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ETSI SMG3 Plenary Meeting #6,
Nice, France
13th – 15th December 1999

NP-99430

Agenda item: 5.3.3
Source: TSG_N WG3
Title: CRs to 3G Work Item FTM

Introduction:

This document contains “2” CRs **on Work Item FTM** 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 |
|-------------|-------------|-----------|------------|------------|-------------|----------------|----------------|---------------------|
| N3-99497 | 27.001 | 004 | | B | R99 | 3.2.0 | 3.3.0 | Introduction of FTM |
| N3-99429 | 29.007 | 008 | | B | R99 | 3.2.0 | 3.3.0 | Introduction of FTM |

3GPP-N3/SMG3 WPD Meeting #7
Sophia Antipolis, France, 29 Nov-03 Dec 1999

Document N3-99497

*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 004

Current Version: **3.2.0**

GSM (AA.BB) or 3G (AA.BBB) specification number ↑

↑ CR number as allocated by MCC support team

For submission to: **TSG N#6**
list expected approval meeting # here ↑

for approval
for information

strategic
non-strategic *(for SMG use only)*

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

Source: **TSG_N3** **Date:** **21-11-1999**

Subject: **Introduction of FTM**

Work item: **Frame Tunnelling Mode (FTM)**

| | | | | | |
|--|---|-------------------------------------|-----------------|------------|-------------------------------------|
| Category: | F Correction | <input type="checkbox"/> | Release: | Phase 2 | <input type="checkbox"/> |
| <i>(only one category shall be marked with an X)</i> | A Corresponds to a correction in an earlier release | <input type="checkbox"/> | | Release 96 | <input type="checkbox"/> |
| | B Addition of feature | <input checked="" type="checkbox"/> | | Release 97 | <input type="checkbox"/> |
| | C Functional modification of feature | <input type="checkbox"/> | | Release 98 | <input type="checkbox"/> |
| | D Editorial modification | <input type="checkbox"/> | | Release 99 | <input checked="" type="checkbox"/> |
| | | | | Release 00 | <input type="checkbox"/> |

Reason for change: **Necessary updates for WI FTM. This CR introduces FTM for both mobile originated and mobile terminated calls**

Clauses affected: **See attached pages**

| | | | |
|------------------------------|-------------------------------|-------------------------------------|----------------------------------|
| Other specs affected: | Other 3G core specifications | <input checked="" type="checkbox"/> | → List of CRs: to 22.002, 29.007 |
| | Other GSM core specifications | <input type="checkbox"/> | → List of CRs: |
| | MS test specifications | <input type="checkbox"/> | → List of CRs: |
| | BSS test specifications | <input type="checkbox"/> | → List of CRs: |
| | O&M specifications | <input type="checkbox"/> | → List of CRs: |

Other comments:

***** Next modified section *****

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".
- [44] [ISO/IEC 3309: "Telecommunications and information exchange between systems - High-level data link control \(HDLC\) procedures - Frame structure"](#)
- [45] [IETF RFC 1662: "PPP in HDLC-like framing"](#)

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. |
| FTM | Frame Tunnelling Mode |

*** Next modified section ***

6.1.1 [Layer 2 Relay in Frame Tunneling Mode](#)

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

*** Next modified section ***

6.3.2 Back Pressure

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

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

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

*** Next modified section ***

8.3.3 Indication of Compatibility Requirements to the PLMN

8.3.3.1 Indication in case of Mobile terminating calls

In support of:

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

Mobile specific requirements to be dealt with in the Bearer Capability information element the call confirmed message has been introduced in the call control protocol (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);
 - Sync/Async (note 8)
 - Rate adaptation/other rate adaptation (note 9)
 - User information layer 2 protocol (note 1);
 - Intermediate rate (note 2), (note 3);
 - Modem Type (note 1), (note 3);
 - User Rate (note 3);
 - Compression ,
 - Fixed network user rate, (note 3) (note 4)
 - Other modem type, (note 3) (note 4)
 - User initiated modification indication(note 4)

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

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

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

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

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

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

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

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

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

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

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

b) requirements with effects at the partner terminal:

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

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

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).

