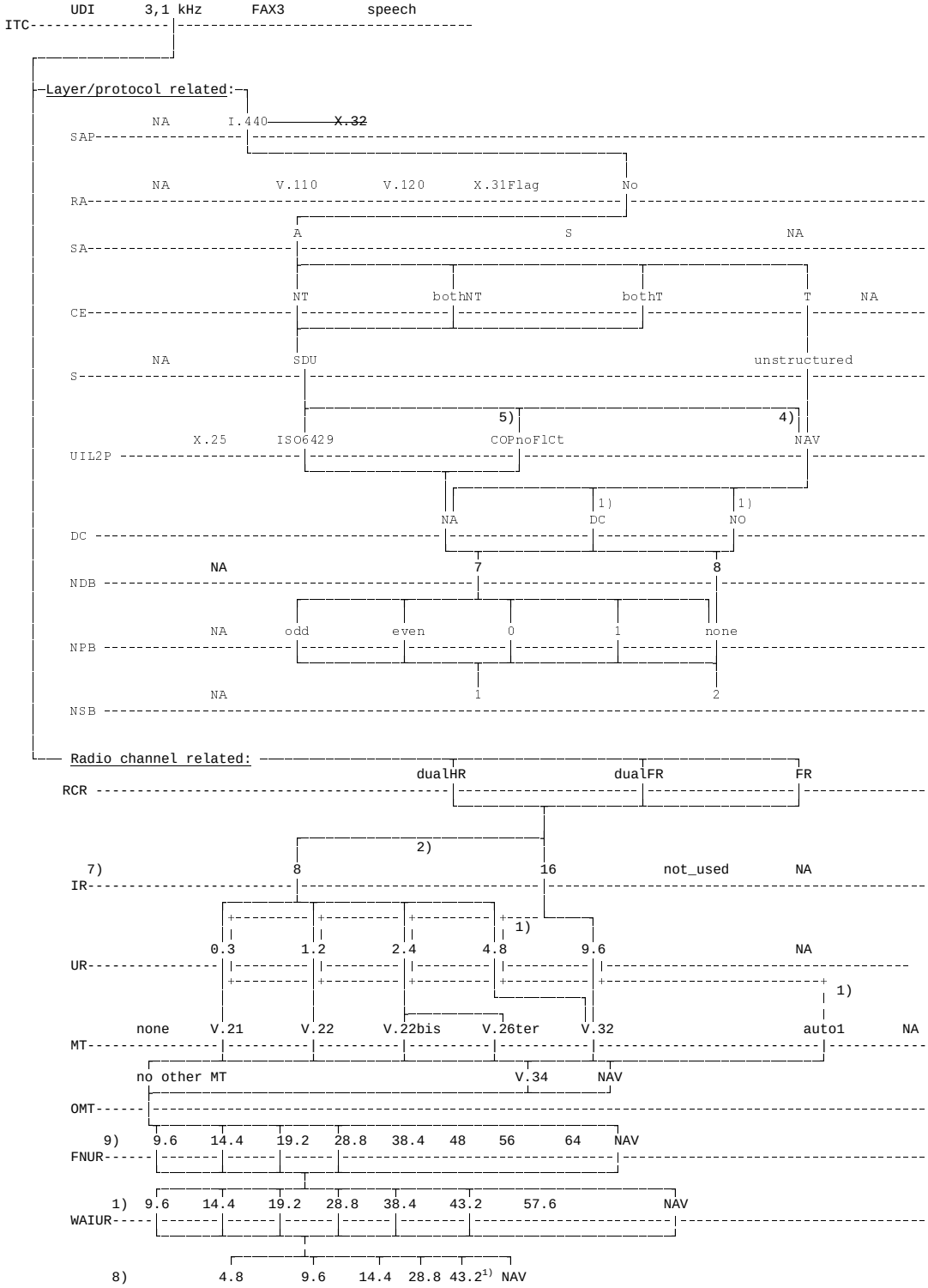
B.1.2 Bearer Service 20, Data Circuit Duplex Asynchronous

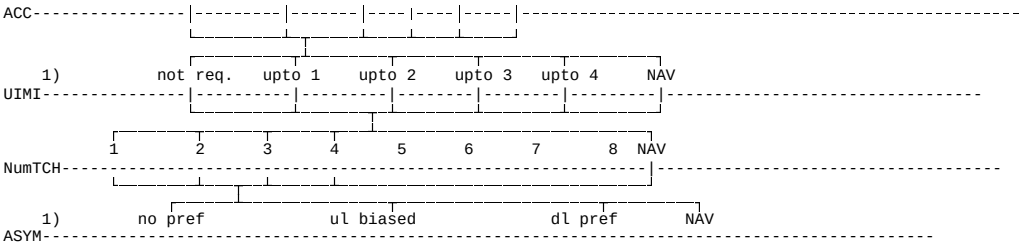
B.1.2.1 Unrestricted / restricted digital information transfer capability



1) for CE:NT or "both";
2) for CE:T only or CE:NT and NIRR:6kb/s (not for the SETUP message);
3) 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).

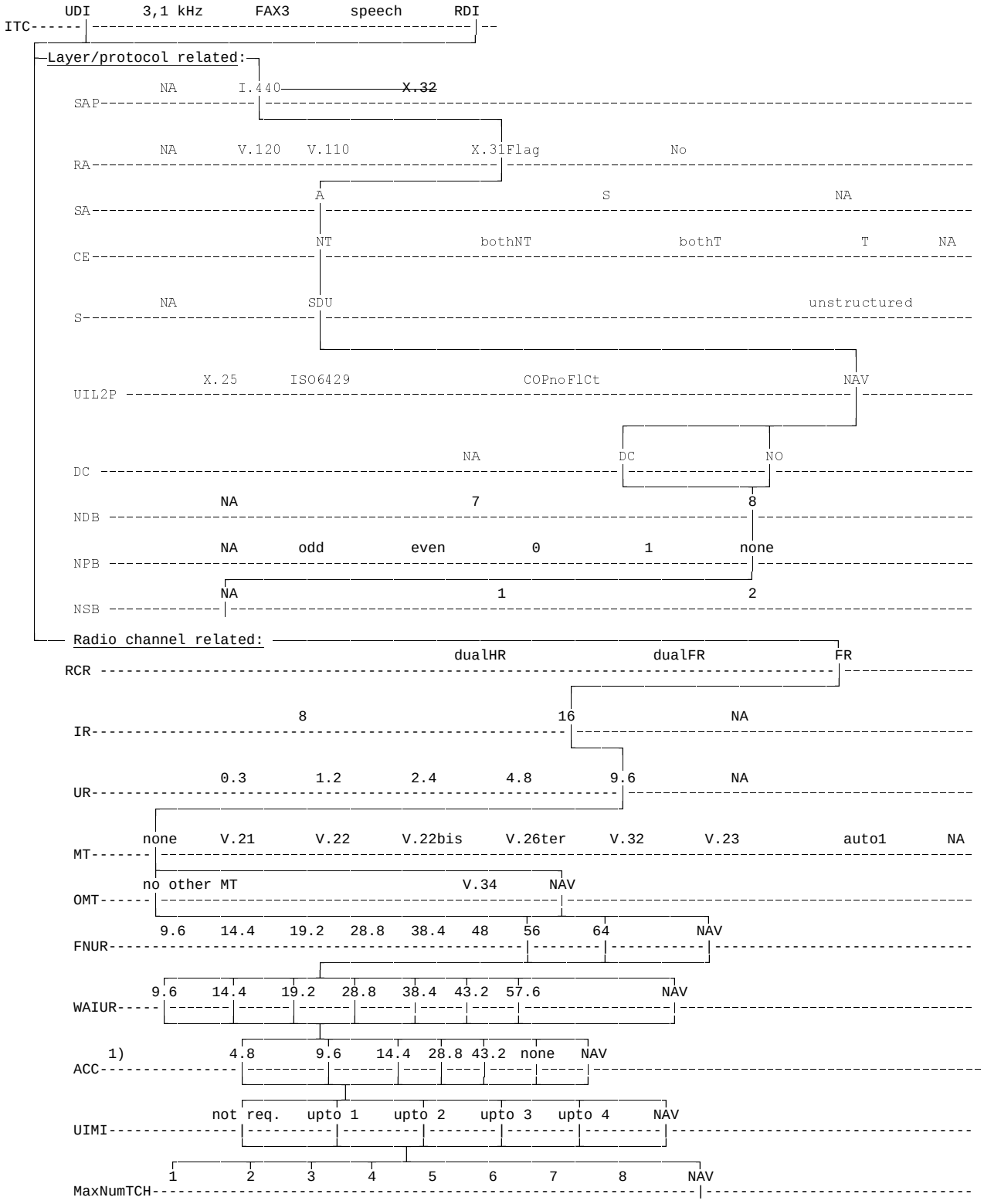
B.1.2.2 3,1 kHz audio ex-PLMN information transfer capability





