3GPP TSG_CN#6 **NP-99437**

ETSI SMG3 Plenary Meeting #6,

Nice, France

13th – 15th December 1999

Agenda item: **5.3.3**

Source: **TSG_N WG3**

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

Introduction:

This document contains **"2"** CRs **on Work Item PIAFS** agreed by **TSG_N WG3** and forwarded to **TSG_N Plenary** meeting #6 for approval.

Tdoc	Spec	CR	Rev	CAT	Rel.	Old Ver	New Ver	Subject
N3-99496	27.001	006		B	R99	3.2.0	3.3.0	Introduction of PIAFS and enhancement of processing at mobile terminated call
N3-99507	29.007	010		B	R99	3.2.0	3.3.0	Introduction of PIAFS and enhancement of processing at mobile terminated call

3GPP TSG-N3 meeting #7
Sophia Antipolis, France, 29th November – 3rd December 1999

Document N3-99496
e.g. for 3GPP use the format TP-99xxx or for SMG, use the format P-99-xxx

CHANGE REQUEST

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

27.001	CR	006	Current Version:	3.2.0

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

For submission to:	CN#6	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

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

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

Source: NTT DoCoMo **Date:** 30/11/99

Subject: Introduction of PIAFS and enhancement of processing at mobile terminated call

Work item: Support of PIAFS in UMTS

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

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

Release:

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

Reason for change: Introduction of PIAFS

Clauses affected: See attached pages

Other specs affected:

Other 3G core specifications	X	→ List of CRs:	22.002, 29.007, 27.007, 24.008
Other GSM core specifications		→ List of CRs:	
MS test specifications		→ List of CRs:	
BSS test specifications		→ List of CRs:	
O&M specifications		→ List of CRs:	

Other comments:


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2 Normative 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.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

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

[2] GSM 02.02: "Digital cellular telecommunication system (Phase 2+); Bearer Services (BS) supported by a GSM Public Land Mobile Network (PLMN)".

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

[4] GSM 03.02: "Digital cellular telecommunication system (Phase 2+); Network architecture".

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

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

[7] GSM 04.08: "Digital cellular telecommunication system (Phase 2+); Mobile radio interface layer 3 specification".

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

[9] GSM 04.22: "Digital cellular telecommunication system (Phase 2+); 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".

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

[11] GSM 07.02: "Digital cellular telecommunication system (Phase 2+); Terminal Adaptation Functions (TAF) for services using asynchronous bearer capabilities".

[12] GSM 07.03: "Digital cellular telecommunication system (Phase 2+); Terminal Adaptation Functions (TAF) for services using synchronous bearer capabilities".

[13] GSM 07.05: "Digital cellular telecommunication system (Phase 2+); Use of Data Terminal Equipment - Data Circuit terminating Equipment (DTE - DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)".

[14] GSM 07.07: "Digital cellular telecommunication system (Phase 2+); AT command set for GSM Mobile Equipment (ME)

[15] GSM 09.01 (ETR 359): "Digital cellular telecommunication system (Phase 2); General network interworking scenarios".

[16] GSM 09.02: "Digital cellular telecommunication system (Phase 2+); Mobile Application Part (MAP) specification".

[17] GSM 09.03: "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)".

[18] GSM 09.04: "Digital cellular telecommunication system (Phase 2+); Interworking between the Public Land Mobile Network (PLMN) and the Circuit Switched Public Data Network (CSPDN)".

[19] GSM 09.05: "Digital cellular telecommunication system (Phase 2+); Interworking between the Public Land Mobile Network (PLMN) and the Packet Switched Public Data Network (PSPDN) for Packet Assembly/Disassembly (PAD) facility access".

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

[21] GSM 09.07: "Digital cellular telecommunication system (Phase 2+); General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN)".

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

[23] GSM 09.10: "Digital cellular telecommunication system (Phase 2+); Information element mapping between Mobile Station - Base Station System and BSS - Mobile-services Switching Centre (MS - BSS - MSC) Signalling procedures and the Mobile Application Part (MAP)".

[24] GSM 09.11: "Digital cellular telecommunication system (Phase 2+); Signalling interworking for supplementary services".

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

[26] CCITT Series V Recommendations: "Data communication over the Telephone network".

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

[28] CCITT Series X Recommendations: "Data Communication networks".

[29] CCITT 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] CCITT Recommendation X.150: "Data Communication Networks: Transmission, Signalling and Switching, Network Aspects, Maintenance and Administrative Arrangements".

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

[32] ITU-T Recommendation V.25ter: "Serial asynchronous automatic dialing and control".

[33] CCITT Recommendation V.54: "Loop Test Devices for Modems".

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

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

[36] ETS 300 102-1: "Integrated Services Digital Network (ISDN); User-network interface layer 3 specifications for basic call control".

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

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

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

[40] IrDA "IrPHY Physical signalling standard".

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

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

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

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

3 Abbreviations and Definitions

In addition to those below, abbreviations used in this TS are listed in GSM 01.04.

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.
PIAFS	PHS Internet Access Forum Standard
PHS	Personal Handyphone System

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 (GSM 04.08). This also allows for renegotiation of specific parameters at the beginning of the connection set-up process. The specific parameters are:

a) mobile specific requirements:

  - Connection element (transparent/non transparent);
  - Structure (note 1);
  - Synchronous/Asynchronous (note 8)
  - Rate adaptation/Other rate adaptation (note 9)
  - User information layer 2 protocol (note 1);
  - Intermediate rate (note 2), (note 3);
  - Modem Type (note 1), (note 3);
  - User Rate (note 3);
  - Compression ,

- Fixed network user rate, (note 3) (note 4)
- Other modem type, (note 3) (note 4)
- User initiated modification indication(note 4)

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

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

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

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

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

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

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

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

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

b) requirements with effects at the partner terminal:

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

NOTE 8: For FTM and PIAFS, this parameter may be ~~negosiated~~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 ~~negosiated~~negotiated as in Table B.4f.

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.

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.

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.

Section 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 MTC cases can be deduced from the individual call set-up request conditions

a) If the set-up does not contain a BC information element, the MS in the call confirmed message shall include any BC information (single or multiple BC-IE). In case of multiple BC-IEs one BC-IE must indicate the information transfer capability "speech".

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. Alternatively a single BC-IE containing fax group 3 only shall be used if a multiple BC-IE requesting speech alternate fax group 3 is received and the MS is not able to support the speech capability. Annex B, table B.7, describes the negotiation rules.

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

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

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

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

a) discard these parameters, or

b) include the possibly modified values for the ‘fixed network user rate’ and ‘other modem type’ in the BC-IE of the call confirmed message. The network might accept or reject the modified values. In this case the MS shall also include the parameters ‘maximum number of traffic channels’ and ‘acceptable channel codings’. Additionally for non-transparent services, the MS shall also include the parameters ‘wanted air interface user rate’ and the ‘user initiated modification indication‘.

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

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

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

If the parameters ‘fixed network user rate’, ‘other modem type’ were not included in the BC-IE received, or no BC-IE was received, the MS shall not include these parameters in the CALL CONFIRMED message (i.e. octets 6d, 6e, 6f, and 6g ref. to GSM 04.08).

Annex A (Informative): List of Bearer Capability Elements

This annex lists the GSM Bearer Capability Elements which need to be provided on the Dm channel to support Terminal adaptation function to Interworking control procedures.

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
- 1200/75 bit/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 GSM 09.07 (Table 6A, 6B) 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.23
- V.26 ter
- V.32
- autobauding type 1
- none

Radio Channel Requirement:

This element is relevant between MT and BSS

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

Connection Element:

This element is relevant between MT and IWF

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

User Information Layer 2 Protocol:

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

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

Signalling Access Protocol:

This element is relevant between TE/TA and MT.

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

Rate Adaptation:

This element is relevant between IWF and the fixed network.

Values:
- V.110/X.30
- X.31 flagstuffing

- no rate adaptation
- V.120 (note 7)
- PIAFS (note 7)

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 GSM 04.08.

Values: - GSM

User Information Layer 1 Protocol:

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

Values: - default

Negotiation of Intermediate Rate requested:

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

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

Compression:

This element is relevant between MT and IWF.

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

Rate adaption header / no header:

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

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

Multiple frame establishment support in data link:

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

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

Mode of operation:

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

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

Logical link identifier negotiation:

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

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

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

Assignor / assignee:

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

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

In-band / out-band negotiation:

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

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

Fixed network user rate, FNUR (Note 12)

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

Values Fixed network user rate not applicable (note 9)

9.6 kbit/s
14.4 kbit/s
19.2 kbit/s
28.8 kbit/s
32.0 kbit/s
38.4 kbit/s
48.0 kbit/s
56.0 kbit/s
64.0 kbit/s

NOTE 9: not used by currently specified services

Wanted air interface user rate, WAIUR (Note 12)

This element is relevant between the MT and the IWF

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

interpreted by the network as 38.4 kbit/s (note 1)

Acceptable channel codings, ACC (Note 12)

This element is relevant between the MT and the IWF.

Value: TCH/F4.8 acceptable

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

Maximum number of traffic channels, MaxNumTCH (Note 12)

This element is relevant between the MT and the IWF.

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

NOTE11: not used by currently specified services

Other modem type, OMT (Note 12)

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

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

User initiated modification indication, UIMI (Note 12)

This element is relevant between the MT and the IWF.

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

Asymmetry preference indication (Note 12)

This element is relevant between the MT and the BSS.