***** Next modified section *****

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-Unless FTM is applied, there~~ is a particular dependency of the parameters "User Information Layer 2 Protocol (UIL2P)" and "Connection Element (CE)":
 - If the MS sends a 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)".
- ~~In case FTM is applied, the GSM BC-IE shows a CE value "non-transparent", SA value "asynchronous", and RA value X.31 flag stuffing. The UIL2P is not available.~~
- Certain parameters of the 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:

| BC-parameter | Message | |
|--------------|--|------------------------------------|
| | 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 ²⁹⁾ 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:

| BC-parameter | Message | |
|------------------------|--|---|
| | 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) |
| <u>Sync/Async</u> | <u>requested value</u> | <u>as requested or selected value</u> ¹⁰⁾ |
| <u>Rate adaptation</u> | <u>requested value</u> | <u>as requested or selected value</u> ¹¹⁾ |
| UIL2P | offered value ²⁾ or NAV ⁴⁾ | selected or NAV ¹⁾ |
| User Rate | offered value | selected value ⁵⁾ |
| DC | requested value ²⁾ | as requested or “NO” ⁷⁾ |
| FNUR | offered value | selected value ⁶⁾ |
| Other MT | offered value | selected value ⁶⁾ |
| UIMI | offered value | selected value ⁸⁾ |

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

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

| OCTET | INFORMATION ELEMENT FIELD |
|-------|---|
| 3 | Radio channel requirements Coding standard Transfer mode Information Transfer Capability |
| 4 | Structure ²⁾ Duplex mode Configuration Establishment Negotiation of Intermediate Rate Requested Compression |
| 5 | Rate adaption ²⁾ Signalling access protocol |

| | | |
|----|--|---------------------|
| 5a | Other ITC Other rate adaption | 2) 3) 7) |
| 5b | Rate adaption header / no header Multiple frame establishment support in data link Mode of operation Logical link identifier negotiation Assignor / assignee In-band / out-band negotiation | 2) 3) |
| 6 | User information layer 1 protocol Synchronous / asynchronous | 2) |
| 6a | Number of stop bits Negotiation Number of data bits User rate | 2) |
| 6b | Intermediate rate NIC on transmission NIC on reception Parity information | 2) |
| 6c | Connection element Modem type | 2) |
| 6d | Fixed network user rate Other modem type | 4) |
| 6e | Maximum number of traffic channels Acceptable channel codings | 4) |
| 6f | Wanted air interface user rate User initiated modification indication | 4) |
| 6g | Acceptable Channel codings Asymmetry preference indication | 5) 6) |
| 7 | User information layer 2 protocol | 1) 2) |

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

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

| information element | flow control method | | |
|-----------------------------------|------------------------|------------------------|------------------------|
| | in-band | out-band ³⁾ | none |
| number of data bits | 7 or 8 | 7 or 8 | 7 or 8 |
| user information layer 2 protocol | ISO 6429 ¹⁾ | NAV | COPnoFIC ²⁾ |

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

- 2) COPnoFICt 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 overridden by the OMT value.

Table B.4b: Intermediate Rate negotiation procedure

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

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

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

NOTE 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 | equal or lower than the requested value |

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

Table B.4d Negotiation of user initiated modification indication

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

Table B.4e: Negotiation of Synchronous/Asynchronous

Mobile Terminated Call:

| BC-parameter Synchronous/Asynchronous | | |
|---------------------------------------|---------------|-------------------|
| Bearer type | Message SETUP | Message CALL CONF |
| FTM ¹⁾ | Synchronous | Asynchronous |