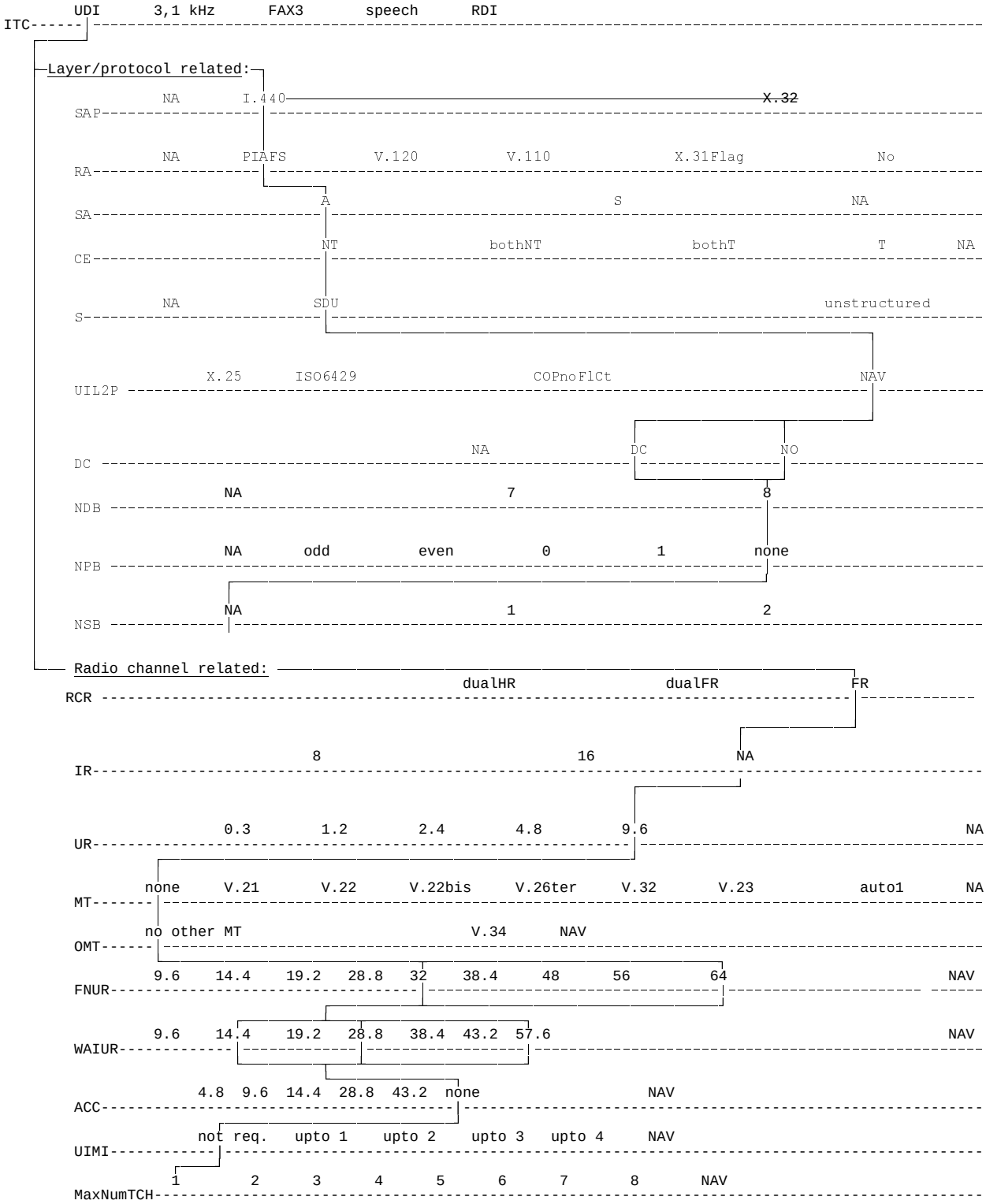
1) for CE:NT or "both";
2) for CE:T only or CE:NT and NIRR:6kb/s (not for the SETUP message);
3) Void;
4) for MT CALLS in the SETUP message or MO/MT CALLS with "out-band" flow control requested (not for V.21 modem type);
5) for MO/MT CALLS with no flow control requested;
6) Void;
7) IR and UR are overridden 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).