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

NOTE 12: These GBS-related parameters are optional.

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

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

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

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

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

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

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

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

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

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 GSM BC-IE for the various occurrences during the call set-up phase, covering all bearer services and teleservices according to GSM 02.02 and GSM 02.03.

The basic principle adopted is a graphic scheme, or mask, wherein the ordinate designates the individual parameters of the GSM 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 GSM 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 GSM BC-IEs in all call set-up messages shall be in accordance with these graphs. Sections 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 GSM 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 GSM 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 GSM BC-Information Element") shall be omitted.
- There is a particular dependency of the parameters "User Information Layer 2 Protocol (UIL2P)" and "Connection Element (CE)":
    - If the MS sends a GSM BC-IE with a CE value other than "Transparent (T)", the parameter UIL2P is essential. Its field value must be set as indicated in the applicable graph.
    - If the MSC sends a GSM 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)".
- Certain parameters of the GSM 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 2) 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) - 12)
Synchronous/Asynchronous	requested value	as requested or selected value10)
Rate adaptation/Other rate adaptation	requested value	as requested or selected value11)
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 or out-band flow control requested by the MS
2) not for CE:T
3) when the SETUP message contains no BC-IE (single numbering scheme)
4) "NAV" shall not be interpreted as an out-band flow control request by the MS
5) The modification of User Rate must be in conjunction with Modem Type and Intermediate Rate
6) The modification of the Fixed Network User Rate shall be in conjunction with the Modem Type and/or Other Modem Type.
7) In case of a Mobile Terminated Call, if the SETUP message does not contain a BC-IE, the MS shall behave as if the DC is set to "data compression not possible ".
In case of a MOC or a MTC 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
10) For FTMand PIAFS, this parameter may be negosiatednegotiated. See Table B.4e for details.
11) For FTM, PIAFSandMultimedia, 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 2) Signalling access protocol
5a	Other ITC 2) 3) 7) Other rate adaption yx)
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 2) Negotiation Number of data bits User rate
6b	Intermediate rate 2) NIC on transmission NIC on reception Parity information
6c	Connection element 2) Modem type
6d	Fixed network user rate 4) Other modem type
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 V.120 rate adaption only
4) optional octes 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.
~~yx~~7) For ITC=RDI or UIL1P=V.120, PIAFS, and 'H.223 and H.245' only ~~for V.120, PIAFS and H.223&H.245 rate adaption~~

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

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

1) ISO6429 stands for "ISO 6429, codeset 0, DC1/DC3" and is applicable for 7 and 8 bit codes.
2) COPnoFlCt stands for a character oriented protocol with no flow control mechanism (no reserved characters for flow control).
3) "out-band" flow control requires V.42 in case of PSTN or V.110 in case of ISDN.
If the V.110 flow control mechanism is not supported, where required, the call pending shall be terminated.
If the V.42 functionality is not supported by the modem in the IWF or in the fixed network, the call will be supported with a fallback to the non-V.42 mode. In this case the IWF will release the call if due to temporary throughput problems on the radio interface or initiation of flow control by the MS and the inability to flow control the fixed network modem an overflow of the L2R buffers occurs.
Note that a phase 1 network may release the call, if the V.42 functionality is not provided by the IWF or the fixed network modem. As V.42 does not apply to V.21 and V.23 modems, outband flow control can not be supported for these modem types.

Table B.3b: Selection of GSM 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 overriden 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 2: 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 MOC or a MTC 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 3: If no other parameter needs negotiation, the CALL CONF/PROC message need not contain any BC-IE.

In case of a MOC or a MTC 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 4: 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 therefor overrides the NIRR parameter.

Table B.4c Negotiation of fixed network user rate

BC-parameter	Message SETUP	Message CALL PROC/CONFIRMED
FNUR	requested value	euqal 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
PIAFS	Synchronous 32)	Asynchronous

1) MSC is not directly connected to a restricted 64kbit/s network
2) MSC is directly connected to a restricted 64kbit/s network
32) 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.1.2.4.32[kbit/s] rate adaptation based on I.460 over UDI
4) In case of UDI

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

Mobile Terminated Call:

	BC-parameter Rate adaptionadaptation/Other rate adaptation	
Bearer type	Message SETUP	Message CALL CONF
PIAFS	V.110, I.460 and X.30 32)	PIAFS

1) MSC is not directly connected to a restricted 64kbit/s network
2) MSC is directly connected to a restricted 64kbit/s network
32) 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. 32[kbit/s] rate adaptation based on I.460 over UDI
4) In case of UDI
5) Not modem within PSTN but TA and modem within ISDN originates the call

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

Abbreviations for Parameters and Values:		default setting of field values (NA)	common setting of field values
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		
	- 1.2/0.075..1200/75 bit/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		default setting of field values (NA)	common setting of field values
DM....Duplex Mode:	-		
	- fd.. Full Duplex	X	X
MT....Modem Type:	- V.21		
	- V.22		
	- V.22 bis		
	- V.23		
	- V.26 ter		
	- V.32		
	- auto1.. autobauding type 1		
	- none	X	
RCR...Radio Channel Requirement:	- FR Full Rate support only Mobile Station		
	- dual HR Dual Rate support Mobile Station/ Half Rate preferred		
	- dual FR Dual Rate support Mobile Station/ Full Rate preferred		
CE....Connection Element:	- T.. Transparent		
	- NT.. Non Transparent		
	- bothT both transparent preferred		
	- bothNT both non Transparent preferred		
UIL2P.User Information Layer 2 Protocol:	- ISO6429..ISO6429,codeset 0,DC1/DC3		
	- X.25		
	- X.75..X.75 layer 2 modified (CAPI)		
	- COPnoFlCt..Character oriented protocol with no flow control mechanism		
SAP...Signalling Access Protocol:	- I.440.. I.440/450	X	
	- X.21		
	- X.28deIN.. X.28, dedicated PAD,individual NUI		
	- X.28deUN.. X.28, dedicated PAD,universal NUI		
	- X.28nond.. X.28, non dedicated PAD		
	- X.32		
RA....Rate Adaptation:	- V.110.. V.110/X.30		
	- X.31Flag.. X.31 flagstuffing		
	- NO.. no rate adaptation	X	
	- V.120		
	- PIAFS		
CS....Coding Standard:	- GSM	X	X
NIRR..Negotiation of Intermediate Rate Requested:	NM..No Meaning associated with this value	X	
	6kbit/s..6kbit/s radio interface rate requested		
DC....Data Compression	- DC.. compression possible/allowed		
	- NO.. compression not possible/allowed		

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

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

FNUR...Fixed Network User Rate         - FNUR not applicable

                                       - 9.6.. 9.6 kbit/s
                                       - 14.4.. 14.4 kbit/s
                                       - 19.2.. 19.2 kbit/s
                                       - 28.8.. 28.8 kbit/s
                                       - 32.0.. 32.0 kbit/s
                                       - 38.4.. 38.4 kbit/s
                                       - 48.0.. 48.0 kbit/s
                                       - 56.0.. 56.0 kbit/s
                                       - 64.0.. 64.0 kbit/s

WAIUR...Wanted Air Interface User Rate - WAIUR not applicable
                                       - 9.6.. 9.6 kbit/s
                                       - 14.4.. 14.4 kbit/s
                                       - 19.2.. 19.2 kbit/s
                                       - 28.8.. 28.8 kbit/s
                                       - 38.4.. 38.4 kbit/s
                                       - 43.2.. 43.2 kbit/s
                                       - 57.6.. 57.6 kbit/s
                                       - int 38.4.. interpreted by the network as
                                                    38.4 kbit/s

ACC.........Acceptable channel codings - 4.8.. TCH/F4.8 acceptable
                                       - 9.6.. TCH/F9.6 acceptable
                                       - 14.4..TCH/F14.4 acceptable
                                       - 28.8..TCH/F28.8 acceptable
                                       - 32.0..TCH/F32.0 acceptable
                                       - 43.2..TCH/F28.8 acceptable


MaxNumTCH...Maximum Number of Traffic Channels
                                          - 1.. 1 TCH
                                       - 2.. 2 TCH
                                       - 3.. 3 TCH
                                       - 4.. 4 TCH
                                       - 5.. 5 TCH
                                       - 6.. 6 TCH
                                       - 7.. 7 TCH
                                       - 8.. 8 TCH

OMT...Other modem type                 - no other MT..  no other modem type
                                       - V.34..    V.34

User initiated modification indication  - not req..   user initiated modification not
                                                      required
                                       - upto 1 TCH.. user initiated modification upto
                                                      1 TCH may be requested
                                       - upto 2 TCH.. user initiated modification upto
                                                      2 TCH may be requested
                                       - upto 3 TCH.. user initiated modification upto
                                                      3 TCH may be requested
                                       - upto 4 TCH.. user initiated modification upto
                                                      4 TCH may be requested