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

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

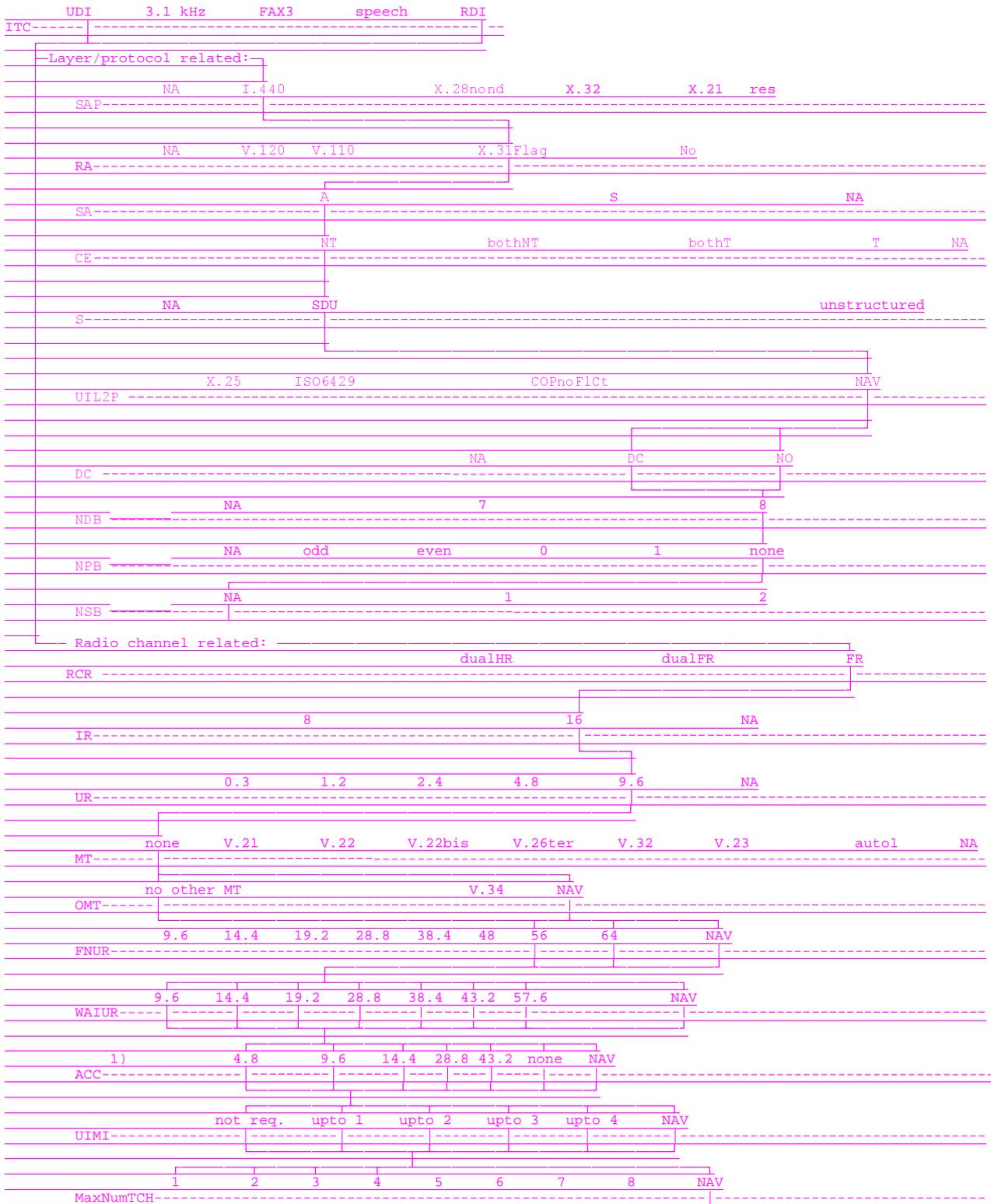
Mobile Terminated Call:

| BC-parameter Rate adaption/Other rate adaptation | | |
|--|-----------------------|--------------------|
| Bearer type | Message SETUP | Message CALL CONF |
| FTM ¹⁾ | V.110, I.460 and X.30 | X.31 flag stuffing |

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

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B.1.2.3 Frame Tunnelling Mode