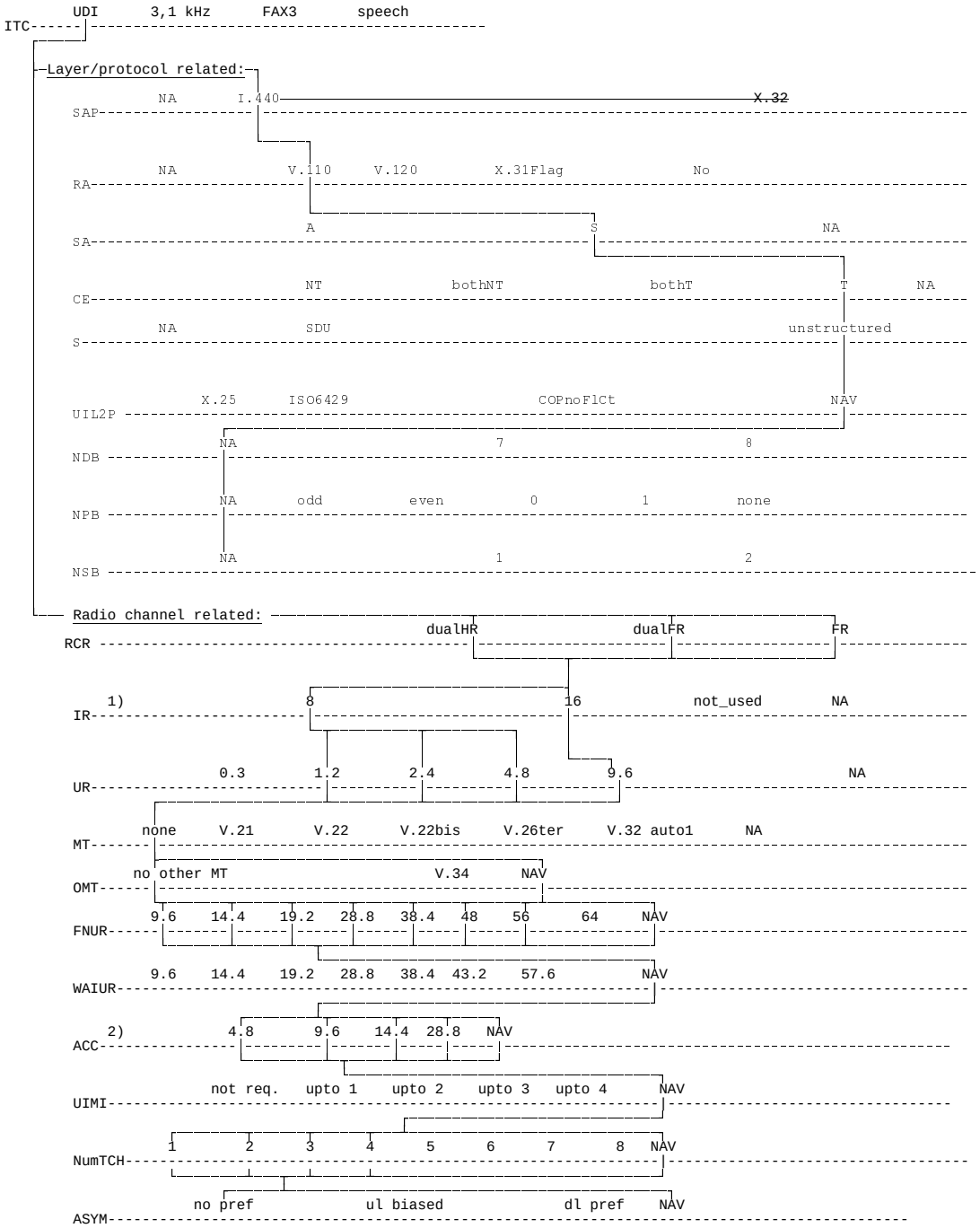
B.1.2.4 PIAFS


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

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

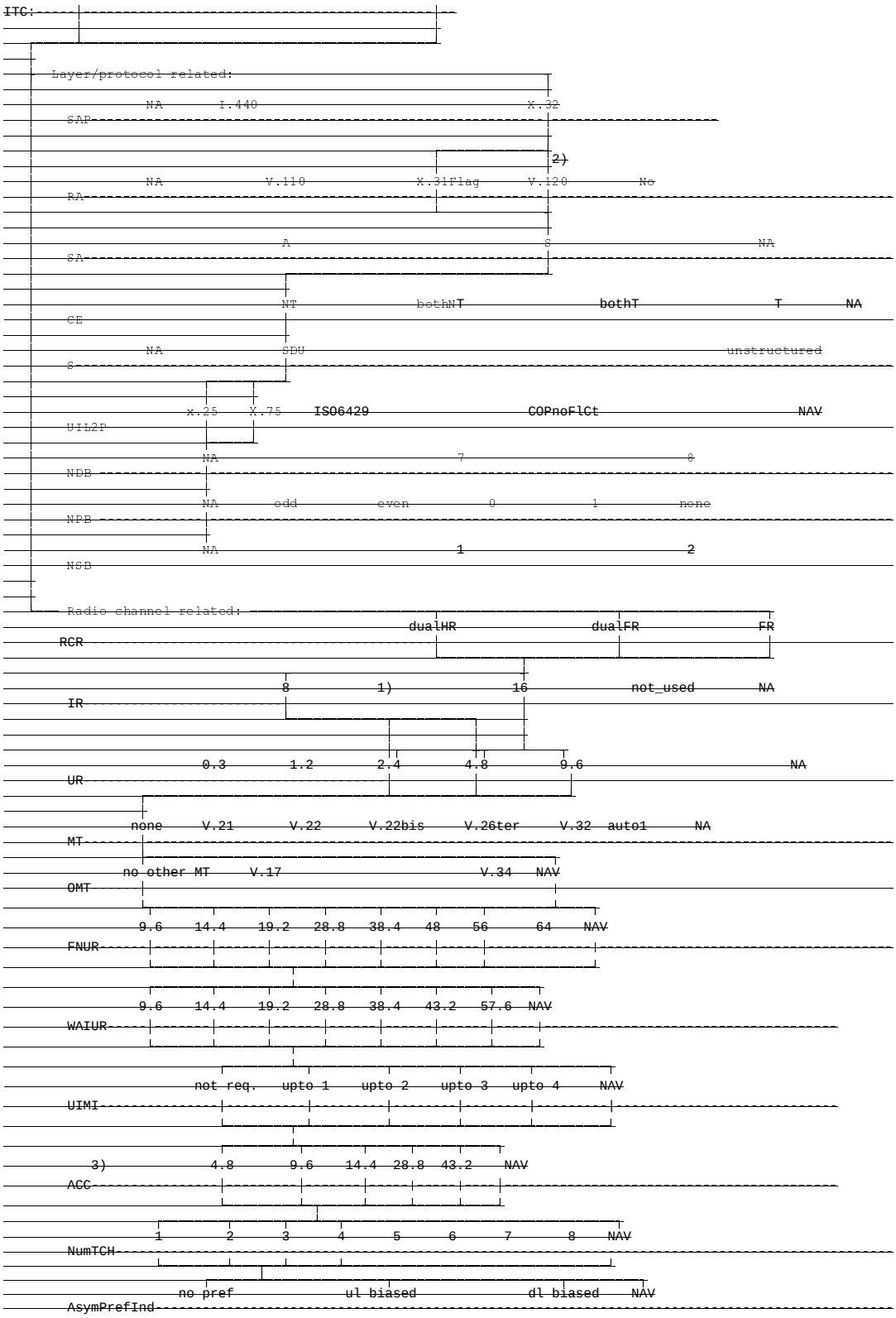


1) IR and UR are overridden if FNUR, ACC and MaxNumTCH are available

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

B.1.3.1.2 X.32 Case

~~UDI 3,1 kHz FAX3 speech RDI~~

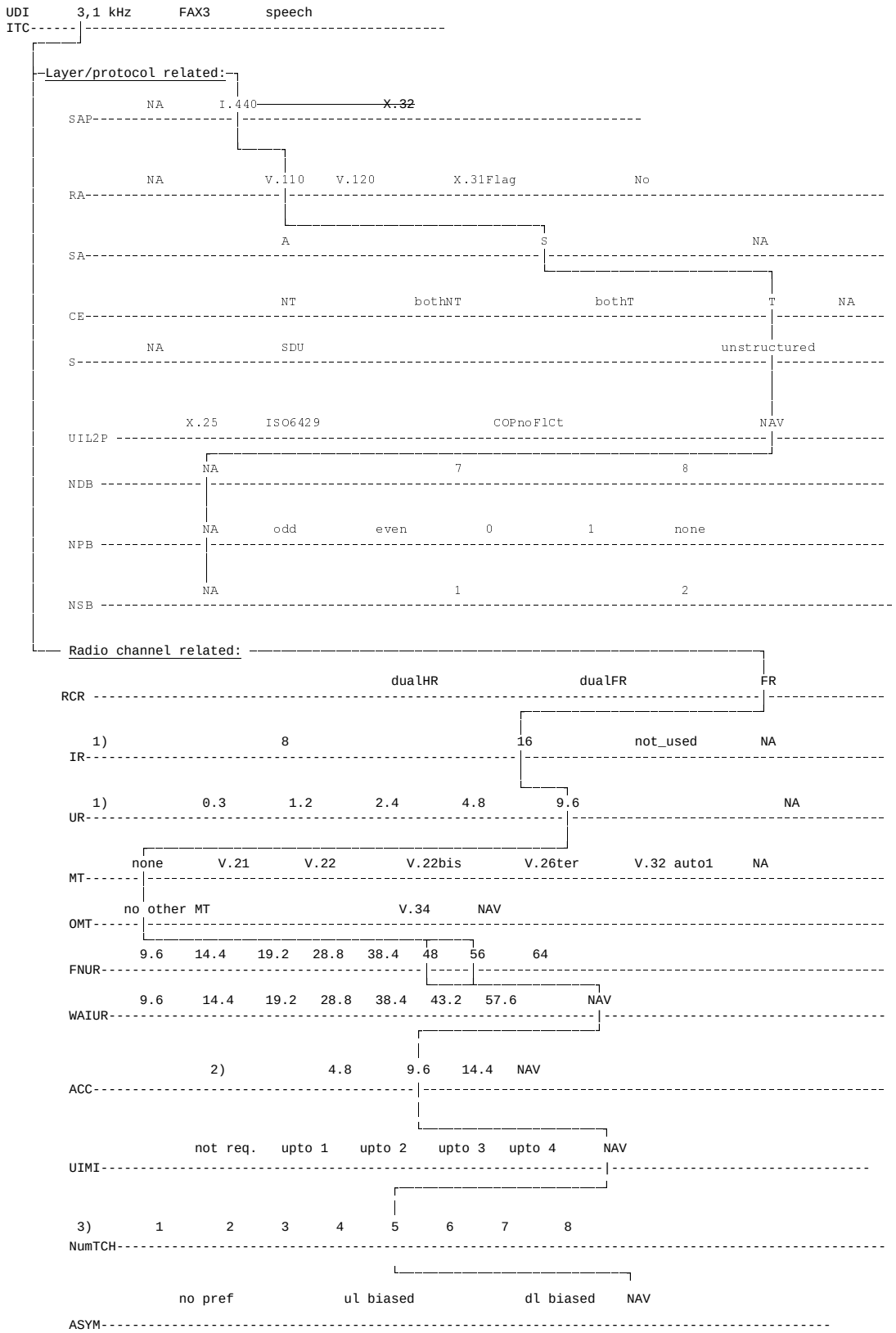


1) for NIRR:6kb/s (not for the SETUP message);

2) the V.120 relevant BC parameters (octet 5b) shall be set according to the LLC (see clause B.2);

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

B.1.3.1.3 48kbit/s and 56 kbit/s transparent Case (TCH/F9.6)



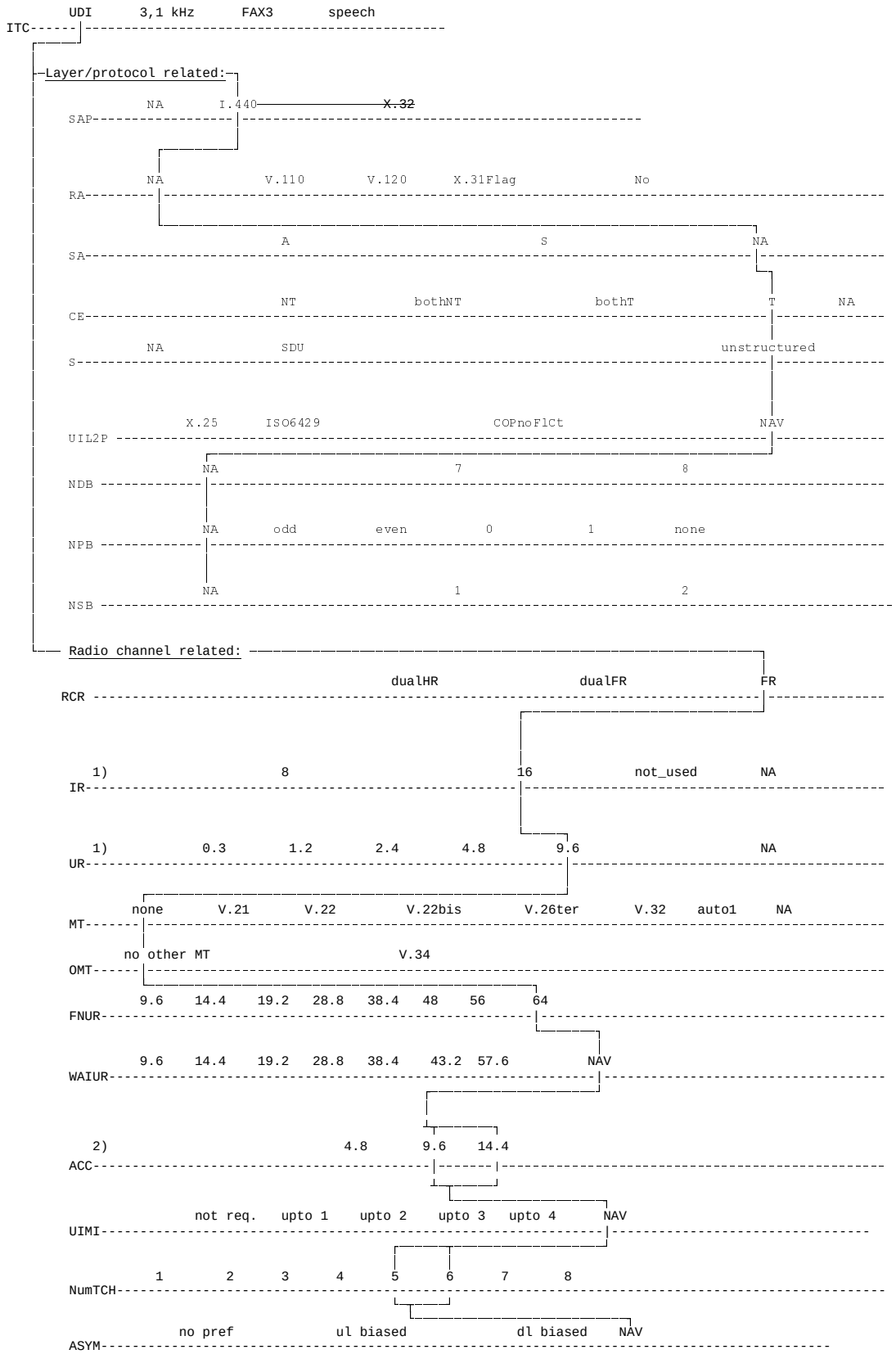
1) IR and UR are overridden by FNUR, ACC and MaxNumTCH are available.

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.1.3.1.4 64kbit/s bit transparent Case (TCH/F9.6 and TCH/F14.4)