Asymmetry preference indication         - 00 no preference
                                        - 01 up link biased asymmetry preferred
                                        - 10 down link biased asymmetry preferred
```

Table B.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 BC(1)	BC(2)	Network selection 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 BC(1)	BC(2)	Network selection 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

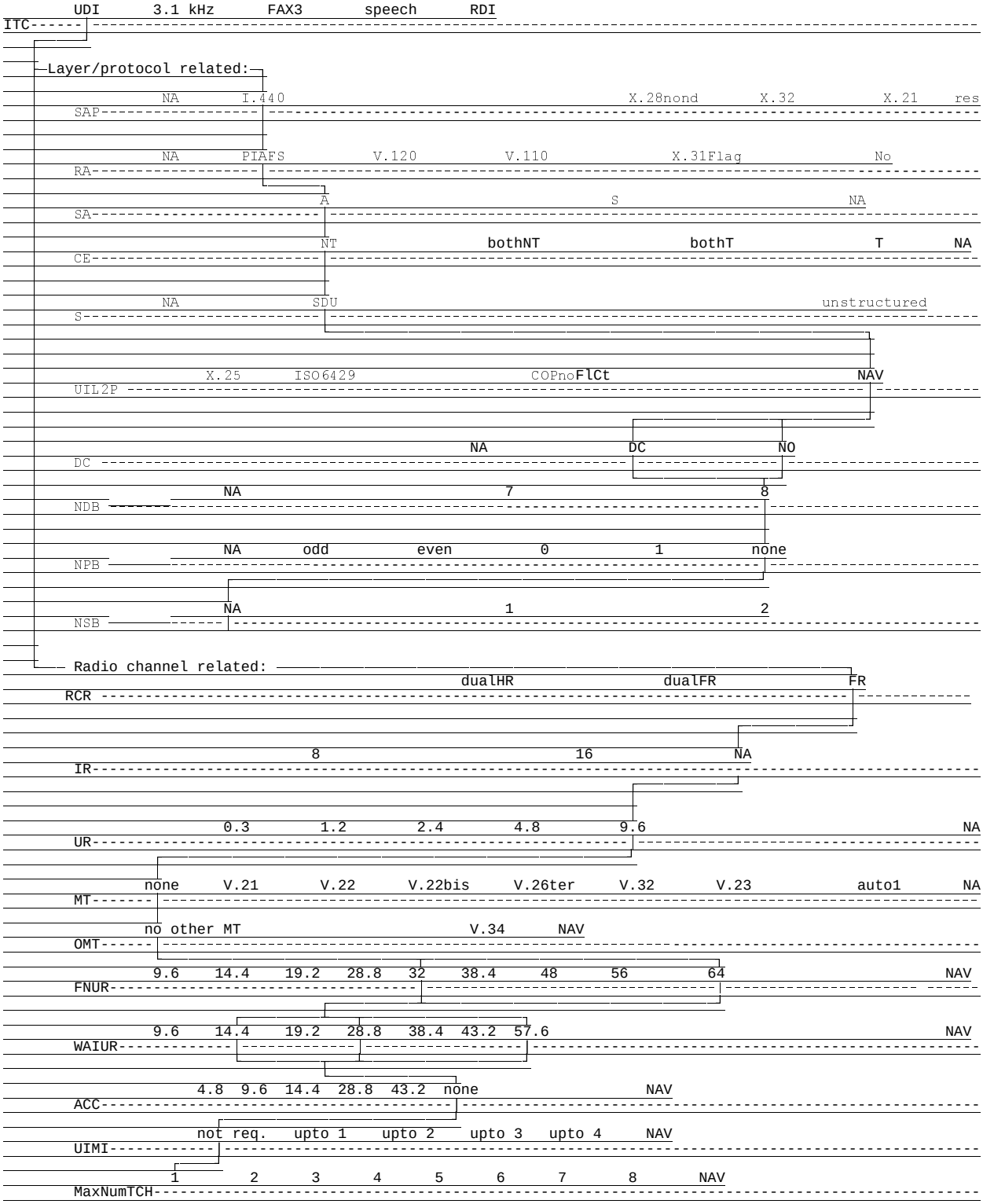
Mobile Terminating Call

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 (Note1)

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

NOTE 1: TS61 is also accepted if the VMSC supports TS61 and does not perform subscription checking on a CALL CONFIRMED message (see GSM 02.01 and GSM 09.07).

B.1.2.4 PIAFS


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

3GPP TSG-N3 meeting #7
Sophia Antipolis, France, 29th November – 3rd December 1999

Document N3-99507
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

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

29.007	CR	010	Current Version:	3.2.0

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

For submission to:	CN#6	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

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

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

Source: TSG_N3 **Date:** 30/11/99

Subject: Introduction of PIAFS and enhancement of processing at mobile terminated call

Work item: Support of PIAFS in UMTS

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

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

Release:

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

Reason for change: Introduction of PIAFS

Clauses affected: See attached pages

Other specs affected:

Other 3G core specifications	X	→ List of CRs:	22.002, 27.001, 27.007, 24.008
Other GSM core specifications		→ List of CRs:	
MS test specifications		→ List of CRs:	
BSS test specifications		→ List of CRs:	
O&M specifications		→ List of CRs:	

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

2 Normative 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.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1] CCITT Recommendation G.711: "Pulse code modulation (PCM) of voice frequencies".

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

[3] CCITT 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".

[4] CCITT Recommendation V.42bis: "Data Compression for Data Circuit Terminating Equipment (DCE) using Error Correction Procedures"

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

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

[7] ETS 300 121: "Integrated Services Digital Network (ISDN); Application of the ISDN User Part (ISUP) of CCITT Signalling System No.7 for international ISDN interconnections (ISUP version 1)".

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

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

[10] GSM 02.02: "Digital cellular telecommunications system (Phase 2+); Bearer Services (BS) supported by a GSM Public Land Mobile Network (PLMN)".

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

[12] GSM 02.04: "Digital cellular telecommunications system (Phase 2+); General on supplementary services".

[13] GSM 02.81: "Digital cellular telecommunication system (Phase 2+); Line identification supplementary services - Stage 1".

[14] GSM 02.82: "Digital cellular telecommunication system (Phase 2+); Call Forwarding (CF) supplementary services - Stage 1".

[15] GSM 02.83: "Digital cellular telecommunication system (Phase 2+); Call Waiting (CW) and Call Hold (HOLD) supplementary services - Stage 1".

[16] GSM 02.84: "Digital cellular telecommunication system (Phase 2+); MultiParty (MPTY) supplementary services - Stage 1".

[17] GSM 02.85: "Digital cellular telecommunication system (Phase 2+); Closed User Group (CUG) supplementary services - Stage 1".

[18] GSM 02.86: "Digital cellular telecommunication system (Phase 2+); Advice of charge (AoC) supplementary services - Stage 1".

[19] GSM 02.88: "Digital cellular telecommunication system (Phase 2+); Call Barring (CB) supplementary services - Stage 1".

[20] GSM 03.03: "Digital cellular telecommunications system (Phase 2+); Numbering, addressing and identification".

[21] GSM 03.08: "Digital cellular telecommunication system (Phase 2+); Organization of subscriber data".

[22] GSM 03.11: "Digital cellular telecommunications system (Phase 2+); Technical realization of supplementary services".

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

[24] GSM 03.46: "Digital cellular telecommunication system (Phase 2+); Technical realization of facsimile group 3 non-transparent".

[25] GSM 03.50: "Digital cellular telecommunications system (Phase 2+); Transmission planning aspects of the speech service in the GSM Public Land Mobile Network (PLMN) system".

[26] GSM 03.54: "Digital cellular telecommunications system (Phase 2+); Description for the use of a Shared Inter Working Function in a GSM PLMN; Stage 2".

[27] GSM 04.08: "Digital cellular telecommunications system (Phase 2+); Mobile radio interface layer 3 specification".

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

[29] GSM 04.22: "Digital cellular telecommunications system (Phase 2+); 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".

[30] GSM 07.01: "Digital cellular telecommunications system (Phase 2+); General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".

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

[32] GSM 07.03: "Digital cellular telecommunications system (Phase 2+); Terminal Adaptation Functions (TAF) for services using synchronous bearer capabilities".

[33] GSM 07.05: "Digital cellular telecommunication system (Phase 2+); Use of Data Terminal Equipment - Data Circuit terminating Equipment (DTE - DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)".

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

[35] GSM 08.60: "Digital cellular telecommunications system (Phase 2+); Inband control of remote transcoders and rate adaptors for Enhanced Full Rate (EFR) and full rate traffic channels".

[36] GSM 09.02: "Digital cellular telecommunications system (Phase 2+); Mobile Application Part (MAP) specification".

[37] GSM 09.03: "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)".

[38] GSM 09.05: "Digital cellular telecommunication system (Phase 2+); Interworking between the Public Land Mobile Network (PLMN) and the Packet Switched Public Data Network (PSPDN) for Packet Assembly/Disassembly facility (PAD) access".

[39] GSM 09.06: "Digital cellular telecommunications 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".

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

[41] 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".

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

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

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

NOTE: As regards ETS 300 102-1 [6], the first edition of this ETS from 1990 shall be used, with one exception: the encoding of the field modem type in the ISDN BC-IE shall be handled as specified in table 7A and 7B.

3 Definitions and abbreviations

Use is made of the following terms within this TS. These terms refer to information requirements necessary to support interworking functions, some of these terms will be identifiable with their use in other GSM specifications.

bearer capability information: Specific information defining the lower layer characteristics required within the network.

low layer compatibility information: Information defining the lower layer characteristics of the terminal.

high layer compatibility information: Information defining the higher layer characteristics of the terminal.

compatibility information: This term subsumes the entirety of Bearer Capability, Low Layer Compatibility, High Layer Compatibility, Progress Indicator and Address Information conveyed out-of-band prior to call establishment for the support of compatibility checking and terminal/function/service selection at the ISDN-type user-network interface.

protocol identifier: Information defining the specific protocols utilized for the support of data transfer by a terminal.

progress indicator: Information supplied to indicate to the terminal that network interworking has taken place.

out-of-band parameter exchange: Information exchanged via an associated or non-associated signalling link e.g. SS No 7.

PSTN: Subscriber to network interface supports only analogue terminals.

ISDN: Subscriber to network interface supports digital or analogue terminals, plus a standardized user to network associated signalling system and a standardized internetwork signalling system.

autobauding type 1: This information element value may be contained in the setup or call confirm messages from the MS in association with a non transparent data service. This implies that the MSC/IWF may select any speed and modem type according to what it can negotiate with the remote modem on the PSTN/ISDN. The parameters User Rate and FNUR (Fixed Network User Rate), if present, has no meaning when Modem Type is autobauding type 1.

multi self selecting speed modem: This term applies to V series modems capable of handling one or more lower speeds as a fall back position. When such a modem is requested in the call setup or call confirm message from the MS in

association with a non transparent service, the MSC/IWF may select any of the speeds supported according to the negotiation with the remote modem on the PSTN/ISDN. The parameters User Rate and FNUR (Fixed Network User Rate), if present, has no meaning when Modem Type is autobauding type 1.

unrestricted 64 kbit/s network: A digital network which has 64 kbit/s octet-structured Information Transfer Capability (ITC) with no restrictions on the contents of each octet.

restricted 64 kbit/s network: CCITT I.464 defines "'restricted 64 kbit/s transfer capability" as "64 kbit/s octet-structured capability with the exception that an all-zero octet is not permitted". In this specification, the term "restricted 64 kbit/s network" refers not only to networks with the I.464 restriction but also to those in which the 8th bit of each octet is unusable for data transmission.

directly connected restricted 64 kbit/s network: A restricted 64 kbit/s network which is connected directly to the MSC/IWF.

indirectly connected restricted 64 kbit/s network: A restricted 64 kbit/s network which is connected to the MSC/IWF via an unrestricted 64 kbit/s network.

EDGE channel: A general term referring to channels based on 8PSK modulation; i.e. TCH/F28.8, TCH/F32.0, and TCH/F43.2.

In addition to the following, abbreviations used in this TS are listed in GSM 01.04 [8].

ADPCM	Adaptive Differential Pulse Coded Modulation
DP	Dial Pulse
DSS1	Digital Subscriber Signalling 1
ITC	Information Transfer Capability
LE	Local Exchange
NT	Network Termination
PABX	Private Automatic Branch Exchange
PIAFS	PHS Internet Access Forum Standard
SPC	Stored Program Control
SS No.7	Signalling System No.7
TE	Terminal Equipment
TA	Terminal Adaptor
TUP	Telephone User Part (of Signalling System No.7)
UNI	User Network Interface

9.2.2.1 Multi-numbering Scheme

In this scheme, the HPLMN will allocate a number of MSISDNs to a subscriber and associate with each of these numbers a Bearer Capability to identify a Bearer or a Teleservice. This Bearer Capability comprises a complete GSM Bearer Capability (GSM BC) information element with contents according to GSM 07.01 and coded as per GSM 04.08. In either case, when the HLR receives an interrogation relating to an incoming call (i.e. the MAP "Send Routing Information" procedure), it requests a roaming number (MSRN) from the VLR. This request will contain the GSM BC(s) reflecting the service associated with the called MSISDN, i.e. the GSM BC(s) are passed to the VLR within the MAP parameter "GSM Bearer Capability" of the message "Provide Roaming Number".

At the VMSC, when the incoming call arrives, the GSM BC associated with the MSRN are retrieved from the VLR and sent to the MS at call set-up.

Where the PLMN specific parameters "connection element" and "radio channel" requirements contained in the retrieved GSM BC-IE, indicate dual capabilities then the VMSC shall set them according to its capabilities/preferences. Additionally the parameters correlated to those mentioned above may have to be modified in accordance with GSM 07.01.

The same applies to the parameter modem type if "autobauding type 1" is indicated but the IWF does not support this feature. The parameter “data compression” may also be modified according to the capabilities of the IWF.

Where single capabilities are indicated then the VMSC shall use the requested values if it is able to support the service requested. If it is unable to support the requested service then it shall set them according to its capabilities/preferences.

Where the Compatibility Information is provided in a degree exhaustive to deduce a GSM Basic Service (see application rules in subclause 10.2.2), then the VMSC in providing the GSM BC IE in the setup message shall set the PLMN specific parameters to its capabilities/preferences.

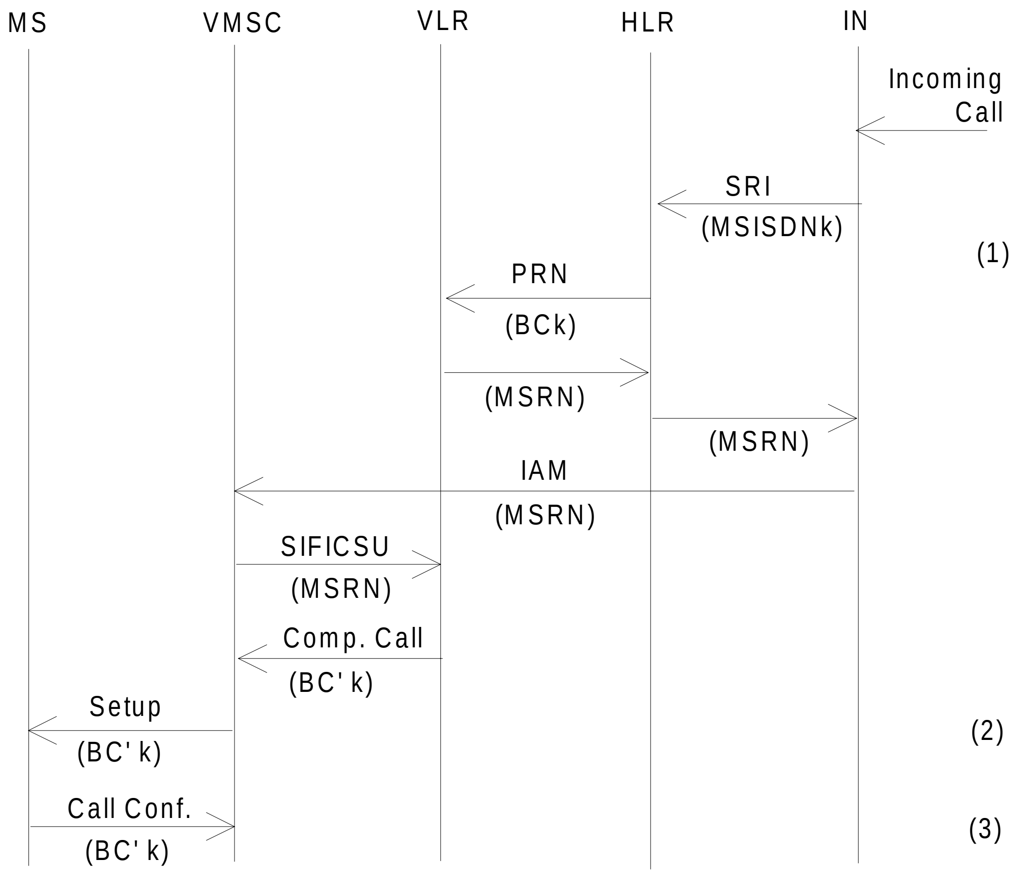
On receipt of a Set-up message containing the compatibility information, the MS will analyse the contents to decide whether the service can be supported (with or without modification, see GSM 07.01) and the call will be accepted or rejected as appropriate.

These negotiable parameters in the GSM BC-IE are: Connection Element (Transparent\non-transparent), Data Compression, number of data bits, number of stop bits and parity as well as the correlated parameters Structure, Intermediate Rate, Modem Type and User Information Layer 2 Protocol. For multislot, 14.4kbit/s or EDGE--operations additionally the parameters Fixed Network User Rate, Other Modem Type and User Initiated Modification Indicator can be negotiated. For FTM, PIAFS and Multimedia, Rate adaptation/Other rate adaptation can be negotiated. For FTM and PIAFS, Synchronous/asynchronous can be negotiated., see See GSM 07.01. This negotiation takes place by means of the MS reflecting back to the MSC a complete bearer capability information element in the call confirm message, with the relevant parameters changed. If this does not take place (i.e. if there is no GSM BC present in the call confirmed message), than the MSC will assume that the values originally transmitted to the MS are accepted.

In case the GSM-BC sent with the set-up message contained the “fixed network user rate”, “other modem type” and “user initiated modification parameter” parameters and no multislot, 14.4kbit/s, and/or EDGE--related parameters (refer to GSM 07.01) are received in the GSM-BC of the call confirmed message or no GSM-BC is received, the MSC shall discard the “fixed network user rate”, “other modem type” and “user initiated modification parameter” parameters - the MSC shall use the fall-back bearer service indicated by the remaining parameters of the GSM-BC on a singleslot configuration (refer to GSM 08.20 and GSM 04.21) on the MSC/IWF-BSS link.

On the other hand, if the GSM-BC received with the call confirmed message contain(s) multislot, 14.4kbit/s or EDGE--related parameters the MSC shall apply a singleslot configuration when the “maximum number of traffic channels” indicates ‘1 TCH’ and the “user initiated modification indicator” indicates either ‘user initiated modification not requested’ or ‘user initiated modification upto 1 TCH/F requested’, otherwise a multislot configuration (refer to GSM 08.20 and GSM 04.21) shall be used on the MSC/IWF-BSS link. 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.

In addition the MS may propose to the network to modify the User Rate as well as the correlated parameters Modem Type and Intermediate Rate in the CALL CONFIRMED message. The network may accept or release the call. For multislot, 14.4kbit/s or EDGE--operations, the MS may also propose to the network to modify the Fixed Network User Rate and Other Modem Type parameters (see GSM 07.01).



NOTES: (1) The HLR translates the received MSISDN_ called address (MSISDNk) into the relevant bearer capability information (BCk).
(2) Some parameters of BCk may be provided/modified according to the MSC's capabilities/preferences. See subclause 9.2.2.
(3) In the "Call Confirm" message, the MS may modify some parameters of the BC. See subclause 9.2.2.

Abbr.: SRI - Send Routing Information
PRN - Provide Roaming Number
MSRN - Mobile Station Roaming Number