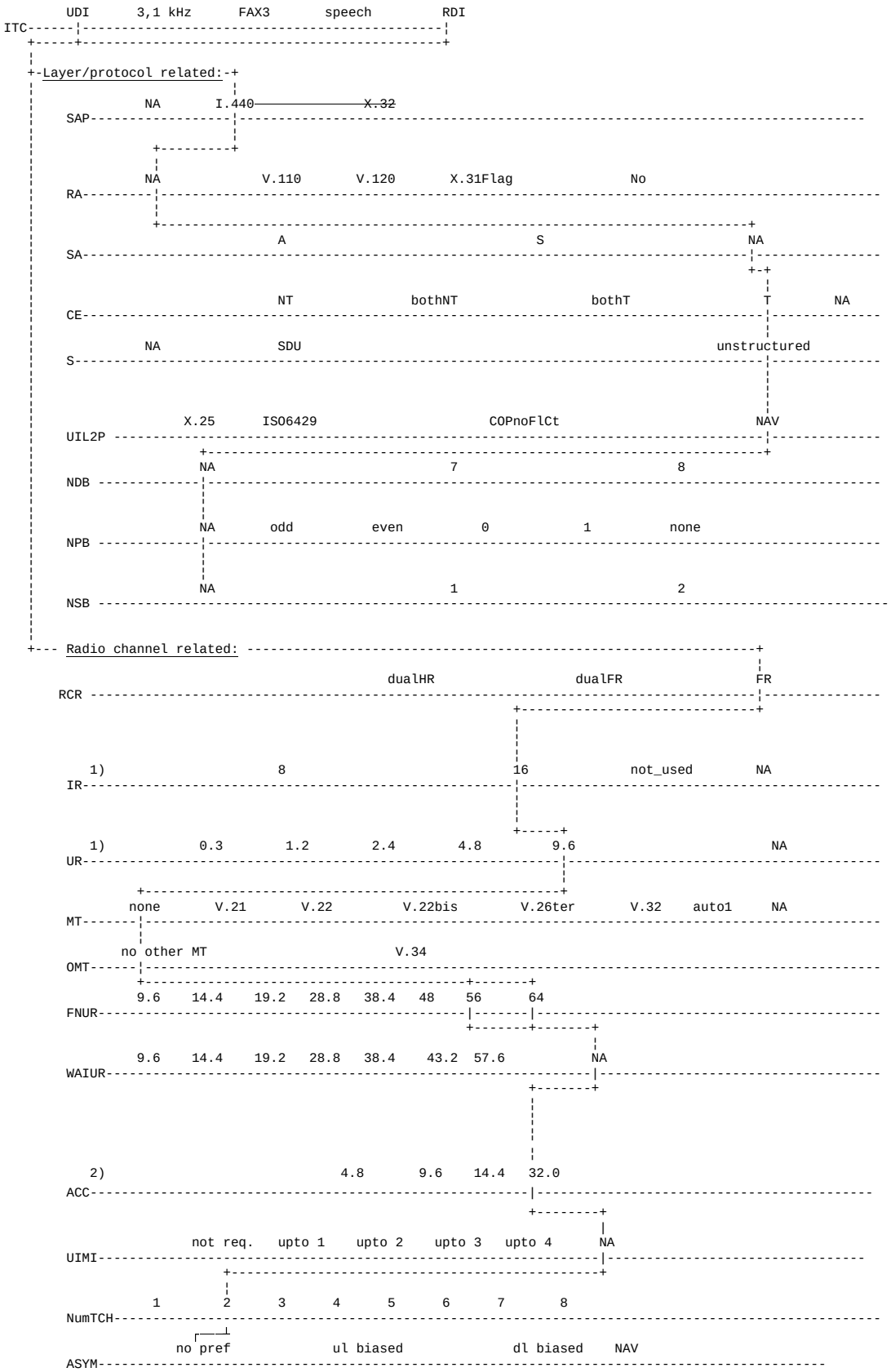


1) IR and UR are overridden by FNUR, ACC and MaxNumTCH are available.

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

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

B.1.3.1.5 Bit transparent 56 kbit/s (RDI) and 64kbit/s (UDI) (TCH/F32.0)

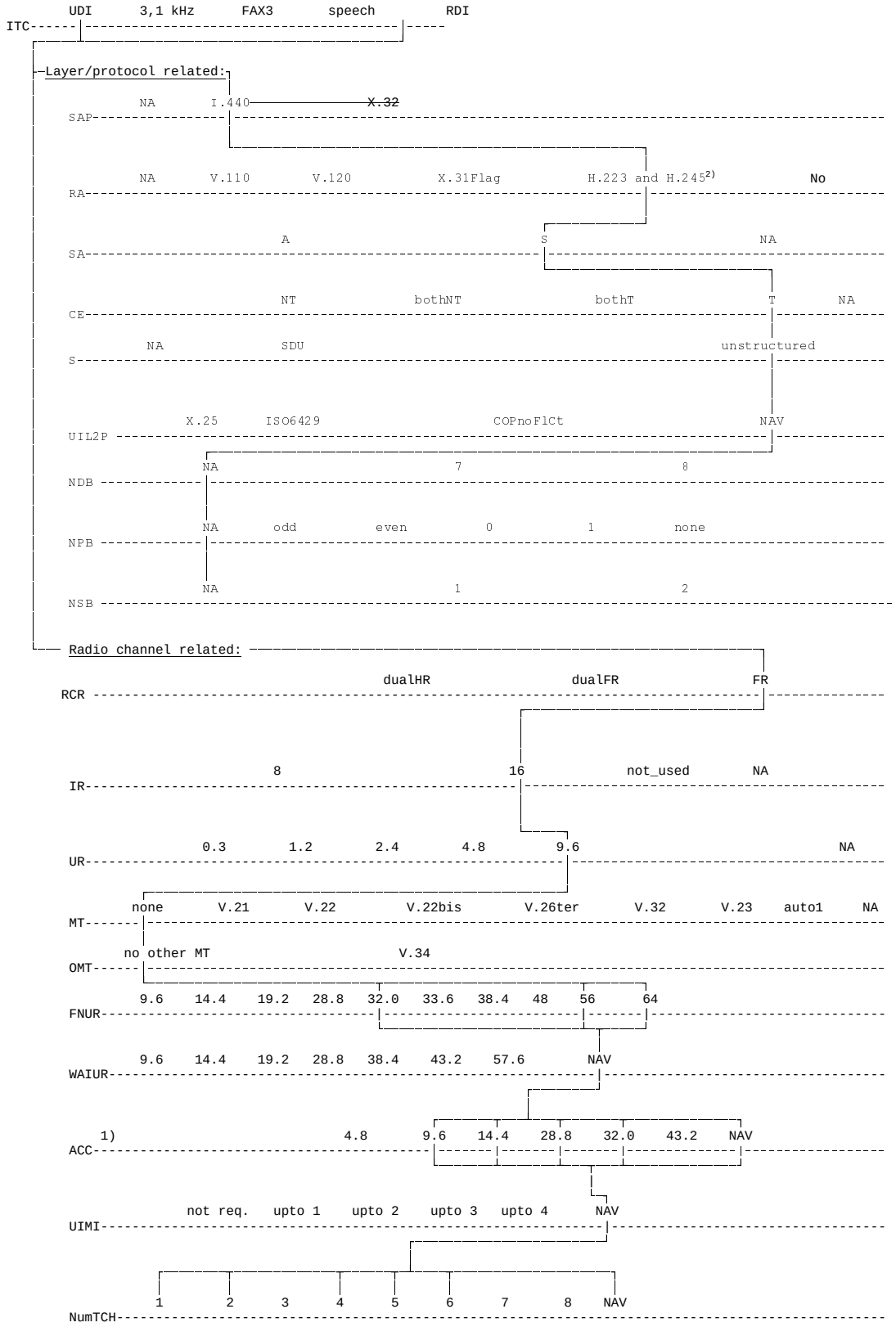


1) IR and UR are overridden by FNUR, ACC and MaxNumTCH are available.

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

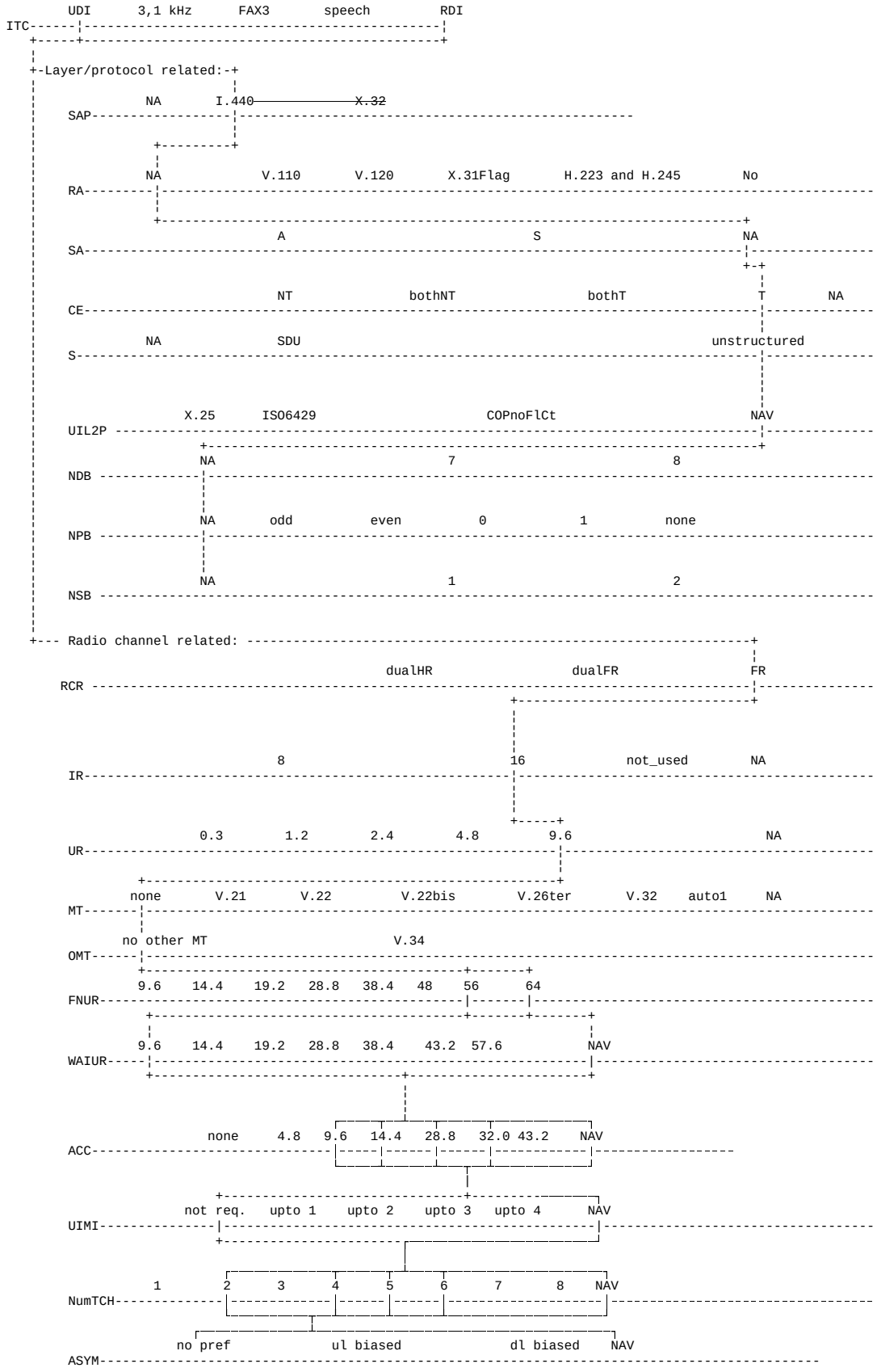
NOTE: The parameters FNUR, OMT, ACC and MaxNumTCH are mandatory for this service.