IAM - Initial Address Message
SIFICSU - Send Information For Incoming Call Set Up

Figure 2: Call Flow for a mobile terminated, PSTN originated call where the compatibility information provided are not exhaustive for deducing a GSM Bearer Service; HLR uses multiple MSISDN numbers with corresponding BCs.

10.2.2.3 Functions in HLR

According to the contents of the Compatibility Information, i.e. the ISDN BC, LLC and HLC received, the HLR applies one of the following alternatives:

1) No ISDN BC is received, or one from which a GSM Basic Service cannot be deduced with the information Transfer Capability field set to "3,1 kHz audio" but without any associated modem type[1] in the ISDN BC and LLC, or without HLC indication of group 3 facsimile. Two cases have to be considered:

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1 "Modem type" in connection with the ITC value "3.1 kHz audio" means hereafter that either an ISDN BC modem type value is present or the autobauding modem function is indicated (see note 16 of table 7B)

a) The called MSISDN has one or two corresponding GSM BC-IE(s) stored in the HLR (see option a) of 9.2.2); then the service attached to this number in the HLR tables is applicable and the corresponding GSM BC-IE(s) is passed to the VLR in "provide roaming number". See figure 6.

If two GSM BC-IE have to be sent to the VLR they are preceded by a repeat indicator information element according to 04.08. These three information elements shall be included within the MAP parameter "GSM Bearer Capability" of the message "Provide Roaming Number".

NOTE: For the case of two GSM BC-IEs see subclause 10.3.

b) The called MSISDN has no corresponding GSM BC-IE(s) stored in the HLR (see option b in 9.2.2). In this case no GSM BC is passed to the VLR in the "provide roaming number" message.

2) Compatibility Information is received from which a GSM Basic Service can be deduced, i.e. the ITC field in the ISDN BC received is "unrestricted digital" and the fields for the applicable user layer 1 protocol and user rate (except for the 64kbit/s case, see Note 22 Table 7B) are available (either in the ISDN BC or LLC), or the ITC field is "3,1 kHz audio", and a modem type, user rate, etc. is indicated but the HLC does not indicate "facsimile group 3". The received ISDN BC (and possibly LLC plus HLC) is then considered applicable regardless of the kind of MSISDN received (GSM BC associated or not) and either the equivalent GSM BC or the original ISDN BC/LLC is sent to the VLR. Additionally in both cases the originally received HLC may also be sent to the VLR, see figure 7.

In exception to this the BC stored in the HLR is regarded valid if one of the following cases applies:

- If ITC = UDI/RDI and User Rate = 32 kbit/s /56 kbit/s and User information layer 1 protocol = V.110, I.460/X.30 and the stored BC indicates FTM, PIAFS or Multimedia.
- If ITC = 3.1 kHz audio and User Rate = 28.8 kbit/s and Modem Type = V.34 and the stored BC indicates Multimedia.

When the HLR interworks with a phase 1 VPLMN (VLR/VMSC), then the HLR shall convert the ISDN BC to the equivalent GSM BC, and forward to the VLR. In this case however no LLC can be forwarded.

3) Compatibility Information is received from which the GSM Teleservice category Facsimile transmission can be deduced i.e. the ITC field in the ISDN BC received is "3,1kHz audio" and the HLC indicates "facsimile group 3" (see figure 7), the following two cases have to be considered:

a) The called MSISDN has a corresponding GSM BC stored in the HLR (either stating TS 61 or TS 62). In this case the service attached to the MSISDN in the HLR tables is applicable and the corresponding GSM BC is passed to the VLR in the "provide roaming number" message, see also subclause 10.3.1.3.

b) The called MSISDN has no corresponding GSM BC stored in the HLR. In this case the HLR shall forward the appropriate GSM BC to the VLR in line with the subscribers subscription to teleservice 61 or 62.

For TS 61 the value of the GSM BC-IE parameter "Information Transfer Capability" shall be set to "alternate speech/facsimile group 3, starting with speech"

In both cases the HLC IE should be passed to the VLR in the "provide roaming number" message.

Alternatively the HLR may forward the originally received ISDN/LLC/HLC, when interworking with a phase 2 VLR.

4) In the case where Compatibility Information received does not allow for deducing a GSM Bearer Service but an ISDN BC is received with the ITC field indicating "unrestricted digital", but without the fields indicating applicable "user layer 1 protocol", user rate, etc., neither in the ISDN BC or the ISDN LLC then the following shall apply. The call is managed as for an udi call according to subclause 9.2.2, i.e. either the "multi numbering" or "single numbering" scenario is applied depending on which capability is provided by home PLMN/HLR.

10.2.2.4 Functions in VMSC

At the VMSC, when the incoming call arrives, the LLC/HLC and the GSM or ISDN BC associated with the MSRN is retrieved from the VLR. LLC and HLC are sent with the GSM BC in general to the MS at call set-up. In particular, however the following rules apply:

1) If the Initial Address Message (IAM) contains no ISDN BC and there is no GSM or ISDN BC/LLC/HLC retrieved from the VLR, the call is handled as subclause 9.2.2 case b.

2) If there is no ISDN BC in the IAM but a GSM or ISDN BC/LLC/HLC was signalled in the "provide roaming number" message, the retrieved GSM or ISDN BC/LLC/HLC applies.

3) If there is an ISDN BC in the IAM with the ITC field set to "3,1 kHz audio" but without any associated modem type or indication of facsimile group 3 in the HLC, the GSM or ISDN BC/LLC/HLC retrieved from the VLR is considered as applicable when it exists. If no GSM or ISDN BC is retrieved from the VLR, the call is handled as in subclause 9.2.2 case b.

4) If the ISDN BC received in the IAM has the ITC field set to the value "unrestricted digital information" and the fields for the applicable "user layer 1 protocol" and "user rate" (except for the 64kbit/s case, see Note 22 Table 7B) are available (either in the ISDN BC or ISDN LLC), or if 3,1 kHz audio and a modem type is indicated, this ISDN BC is applicable regardless of what has been retrieved from the VLR. In this case the ISDN BC has to be mapped to an appropriate GSM BC (refer to table 7B).

   In exception to this the BC stored in the VLR is retrieved and send to the MS if one of the following cases applies:

   - If ITC = UDI/RDI and User Rate = 32 kbit/s /56 kbit/s and User information layer 1 protocol = V.110, I.460/X.30 and the stored BC indicates FTM, PIAFS or Multimedia.
   - If ITC = 3.1 kHz audio and User Rate = 28.8 kbit/s and Modem Type = V.34 and the stored BC indicates Multimedia.

5) If the ISDN BC received in the IAM has the ITC field set to the value "3,1kHz audio" and a HLC "facsimile group 3" is indicated, the GSM BC retrieved from the VLR is applicable when it exists. If a GSM BC-IE with the parameter "information transfer capability" set to "alternate speech/facsimile group 3, starting with speech" (stating TS61) is retrieved from the VLR, this shall be mapped to two GSM BC-IE preceded by a repeat indicator, one representing speech, the other representing facsimile group 3.

   When no GSM BC is retrieved from the VLR, either two GSM BCs preceded by a repeat indicator (stating teleservice 61), or a single GSM BC-IE (stating TS 62), are sent in the setup message, depending whether TS 61 or TS 62 is subscribed (see also subclause 10.3.1.3).

   In case of TS 61, the order in which the two GSM BC-IEs are sent towards the MS, in the setup message, is a network option.

6) If the ISDN BC received in the IAM has a ITC value "unrestricted digital information" but without applicable "user layer 1 protocol" and "user rate", etc. fields, neither in the ISDN BC nor ISDN LLC, then the GSM or ISDN BC/LLC retrieved from the VLR is applicable, if available otherwise subclause 9.2.2 case b applies.

   In case of an ISDN BC/LLC/HLC was attached to the MSRN this has to be mapped to an appropriate GSM BC (refer to table 7B). However in both cases (GSM or ISDN BC attached) the PLMN specific parameters of the GSM BC-IEs may be added/modified in line with procedures identified in subclause 9.2.2.

In all cases when no GSM or ISDN BC is retrieved from the VLR and no ISDN Compatibility information allowing deduction of a GSM Bearer Service is available, then no GSM BC is inserted by the VMSC and subclause 9.2.2 case b applies.

The mapping between GSM and ISDN BCs is shown in table 7.

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/GSM BC-IE mapping shall be performed as specified in tables 7A and 7B. This must be done to allow setup of a compatible end-to-end connection between two MSs or one MS and an ISDN terminal.

It has been acknowledged that octets 5a, 5b, 5c and 5d or a combination of them may also be sent and received in 3,1 kHz audio calls. Follow-up versions of ETS 300 102-1 (i.e. ETS 300 403-1), confirm this interpretation. This is especially important for MOC-ISDN terminating calls, where early Customer Premise Equipment (e.g. PABXs), may reject these calls.

In the following table the comparison is drawn between parameters in the GSM 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 GSM 09.07 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.

Table 7A: Comparable setting of parameters in GSM 04.08 and ETS 300 102-1 (ETSI ISDN user to network signalling) Mobile Originated

Octet	GSM 04.08 parameter value as in GSM 07.01	Octet	ETS 300 102-1 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 #4	**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 see table 4 in GSM 09.07 no comparable value
5a #7..6	**Other ITC** restricted digital		(note 18)
4 #7	**Compression** (note 14) data compression allowed data compression not allowed		No comparable field
4 #6..5	**Structure** SDU integrity unstructured	4a #7..5	**Structure** (note 4)
4 #4	**Duplex mode** half duplex full duplex	5d #7	**Duplex mode** half duplex full duplex
4 #3	**Configuration** point to point	4a #4..3	**Configuration** (note 4) point to point
4 #1	**Establishment** demand	4a #2..1	**Establishment** (note 4) demand
4	**NIRR** (note 12) 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 GSM 04.08 and ETS 300 102-1 (ETSI ISDN user to network signalling) Mobile Originated

Octet	GSM 04.08 parameter value as in GSM 07.01	Octet	ETS 300 102-1 parameter value
5 #5..4	**Rate adaptation** no rate adaptation (note 2) V.110/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/X.30 CCITT standardized rate adaption X.31 flag stuffing Recommendation G.711 µ-law Recommendation G.711 A-law (note 3) Recommendation G.721 32 kbit/s ADPCM and I.460 No comparable value No comparable value
5a #5..4	**Other rate adaptation** V.120 (note 17) PIAFS (note xy)		
5 #3..1	**Signalling access protocol** I.440/I.450 X.21 X.28, ded.PAD, indiv.NUI (note 24) X.28, ded PAD, univ.NUI (note 24) X.28, non-ded PAD (note 24) X.32		No comparable field
6 #1	**Synchronous/asynchronous** synchronous asynchronous	5a #7	**Synchronous/asynchronous** synchronous asynchronous
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 GSM 04.08 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 GSM 04.08 and ETS 300 102-1 (ETSI ISDN user to network signalling) Mobile Originated

Octet	GSM 04.08 parameter value as in GSM 07.01	Octet	ETS 300 102-1 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** (note 9) no comparable value (note 5) V.21 V.22 V.22bis V.23 V.26ter V.32 No comparable value (note 5) No comparable value (note 5, note 10)
7 #5..1	**User info. layer 2 protocol** X.25 link level ISO 6429, codeset 0 COPnoFlCt videotex profile 1 (note 7) X.75 layer 2 modified (CAPI)	6	**User info.layer 2 prot.** (note 6) X.25 link level no comparable value no comparable value no comparable value X.25 link level
6d #5..1	**Fixed network user rate** (note 15) FNUR not applicable (note 7) 9,6 kbit/s 12 kbit/s (note 7) 14,4 kbit/s 19,2 kbit/s 28,8 kbit/s 32,0 kbit/s 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 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 GSM 04.08 and ETS 300 102-1 (ETSI ISDN user to network signalling) Mobile Originated

Octet	GSM 04.08 parameter value as in GSM 07.01	Octet	ETS 300 102-1 parameter value
6e #3..1	**Maximum number of traffic channels** 1 TCH 2 TCH 3 TCH 4 TCH 5 TCH 6 TCH 7 TCH (note 7) 8 TCH (note 7)		No comparable field
6f #4..1	**Wanted air interface user rate (note 23)** air interface user rate not applicable (note 7) 9,6 kbit/s 14,4 kbit/s 19,2 kbit/s 28,8 kbit/s 38,4 kbit/s 43,2 kbit/s 57,6 kbit/s interpreted by the network as 38.4 kbit/s (note 7)		No comparable field
6d #7..6	**Other modem type** (note 15) No other modem type V.34	5d #6..1	**Modem type** no comparable value V.34
6e #7..4	**Acceptable channel coding(s)** TCH/F4.8 acceptable (note 19) TCH/F9.6 acceptable TCH/F14.4 acceptable		No comparable field
6f #7..5	**User initiated modification indicator (note 23)** User initiated modification not required User initiated modification upto 1 TCH/F may be requested User initiated modification upto 2 TCH/F may be requested User initiated modification upto 3 TCH/F may be requested User initiated modification upto 4 TCH/F may be requested		No comparable field
6g #7..5	**Acceptable channel coding(s) (note 20)** TCH/F28.8 acceptable TCH/F32.0 acceptable (note 21) TCH/F43.2 acceptable (note 22)		No comparable field
6g #4..3	**Asymmetry preference indication (Note 23)** no preference up link biased asymmetry preference down link biased asymmetry preference		No comparable field

The application rules for coding the information elements ISDN-BC/LLC/HLC as set out in ETR 018 and ETS 300 102-1 shall apply.

Other field values in the ISDN BC-IE of ETS 300 102-1 not supported in GSM 04.08 are:

Information transfer rate: In this case default 64 kbit/s is selected.

Symmetry: In this case default bi-directional symmetric is selected for all user data rates (note 5).

Flow control on transmission: This shall be selected if outband flow control applies.

Flow control on reception: This shall be selected if outband flow control applies.

NOTE: Outband flow control is indicated by the absence of the UIL2P parameter for non-transparent connections.

User information layer 3 protocol:
Octet 7 shall not be sent unless specific application rules are given for particular cases (to be defined by GSM).
End-to-end significant User Information layer 3 protocol shall be sent by LLC.

NOTE 1: In the case where GSM BC "Information Transfer Capability" indicates "Facsimile group 3" and only a single GSM 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 GSM BC "Information Transfer Capability" indicates "Facsimile group 3" and two GSM BCs are contained in the call set-up request, then the same ISDN BC as mentioned above is created. If the first GSM 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 GSM 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 "CCITT Recommendation G.711 A-law or µ-law (PCS-1900)" of the ETS 300 102-1 parameter user layer 1 protocol (see note 3).

NOTE 3: The value "CCITT Recommendation G.711 A-law or µ-law (PCS-1900)" applies only when the ETS 300 102-1 parameter information transfer capability indicates "3,1 kHz audio" or "speech".

NOTE 4: Octets 4a and 4b shall not be included because default values apply.

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 (GSM 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: The mapping of the modem type shall be according to Draft ETS 300 102-1/prA1.

NOTE 10: The GSM 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 CCITT Rec I.460 or may be negotiated inband" (octet 5a of ISDN BC-IE). In case of data compression high speed modems, like V.32bis and/or V.34 may be used in the IWF.

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

NOTE 12: For the use of NIRR see GSM 07.01.

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 GSM 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 must 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 GSM-BC is overridden by the fixed network user rate of the GSM 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 GSM 07.01).

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 GSM-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 (not applicable to ISDNs conforming to ETS 300 102-1).
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 GSM-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: Only applicable for bit transparent 56 and 64 kbit/s services.