B.1.3.1.6 3G-H.324/M Case



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

B.1.3.1.7 Bit transparent 56 kbit/s (RDI) and 64kbit/s (UDI) (UTRAN)

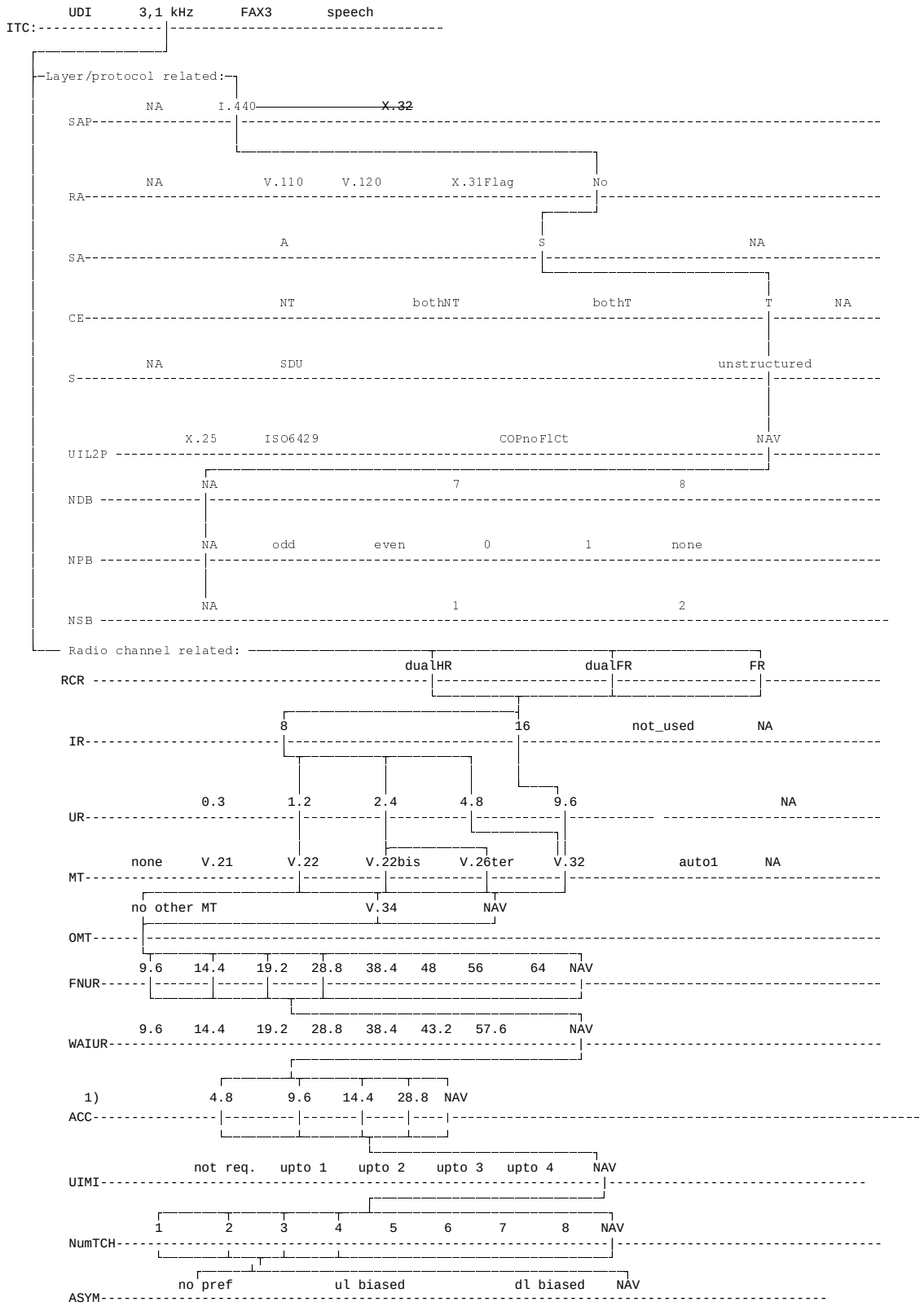


WAIUR, UIMI and ASYM shall be available only if the ACC includes TCH/F32.0.

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

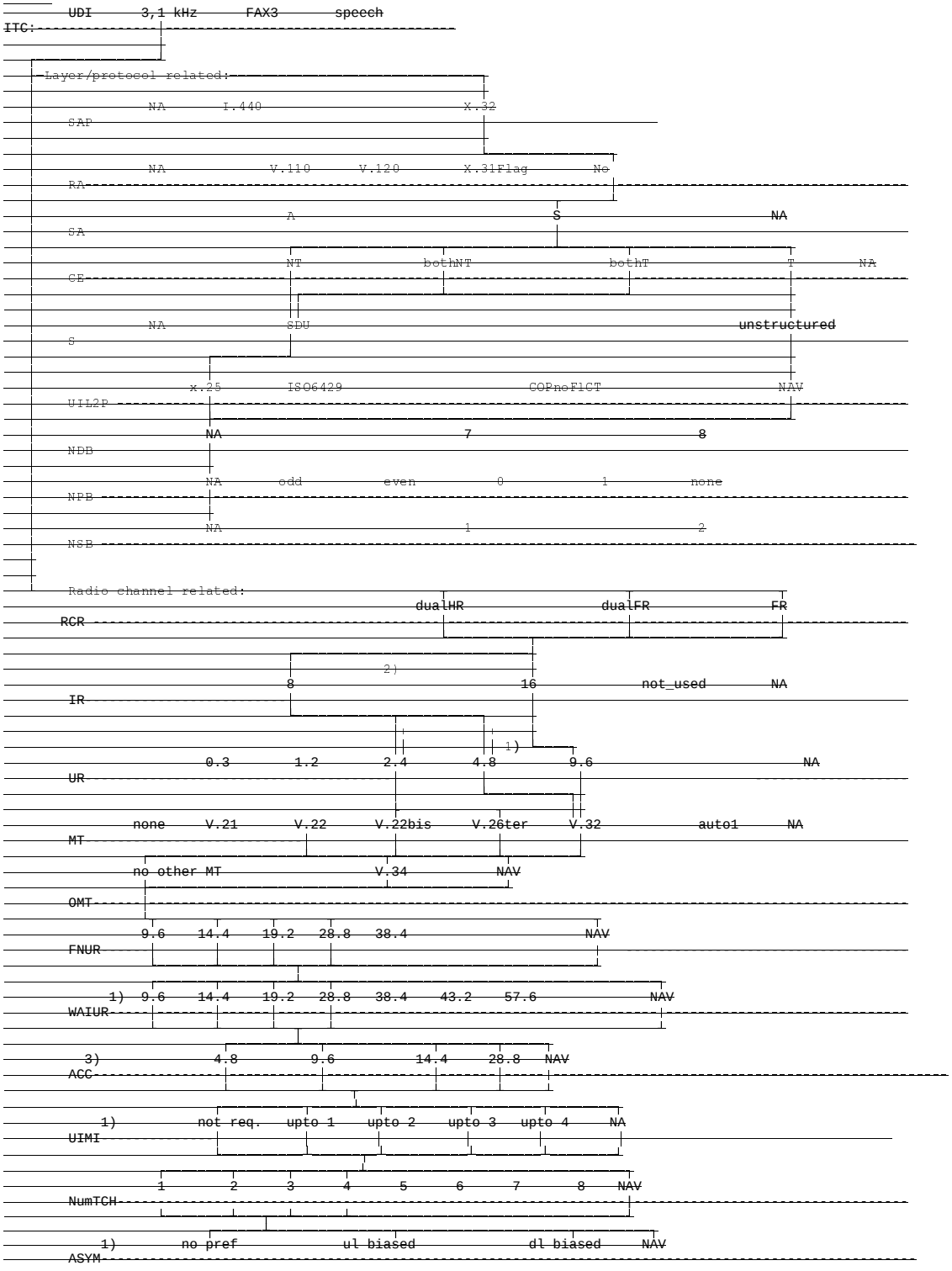
B.1.3.2.1 Non-X.32 Cases



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

B.1.3.2.2 X.32 Case

Void

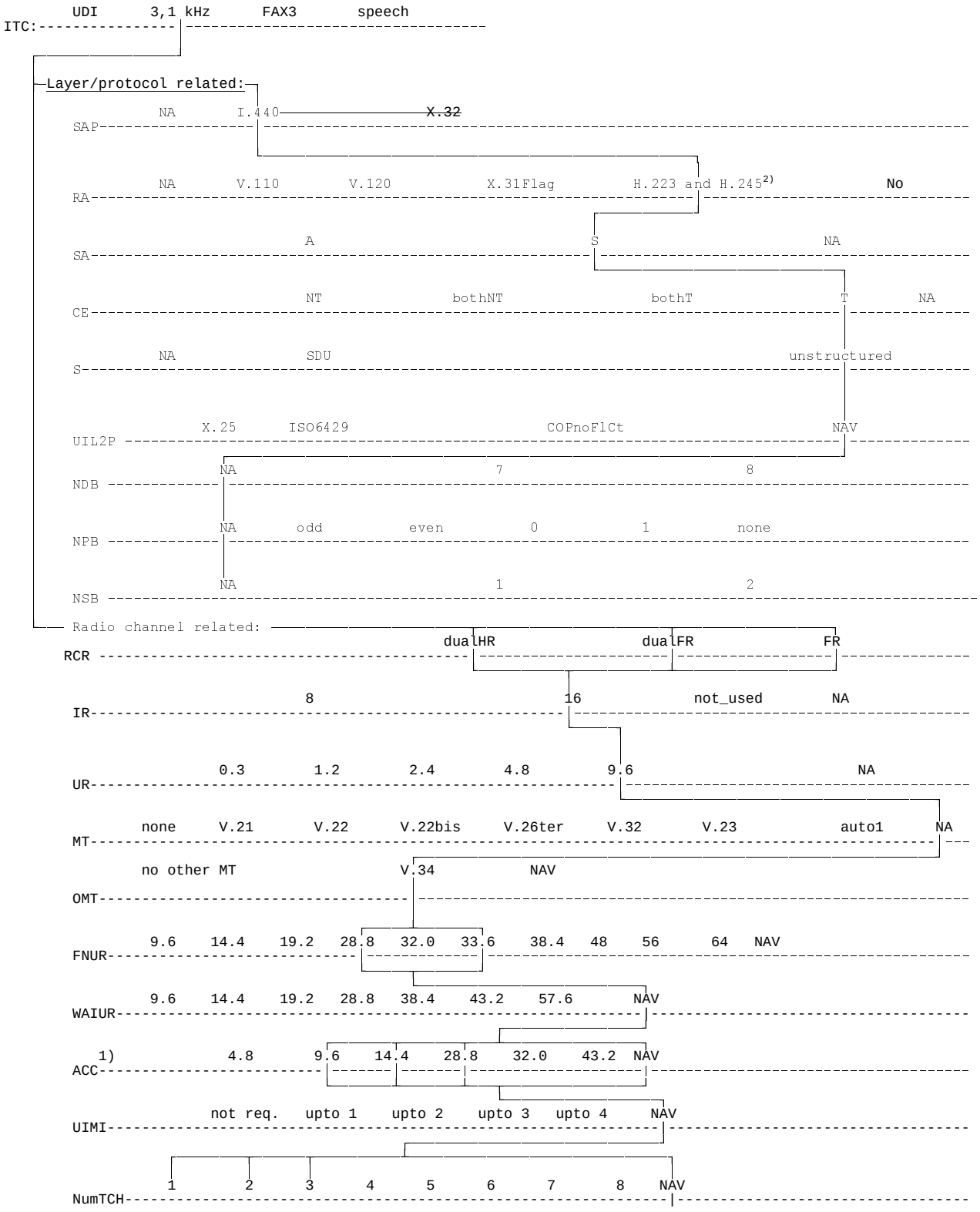


1) for CE:NT or "both".

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).

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

Void.

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

Void.

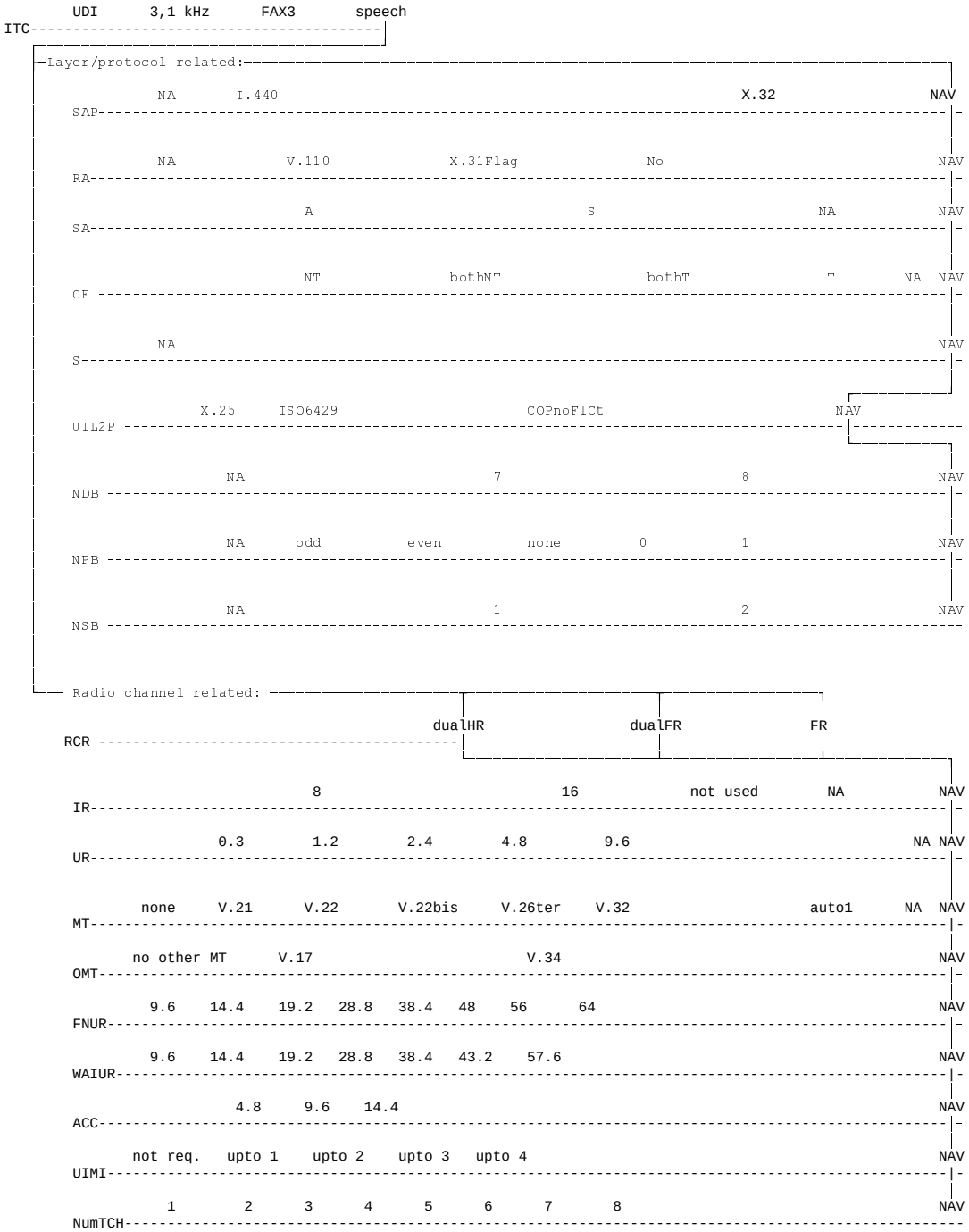
B.1.6 Bearer Service 61, Alternate Speech/Data

Void.

B.1.7 Bearer Service 81, Speech followed by Data

Void.

B.1.8 Teleservice 11 ... 12, Speech



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

Not applicable.

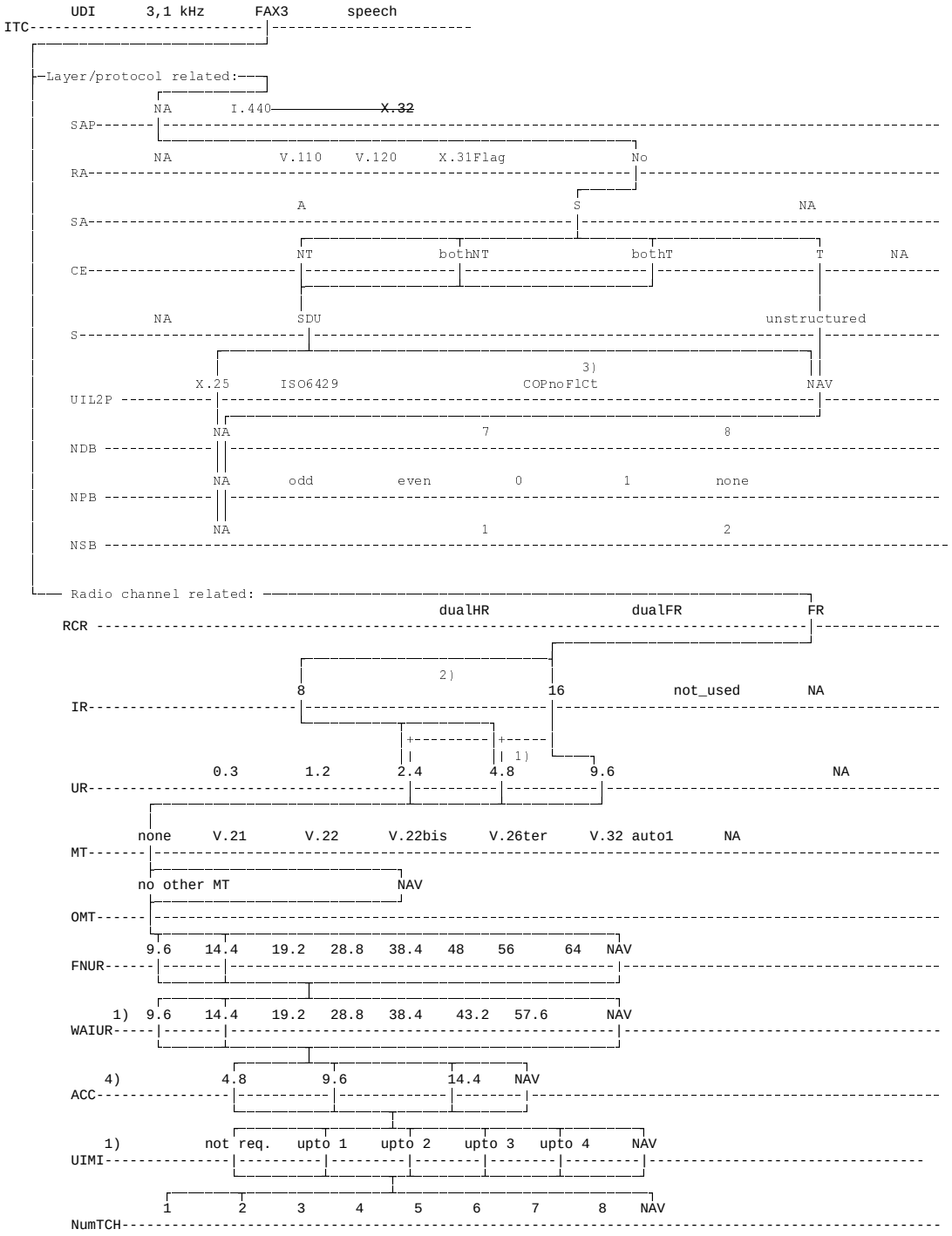
B.1.10 Teleservice 61, Alternate Speech and Facsimile group 3