NOTE 22: Only applicable for non-transparent services.

NOTE 23: This parameter has to 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 xy: 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: Comparability and Mapping of bearer capability parameter values according to ETS 300 102-1 and GSM 04.08 within the HLR for a mobile terminated Call

Octet	ETS 300 102-1 parameter value	Octet	GSM 04.08 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** (note 1) half rate channel full rate channel both, half rate preferred both, full rate preferred
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	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
	(note 23)	5a #7..6	**Other ITC** restricted digital
4 #7..6	**Transfer mode** circuit mode packet mode	3 #4	**Transfer mode** circuit mode 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
4a #7..5	**Structure** default 8 kHz integrity SDU integrity unstructured	(4) 4 #6..5	**Structure** no comparable value no comparable value SDU integrity (note 9) unstructured (note 5)
4a #4..3	**Configuration** point-to-point	4 #3	**Configuration** point-to-point (*)
	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	**Establishment** demand	4 #1	**Establishment** demand (*)
4b #7..6	**Symmetry** bi-directional symmetric		no comparable field
4b #5..1	**Information transfer rate (dest->orig.)** 64 kbit/s		no comparable field

(continued)

Table 7B (continued): Comparability and Mapping of bearer capability parameter values according to ETS 300 102-1 and GSM 04.08 within the HLR for a mobile terminated Call

Octet	ETS 300 102-1 parameter value	Octet	GSM 04.08 parameter value
5 #5..1	**User information layer 1 protocol** no comparable value CCITT V.110 / X.30 CCITT G.711 A-law CCITT X.31 flag stuffing no comparable value	5 #5..4	**Rate adaption** no rate adaption (note 11) V.110/X.30 rate adaption no comparable value CCITT X.31 flag stuffing other rate adaption (see octet 5a)
	No comparable value	5a #5..4	**Other rate adaptation** V.120 (note 24) PIAFS
	no comparable field	5 #3..1	**Signalling access protocol** I.440/I.450 X.21 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
	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): Comparability and Mapping of bearer capability parameter values according to ETS 300 102-1 and GSM 04.08 within the HLR for a mobile terminated Call

Octet	ETS 300 102-1 parameter value	Octet	GSM 04.08 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 CCITT 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 28.8 kbit/s 32 kbit/s 38.4 kbit/s 48 kbit/s 56 kbit/s 64 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 0,115 kbit/s 0,2 kbit/s	6a #4..1	**User rate (note 18)** 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)~~not supported~~ (note 20) (note 20) (note 20) not supported
5b #7..6	**Intermediate rate** not used (note 19) 8 kbit/s 16 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): Comparability and Mapping of bearer capability parameter values according to ETS 300 102-1 and GSM 04.08 within the HLR for a mobile terminated Call

Octet	ETS 300 102-1 parameter value	Octet	GSM 04.08 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 (*)
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 V.35 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 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 yx) 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): Comparability and Mapping of bearer capability parameter values according to ETS 300 102-1 and GSM 04.08 within the HLR for a mobile terminated Call

Octet	ETS 300 102-1 parameter value	Octet	GSM 04.08 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 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

General notes:

1) Other ETS 300 102-1 parameter values than those listed in the table, if indicated in the BC-IE, will be rejected by clearing the call.

2) Only the GSM 04.08 parameter values listed in the table may be generated (comparable values) during a mobile-terminated call by mapping the ETS 300 102-1 parameter values, exception see (10).

3) According to ETS 300 102-1 and GSM 04.08, 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 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 GSM BC-IE must comply to encoding rules in GSM 04.08 and the combination of the different parameter values shall be in accordance to GSM 07.01.

NOTES regarding the mapping:

(*) This GSM 04.08 parameter value is inserted, if the comparable ETS 300 102-1 parameter value is missing.

1) This GSM 04.08 parameter value is inserted according to user rate requirements and network capabilities / preferences.

2) This GSM 04.08 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 GSM 04.08 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) If octet 4a is omitted the default condition according to ETS 300 102-1 applies.

5) The GSM 04.08 parameter value shall be set to "unstructured" where the network indicates connection element "transparent".

6) The value of the Intermediate Rate field of the GSM Bearer Capability information element shall only depend on the values of the user rate or the radio channel requirement 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, if the radio channel requirements are "full rate" or "dual, full rate preferred", or "dual, half rate preferred", and 8 kbit/s, if the radio channel requirements is "half rate".

7) This GSM 04.08 parameter value is inserted, if the GSM 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) 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 GSM BC parameters and values are subject to specific application rules, i.e. unless otherwise explicitly stated in an appropriate TS mapping to GSM BC parameters shall not take place.

11) This value shall be used when the value of the GSM 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 Draft ETS 300 102-1/prA1 and ETS 300 102-1 version 1 shall be accepted and mapped according to GSM 04.08.

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

14) NIC is only supported 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 GSM 07.01), 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 GSM PLMNs, 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 GSM BC-IE shall be set according to a network preferred value, whereas the preferred value of the Radio Channel Requirement shall be considered. If parameter ISDN-BC modem type is present, its value shall be ignored. The parameter GSM-BC modem 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 and/or V.34 may be used in the IWF.

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

17) For the use of NIRR see GSM 07.01. 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 GSM 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 GSM-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 GSM-BC parameters, indicating a 64 kbit/s bit transparent service, 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 GSM-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 (not applicable to ISDNs conforming to ETS 300 102-1).
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 GSM BC parameter Information Transfer Capability is set to „Other ITC“ and Other ITC parameter is set to „restricted digital“. If ISDN LLC exists, All all the corresponding fields in the GSM 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 GSM 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.

yx) Following UMTS-BC parameters in SETUP message shall be set to:

Fixed network user rate	32 kbit/s
Connection element	transparent
	BothNT or bothT (If IWF supports PIAFS)

10.2.4.2 Structure of the MSC/IWF

GSM 03.10 identifies the protocol layer structure for the non-transparent case, the MSC/IWF provides the inverse of the action in the MS terminal adaptation function. For a multislot configuration refer to GSM 03.10.

The V.110 and, V.120 and PIAFS ISDN TA (terminal adapter) functions provide the same functionality and operational behaviour as fixed ISDN terminal adapters that conform to the corresponding ITU-T Recommendations (V.110 or V.120).

Figure 9: Structure of the MSC/IWF (non-transparent)

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. for synchronous services flow control is covered by the protocol indicated whereas for asynchronous services a specific rule applies for flow control (see GSM 07.01).