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

B.1.10.1 Teleservice 61, Speech

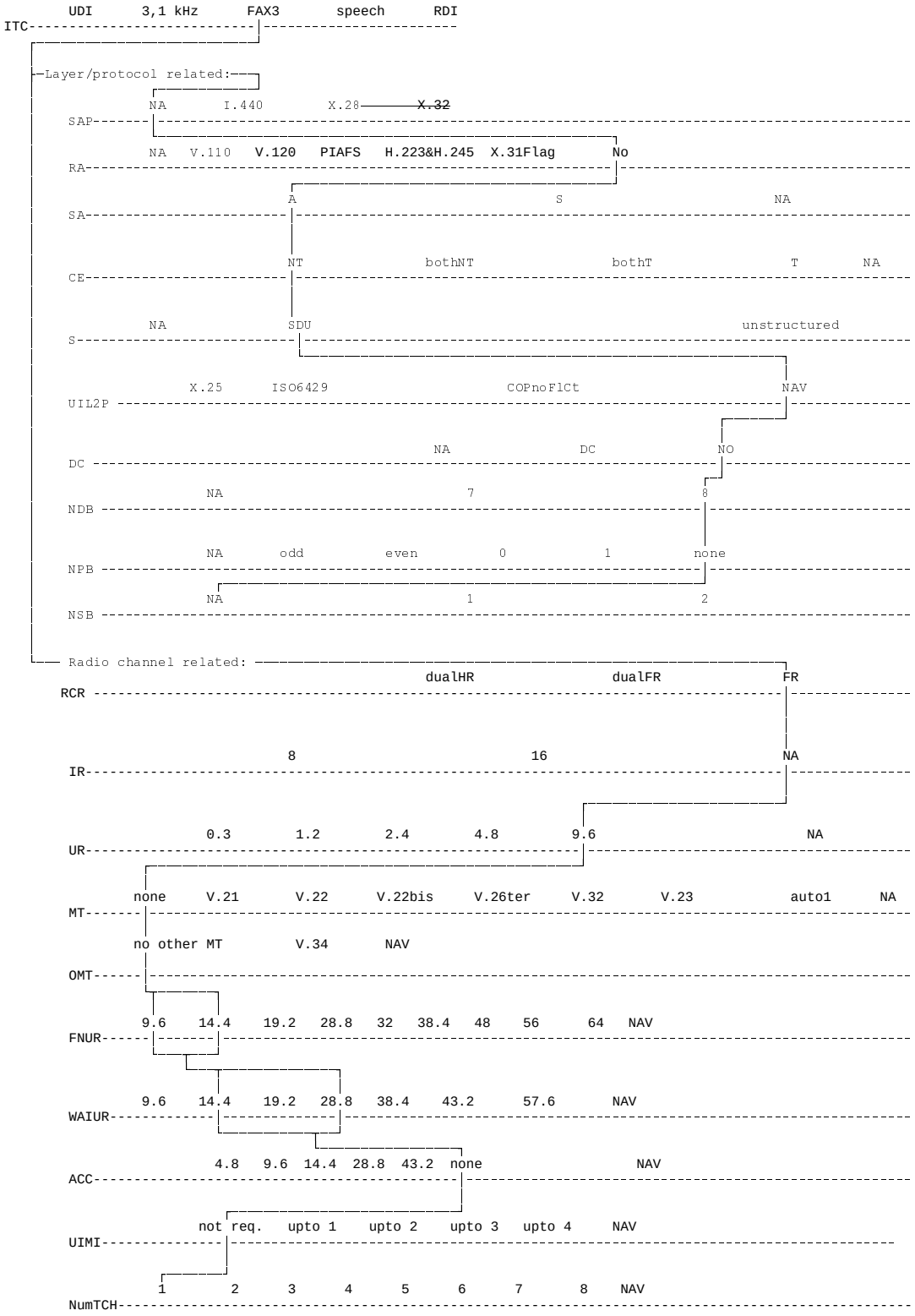
Ref. subclause B.1.8.

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~~ shall be included in the ACC and a '*' indicates that it may or may not be included.

NOTE 2: Padding Required, ref ~~GSM~~3GPP TS 04.21.

NOTE 3: Air interface user rate 11,2 kbit/s, ref. ~~GSM~~3GPP TS 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~~ shall 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. 3GPP 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. A combination is compliant to the table, if there exists at least one row that it is compliant to. A combination is compliant to a row if each parameter value meets the conditions given in that row. When a WAIUR, ACC, mTCH combination is compliant to a row, the network is allowed to assign any Channel Mode compliant to that row. The notes of the table provide further details on the compliance conditions.

WAIUR (Note 7)	**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/F32.0	TCH/F4.8	TCH/F9.6	TCH/F14.4	TCH/F28.8	TCH/F32.0
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~~ shall 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~~ shall 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.
.NOTE 7: The MS is allowed to signal higher values for WAIUR than indicated in the table for the signalled mTCH and ACC. Before initiating the assignment procedure, the MSC, if necessary, ~~will~~ shall lower the value of the WAIUR to the highest value applicable for the signalled mTCH and ACC.

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. 3GPP 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 (Note 1)
Delivery Order	Yes	
Maximum SDU size	640bits for FNUR = 32, 56 and 64 kbit/s 576 bits for FNUR = 28.8 kbit/s	(Note 2)
Transfer Delay	< 200 ms	Subject to operator tuning
Traffic Handling Priority	-	Not applicable for the conversational traffic class
Source statistics descriptor	Unknown	
SDU Parameters		
SDU error ratio	-	Not applicable
Residual bit error ratio	10^{-4}	Subject to operator tuning according to 3GPP TS 23.107. Operator may also choose different value for Multimedia and other transparent data services.
Delivery of erroneous SDUs	-	No error detection in the core network

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

Note 2: The maximum SDU size for bit rate 33.6 kbit/s is still under discussion.

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	Operator can choose 14.4, 28.8 or 57.6 kbit/s.
Delivery Order	Yes	
Maximum SDU size	576 bits	
Transfer Delay	250 ms	Subject to operator tuning
Traffic Handling Priority	-	Not applicable to the streaming traffic class
Source statistics descriptor	Unknown	
SDU Parameters		
SDU error ratio	10 %	Subject to operator tuning
Residual bit error ratio	10^{-3}	Subject to operator tuning.
Delivery of erroneous SDUs	No error detection consideration	
SDU format information		
RAB Subflow Combination bit rate	57.6 kbit/s	(Note 2)
RAB Subflow Combination bit rate	28.8 kbit/s	(Note 2)
RAB Subflow Combination bit rate	14.4 kbit/s	
RAB Subflow Combination bit rate	0 kbit/s	indicates DTX, RFCI is not assigned

NOTE 1: In case the WAIUR is less than Guaranteed bit rate, the Maximum bit rate is set to the Guaranteed bit rate.

NOTE 2: Only RAB subflow combination bit rates ≤ maximum bit rate shall be specified.

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 3GPP 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. 3GPP TS 27.002 and 3GPP 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. "ITU-T 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" (3GPP 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 3,1 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 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.

B.2.5 LLC Bearer Services 51 ... 53

Void.

B.2.6 LLC Bearer Service 61

Void.

B.2.7 LLC Bearer Service 81

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**	**CR**	**<Phase>**	**Version**	**New Version**	**Subject/Comment**
Apr 1999	07.01			7.1.0		Transferred to 3GPP CN1
CN#03	27.001				3.0.0	Approved at CN#03
CN#04	27.001	001	R99	3.0.0	3.1.0	Introduction of EDGE channel codings into the specifications
CN#05	27.001	002	R99	3.1.0	3.2.0	Asymmetry in EDGE
CN#05	27.001	003	R99	3.1.0	3.2.0	EDGE related correction
CN#06	27.001	004	R99	3.2.0	3.3.0	Introduction of FTM
CN#06	27.001	005	R99	3.2.0	3.3.0	Introduction of UMTS
CN#06	27.001	006	R99	3.2.0	3.3.0	Introduction of PIAFS and enhancement of processing at mobile terminated call
CN#06	27.001	007	R99	3.2.0	3.3.0	Introduction of multi media
CN#06	27.001	008	R99	3.2.0	3.3.0	Service clean-up for Release 99
CN#06	27.001	009	R99	3.2.0	3.3.0	BC-IE setting for Real-time non-transparent FAX
CN#07	27.001	010	R99	3.3.0	3.4.0	FALLBACK TO SPEECH IN A CS MULTIMEDIA CALL SETUP
CN#07	27.001	011	R99	3.3.0	3.4.0	Bit transparent services RDI and UDI
CN#07	27.001	012	R99	3.3.0	3.4.0	FTM corrections
CN#07	27.001	013	R99	3.3.0	3.4.0	Alignment to RANAP and other clarifications
CN#07	27.001	014	R99	3.3.0	3.4.0	Corrections related to MULTIMEDIA
CN#08	27.001	015	R99	3.4.0	3.5.0	Missing Asymmetry preference indication in Table B. 5.a
CN#08	27.001	016	R99	3.4.0	3.5.0	Residual bit error ratio in Transparent Data
CN#08	27.001	017	R99	3.4.0	3.5.0	Adding the value of GBR of NT services
CN#08	27.001	018	R99	3.4.0	3.5.0	Application of multi media in GSM
CN#08	27.001	019	R99	3.4.0	3.5.0	Removal of packet access service
CN#08	27.001	020	R99	3.4.0	3.5.0	WAIUR in case of HO between UMTS and GSM
CN#08	27.001	021	R99	3.4.0	3.5.0	Adaptations for UMTS
CN#08	27.001	022	R99	3.4.0	3.5.0	Indication of discontinuous transfer for NT data
CN#08	27.001	023r1	R00	3.4.0	4.0.0	Indication of WAIUR 14.4kbit/s in case of UMTS FAX
CN#09	27.001	024r1	Rel 4	4.0.0	4.1.0	UMTS clean-up
CN#09	27.001	027	Rel 4	4.0.0	4.1.0	Cleanup of RAB parameter setting
CN#09	27.001	028	Rel 4	4.0.0	4.1.0	Relevance of GSM specific BC-IE parameters for negotiating RLP version in UMTS
CN#09	27.001	032	Rel 4	4.0.0	4.1.0	32 kbit/s UDI/RDI multimedia in GSM
CN#09	27.001	034	Rel 4	4.0.0	4.1.0	3.1 kHz multimedia calls at 33.6 kbit/s data rate
CN#09	27.001	036	Rel 4	4.0.0	4.1.0	RCR is not indicated from the network to the MS
CN#09	27.001	038	Rel 4	4.0.0	4.1.0	Modification from V.25bis to V.250
CN#09	27.001	040	Rel 4	4.0.0	4.1.0	Delivery of erroneous SDUs parameter value

3GPP TSG-CN3 Meeting #14 ***Tdoc N3-000606***
ETSI/Sophia Antipolis, France, 14th – 16th November 2000

CR-Form-v3

CHANGE REQUEST

⌘	27.003	CR	007	⌘ rev	-	⌘ Current vers	3.5.0	⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM [ ] ME/UE [X] Radio Access Network [ ] Core Network [X]

Title:	⌘	Removal of Bearer Service 30 Non-transparent
Source:	⌘	TSG CN WG3
Work item code:	⌘	TEI4 (CS Bearers)
Date:	⌘	03/11/00
Category:	⌘	C
Release:	⌘	REL-4

Use one of the following categories:
F *(essential correction)*
A *(corresponds to a correction in an earlier release)*
B *(Addition of feature),*
C *(Functional modification of feature)*
D *(Editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change:	⌘	Deletion of BS 30 NT and editorial changes.
Summary of change:	⌘	Changes throughout the whole document
Consequences if not approved:	⌘	Inconsistent with decision in SA1

Clauses affected:	⌘	The whole document		
Other specs affected:	⌘	[ ] Other core specifications [ ] Test specifications [ ] O&M Specifications	⌘	22.002, 27.001, 29.007, 03.10, 04.21
Other comments:	⌘			

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at:
http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.
3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

3GPP TS 27.003 V3.5.0 (2000-09

Technical Specificatio

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

Keywords
UMTS, GSM, terminal, adaption

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 (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 use of synchronous bearer services in the PLMN and the attachment of Synchronous synchronous Terminals terminals to an MT (see 3GPP TS ~~04.02~~24.002 [3]). For the case where asynchronous terminals are attached to the TAF when using synchronous bearer services in the PLMN, the reader is referred to 3GPP TS 27.002 [36] for the asynchronous MT-TAF interface specifics and to the present document for synchronous bearer service specifics on the TAF-IWF interface. The general aspects of Terminal Adaptation Functions are contained in specification 3GPP TS 27.001 [9]. The present document covers support of synchronous data services (see 3GPP 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;
- X.21 bis [24] DTE/DCE Interface;
- X.32 [30] Procedure;
- V.25-bis [18] Procedure;

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

NOTE: From ~~GSM~~ R99 and onwards the following services are no longer required 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.

From R00 onwards the following service is no longer required by a PLMN:

- the synchronous Bearer Service non-transparent (BS 30 NT).

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 R98 or R99, respectively.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

[1] 3GPP TS 01.04: "Digital cellular telecommunication system (Phase 2+); Abbreviations and acronyms".

[2] 3GPP TS 03.10: "Digital cellular telecommunication system (Phase 2+); GSM Public Land Mobile Network (PLMN) connection types".

[3] 3GPP TS ~~04.02~~24.002: "3rd Generation Partnership Project; Technical Specification Group TSGN; GSM - UMTS Public Land Mobile Natwork (PLMN) access reference configuration

~~Digital cellular telecommunication system (Phase 2+); GSM Public Land Mobile Network (PLMN) access reference configuration~~".

[4] 3GPP TS 04.21: "Digital cellular telecommunication system (Phase 2+); Rate adaption on the Mobile Station - Base Station System (MS - BSS) interface".

[5] 3GPP TS 08.20: "Digital cellular telecommunication system (Phase 2+); Rate adaption on the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface".

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

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

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

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

[10] 3GPP 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".~~Void

[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".~~Void

[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".~~Void.

[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".~~Void.

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

[23] Void.

[24] 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".~~Void.

[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".~~Void.

[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".~~Void.

[28] Void.

[29] 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/IEC 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".~~ Void.

[32] ~~ISO/IEC Recommendation 8886: "Information technology - Telecommunication and information exchange between systems - Data link service definitions for Open Systems interconnection".~~Void.

[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] ~~3GPP TR 23.910: "Circuit Switched Data Bearer Services".~~ Void.

[36] 3GPP TS 27.002: "Terminal adaptation functions (TAF) for services using asynchronous bearer capabilities".

2.1 Abbreviations

In addition to the abbreviations listed below, the present document also uses termslisted in 3G TR 21.905 [10] and 3GPP TS 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 3GPP TR 21.905.

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

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

3 General

3.1 Customer access configuration

The PLMN access reference configuration is described in figure 1 of 3GPP TS ~~04.02~~24.002 [3] and 3GPP 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 3GPP TS ~~04.02~~24.002 [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 following functions are included:

- conversion of electrical, mechanical, functional and procedural characteristics of the ITU-T V-series, type interfaces to those required by a 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 to the PLMN Layer 3 signalling;
- the mapping functions necessary to convert ITU-T S-interface signalling to PLMN 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 3GPP TS 27.001 [9];
- filtering of channel control information. This is described in the specification 3GPP TS 27.001 [9];
- compatibility checking (see 3GPP 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.

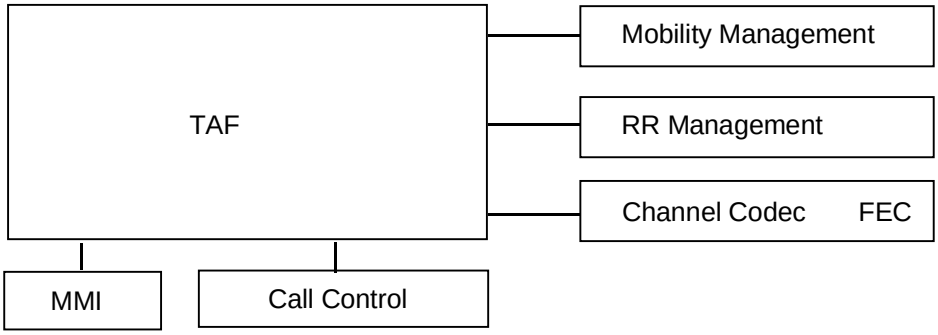


Figure 1: TAF interfacing to other MT functions

4 Terminal Adaptation Functions for synchronous transparent services

Specification 3GPP TS 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 3GPP TS 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 3GPP TS 03.10 [2]. The D-bits of the rate adaptation frames are used to convey user data. ~~and t~~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 3GPP TS 04.21 [4]. The functions applied in this case are shown in figure 2 (see model 2b in figures 6, 7 and 8 of 3GPP TS 03.10 [2]).

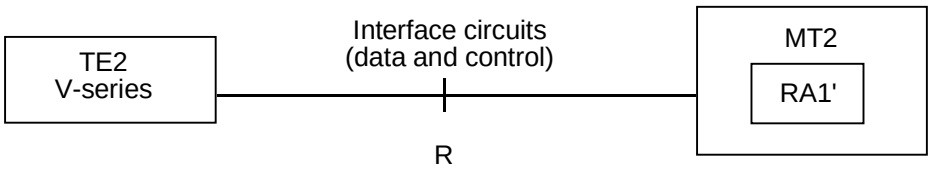


Figure 2: Rate adaptation for V-series terminals

4.1.2 Rate adaptation - ITU-T X.21

Void.

4.1.3 Rate adaptation - ITU-T S-interface

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].; Twhile 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 3GPP TS 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 (3GPP TS 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 (3GPP 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 (3GPP 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 3GPP TS 04.21 [4] and 3GPP TS 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 3GPP TS 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 compensation~~s~~ 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. B~~b~~etween 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 3GPP TS 04.21 [4] and 3GPP TS 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, there may be a Channel Mode Modify during the course of the facsimile portion of the call. If this occurs, 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 3GPP TS 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 3GPP TS 04.21 [4].

4.2.2 ITU-T X.21 [23] Interchange circuit mapping

Void.

4.2.3 Case of ITU-T S-interface

Void.

4.3 Call establishment signalling mapping at TE/MT interface

4.3.1 ITU-T V-series interfaces

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

The mapping of the ITU-T V.25-bis [18] procedures to the messages of the PLMN Layer 3 signalling (3GPP 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 from TE2	Call Request with Number provided 0,1..9,*,#,A,B,C,D	CRN
	Disregard Incoming Call	DIC
	Connect Incoming Call	CIC
Indications to TE2	Call Failure Indication XX = CB,AB,NT,FC (Note)	CFI XX
	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

Void.

4.3.3 ITU-T S-interface (ITU-T I.420 [11]) signalling mapping

Void.

4.3.4 X.25 Procedures Mapping

Void.

5 Terminal Adaptation Functions for synchronous non-transparent services.

Void.

5.1 Rate Adaptation and protocol model

Void.

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 3GPP TS 03.10 [2]) and 3GPP TS 23.910[35].

5.1.2 ITU-T S-interface

Void.

5.2 Signalling Mapping (GSM only)

Void.

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 and 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 (3GPP 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.

Void.

5.2.2 Call establishment signalling mapping

Void.

5.3 Flow Control

Void.The passage of flow control information between L2Rs is described in annex 1.

5.3.1 Conditions requiring flow control towards the network

Void.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

Void.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

Void.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

Void.

5.4.1 TX buffers

Void.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

Void.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-series interface procedures to 3GPP TS 24.008 [7] mapping

Interface procedures not directly mappable to 3GPP TS 24.008 [7] (ie. ITU-T V.25 bis [18] VAL/INV) are not considered. Mobile management procedures of 3GPP 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.

Element	Derived from	
	MMI	ITU-T V.25 bis [18] message
Called Address	Keypad	CRN/CRI/CRS
Called Sub Address	Keypad	CRI
HLC	Derived from internal settings or MMI information.	
LLC	Same as HLC	
BC	Same as HSC	
	3GPP TS 27.001 [9] gives allowed values	

b) RELEASE COMPLETE.

Element	Derived from	
	MMI	ITU-T V.25 bis [18] message
Cause	Display (optional)	CFI

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
Called Address	Display (optional)	INC
Called Sub Address	Display (optional)	Not applicable
HLC	Display (optional)	Not applicable
LLC	Display (optional)	Not applicable
BC	Display (optional)	Not applicable

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, CIC from ITU-T V.25 bis [18] or in response from MMI.

7 ITU-T X.21 [23] interface procedures to 3GPP TS 24.008 [7] mapping

Void.

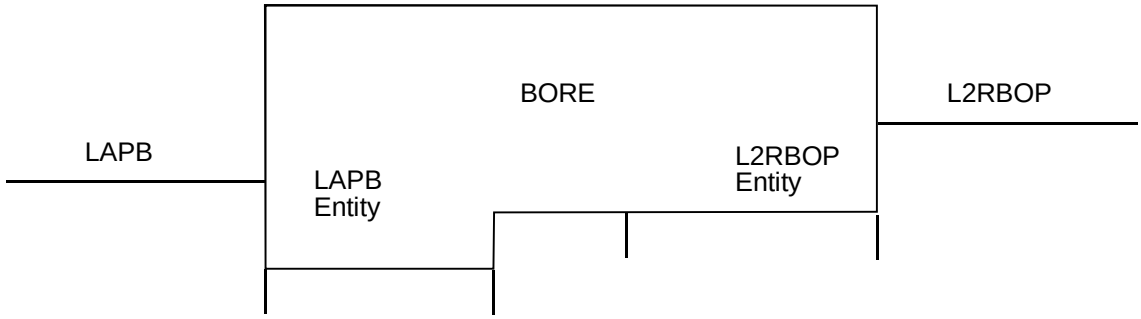
8 Support for packet service

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 ~~3GPP~~ 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 (~~3GPP~~ 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]. 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]. 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 ~~3GPP~~ 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]. 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
CN#08	27.003	005	R99	3.3.0	3.4.0	Adaptations for UMTS
CN#09	27.003	006	R99	3.4.0	3.5.0	Modification from V.25bis to V.250