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 must:

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.

10.2.4.8 Signalling mapping of modem or ISDN (V.110 or, V.120 or PIAFS) TA-function status information

Status information is carried between the modem or ISDN (V.110 or, V.120 or PIAFS) TA-function in the IWF and the terminal adaption function in the MS by the L2R function. The L2RCOP entity transfers interface status information between L2Rs via the status octets SA, SB and X in L2RCOP-PDUs (07.02). Table 9 shows the mapping scheme between the V.24 circuit numbers corresponding to the V-series DCE functions 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 B. A binary 0 corresponds to the ON condition, a binary 1 to the OFF condition.

NOTE. Although the interface to the ISDN TA function is described in terms of V.24 interchange circuit functions, this does not imply that such circuits need to be physically realised.

Table 9: Mapping scheme at the IWF for the non-transparent mode

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

NOTE 1. The SB bit towards the IWF, according to the General Mapping (annex B), could be used to carry CT 105 from the mobile DTE to the ISDN TA function in the IWF. However, CT 105 should always be ON at the mobile DTE interface 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. Therefore, CT 105 shall always be set to ON at the ISDN TA function during the data transfer state.

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

NOTE 3. The condition of CT 133 (or other flow control mechanism) may also be affected by the state of the L2R transmit buffer (towards the MS) in the IWF and the state of RLP (RR/RNR).

NOTE 4. The condition of status bit X towards the MS may also be affected by the state of the L2R receive buffer in the IWF (from the MS).

NOTE 5. CT 107 is not used by the IWF.

NOTE 6. CT 108 is used in the call setup and answering processes.

NOTE 7. For inband flow control, CT 106 is not mapped and the status bit X towards the MS is controlled by the reception of XON and XOFF characters from the ISDN TA function.

NOTE 8. For inband flow control, changes in the condition of the status bit X from the MS result in the sending of XON or XOFF to the ISDN TA function. CT 133 is always set to ON.

10.2.4.10.4.2 Transit side (towards the fixed network)

Depending upon implementation, the synchronization of the V.110 or V.120 rate adaptation protocol on the ISDN transit network may be performed either after RLP establishment or in parallel to the RLP establishment. In case of the parallel establishment, data received from the transit side during RLP establishment shall be stored within the L2R buffers until the RLP establishment at the terminating side has been finished. When the RLP has been established and on recognizing frame alignment the information from/to the RLP is mapped by the L2R entity applicable to this particular bearer capability.

For V.110 rate adaptation on the ISDN, the synchronization process consists of sending the V.110 frame structure and looking for incoming frame synchronization according to the procedures in ITU-T V.110.

For V.120 rate adaptation the following applies. In Multiple frame acknowledged mode, data (I frames) may be sent following an exchange of SABME and UA in the traffic channel. In Unacknowledged mode, data (UI frames) may be sent immediately after an ISUP CONNECT or CONNECT COMPLETE message has been received on the ISDN signalling channel. Optionally, an XID exchange may take place in the traffic channel to verify link integrity.

Note. V.120 allows UI frames to be sent in Multiple frame acknowledged mode at any time in addition to I frames. Whilst the IWF shall not follow this procedure when sending frames, such a sequence of I and UI frames may be received by the IWF. Although not specified in V.120, it is recommended that the IWF should deliver to the MS, the contents of the sequence of I and UI frames in the order in which they are received.

For PIAFS rate adaptation the following applies. Data frame is sent following an exchange of initial negotiation and control frame in the traffic channel.

10.2.4.zy Additional aspects of PIAFS Interworking

PIAFS has several U-Plane protocol suites, but "Data Transmission Protocol (fixed rate)"[xx] is only applied for UMTS R'99 in consideration of simplicity. Details of frame structure and retransmission procedure etc. conform to reference [xx].

In case of 32[kbps] mode, IWF performs rate adaptation based on I.460 for fixed network.

In case of 64[kbps] mode, restriction on throughput may be caused by co-ordination with GSM (maximum frame length of RLP is 572[bits] in UMTS).

11 Frame Synchronization

Potentially two links are involved in the MSC/IWF regarding the need for frame synchronization, i.e the MSC/IWF-BSS interface and the MSC/IWF-PSTN/ISDN interface. The MSC/IWF-BSS links are covered by the TSs dealing with the GSM transcoder function (i.e. GSM TS 08.20 and 08.60). For the MSC/IWF-PSTN/ISDN interface, the appropriate sections of ITU-T V-series modem, V.110 and, V.120 and PIAFS Recommendations apply.

11.2.1 Loss on the transit side (towards the fixed network)

If loss of frame synchronization is detected from the fixed network in line with the procedures specified in the ITU-T or PIAFS recommendation applicable to the type of interworking (V.110, V.120, PIAFS or V-series modem), then re-synchronization is initiated in line with the procedures specified in that recommendation. No change of behaviour of the MSC/IWF on the BSS/MSC link is necessary.

11.2.2 Loss on the terminating side (towards the MS)

If the MSC/IWF detects a loss of frame synchronisation on one or more substreams on the BSS/MSC link, the MSC/IWF initiates a re-synchronisation on the substreams in question as specified in the following.

The MSC/IWF shall detect a loss of V.110 frame synchronisation in line with the rules specified in ITU-T V.110. The MSC/IWF shall detect a loss of A-TRAU frame synchronisation when an A-TRAU frame has been received with at least one error in the synchronisation pattern (ref GSM TS 08.20).

If loss of synchronization is detected on the BSS/MSC link then a re-synchronization process should be initiated. However for this link to the BSS it is only necessary to search for the frame alignment pattern incoming from the BSS. In the case of A-TRAU the synchronisation shall take care of the multiframe alignment according to subclause 9.2.3.4.1.2 and the MSC/IWF shall set the control bit UFE (Uplink Frame Error, see GSM TS 08.20) in the next downlink A-TRAU frame to indicate the framing error to the BSS.

There shall be no action regarding the outgoing frame towards the BSS, other than to continue sending the rate adapted frames made up of the incoming data from the fixed network. During the re-synchronization process data shall continue to be sent towards the fixed network via the modem or ISDN (V.110 or V.120 or PIAFS) TA-function as if the frame synchronization were still available. The mapping of the status bits is unchanged during re-synchronization.

Once synchronization has been re-attained the RLP will recover any possible loss of data on the BSS/MSC link in the case of non-transparent services. The indication of UFE will be stopped in the case of A-TRAU.

12 Call Clearing

When a call is to be cleared, the MSC/IWF has to handle both the MSC/IWF-BSS interface and the MSC/IWF-ISDN/PSTN interface.

At the MSC/IWF-BSS interface out-band (04.08) signalling shall be used. Changes in the in-band status bits shall not be used to signal call clearing.

At the MSC/IWF-PSTN/ISDN interface, the clearing procedures appropriate to the fixed network shall be used, together with any additional procedures described in the ITU-T recommendation applicable to the type of interworking (V.110, V.120, PIAFS or V-series modem).

Annex A (Informative): SDLs

The following SDLs are intended to assist in the interpretation of the text in subclause 10.2.2 and are not intended to indicate implementation requirements. Therefore these SDLs are informative only.

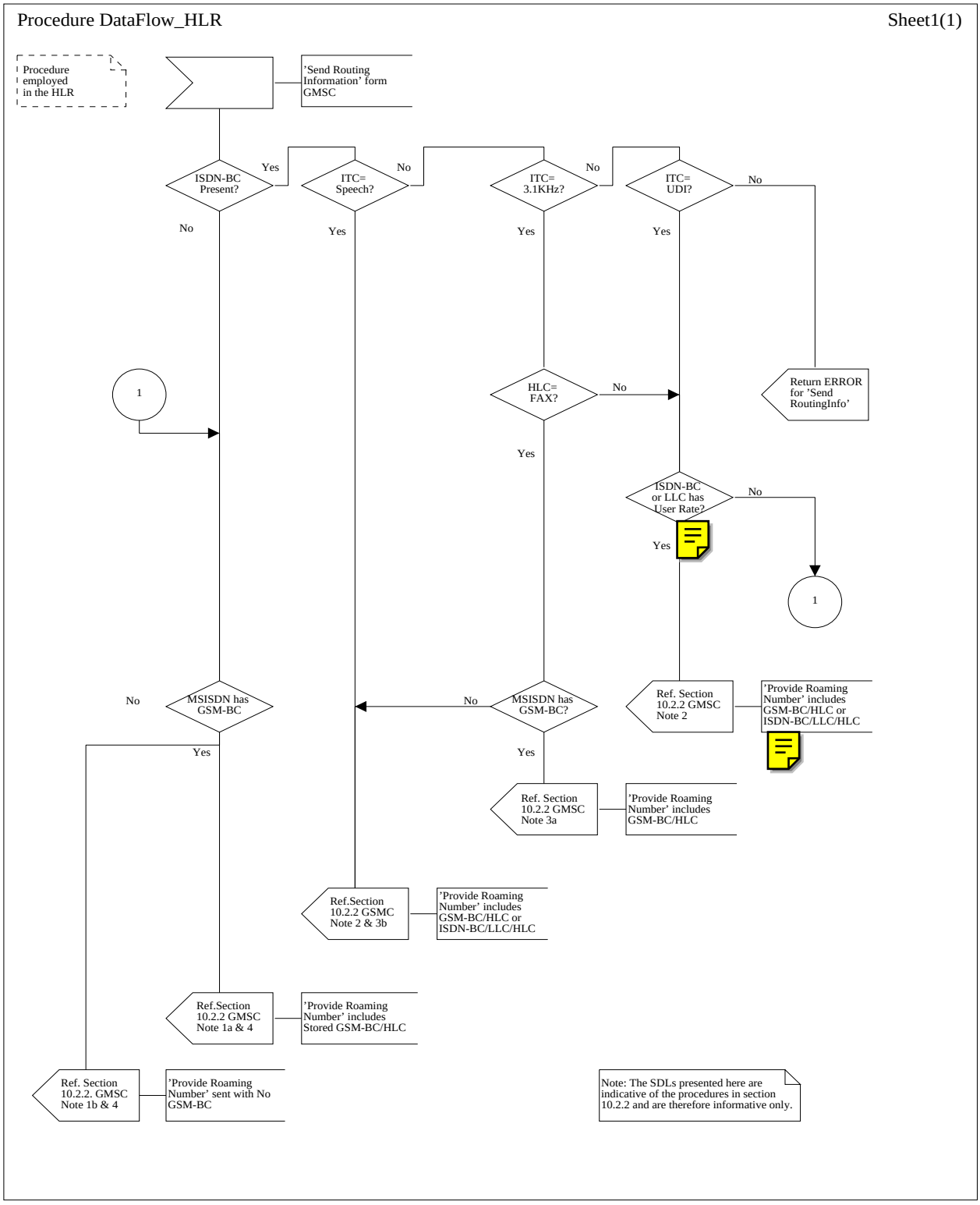

Figure A-1 (Sheet 1 of 1): Procedures in the HLR

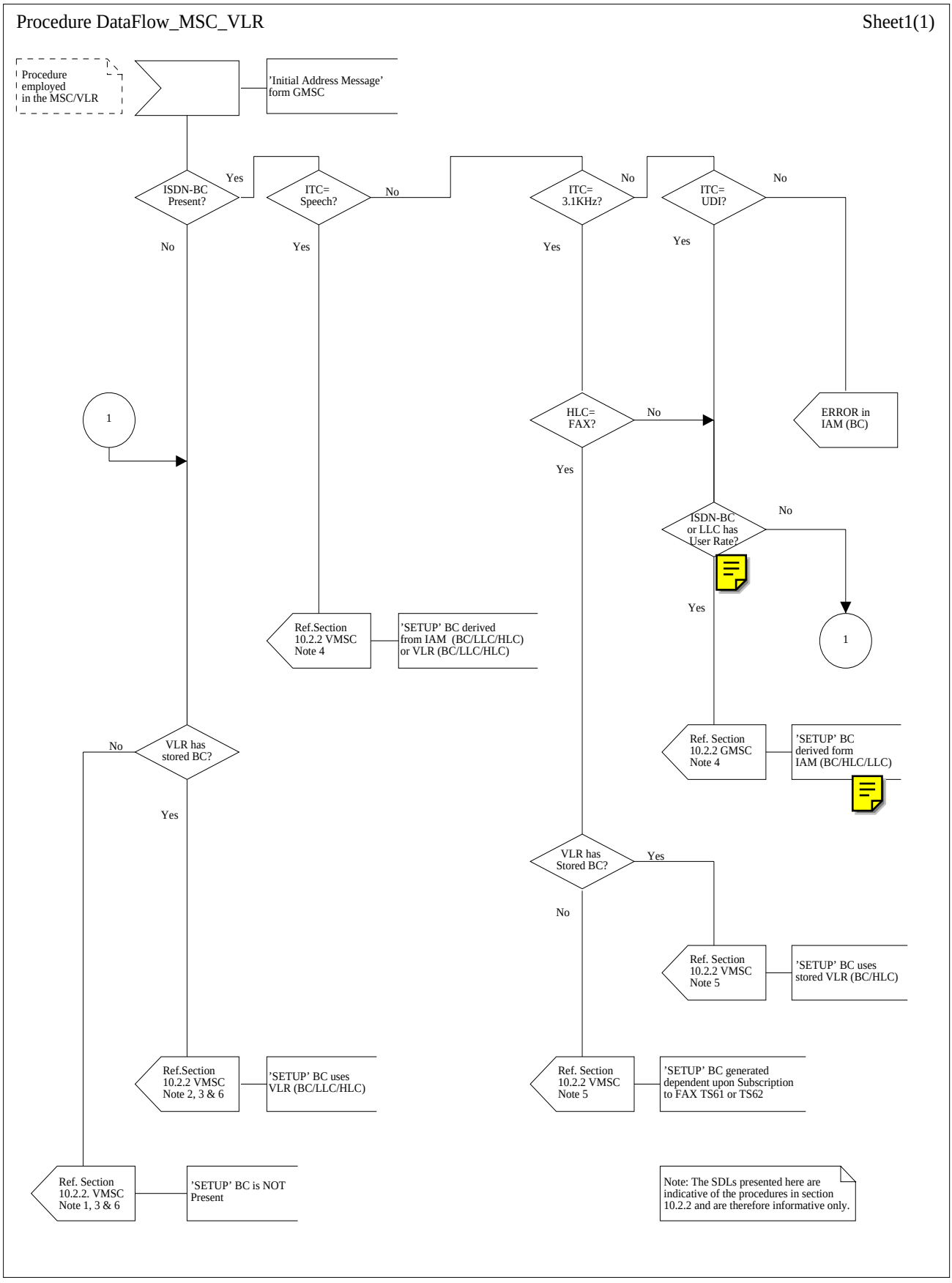

Figure A-2 (Sheet 1 of 1): Procedures in the MSC/VLR