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

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

*** Next modified section ***

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"
- [45] [ISO/IEC 3309: "Telecommunications and information exchange between systems - High-level data link control \(HDLC\) procedures - Frame structure"](#)
- [46] [IETF RFC 1662: "PPP in HDLC-like framing"](#)

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 |
| <u>FTM</u> | <u>Frame Tunnelling Mode</u> |
| ITC | Information Transfer Capability |
| LE | Local Exchange |
| NT | Network Termination |
| PABX | Private Automatic Branch Exchange |
| <u>PPP</u> | <u>Point to Point Protocol</u> |
| 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 |

*** Next modified section ***

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.

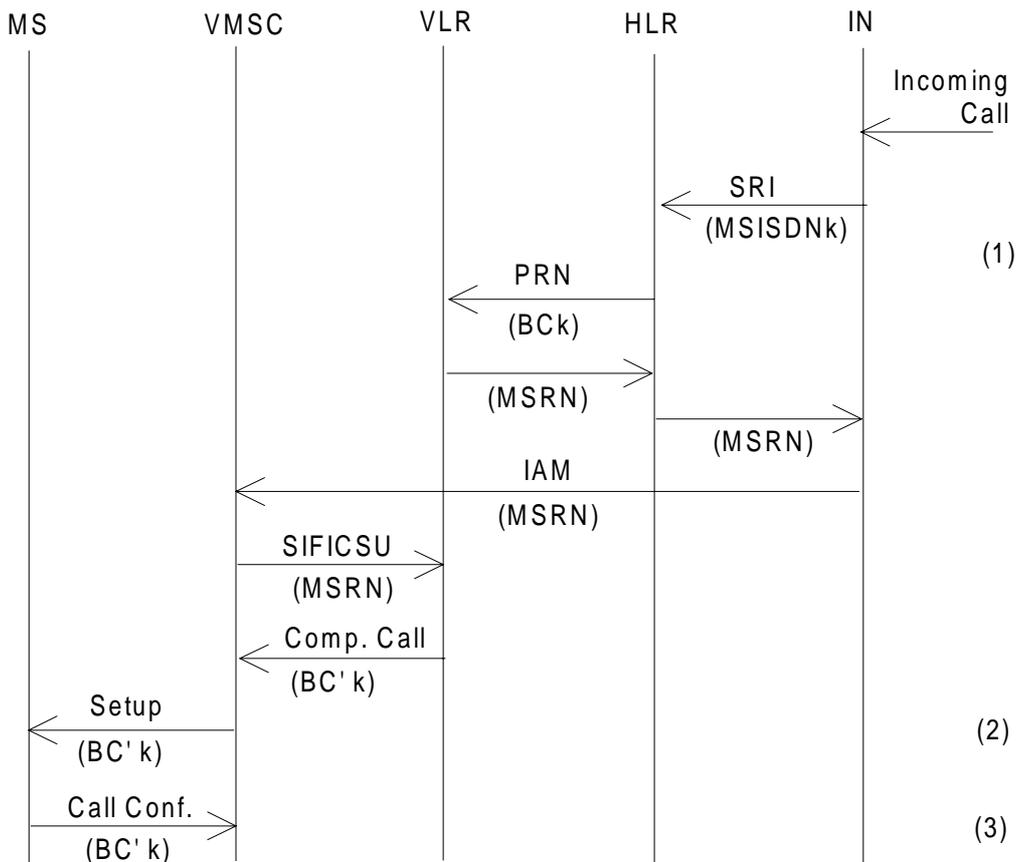
On receipt of a Set-up message containing the compatibility information, the MS will analyse the contents to decide whether the service can be supported (with or without modification, see GSM 07.01) and the call will be accepted or rejected as appropriate.

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 adaption/Other rate adaption can be negotiated. For FTM and PIAFS, Synchronous/asynchronous can be negotiated. 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), then 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.

*** Next modified section ***

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) | | No comparable field |
| 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 (note 25) |
| 6 #5..2 | User info. layer 1 protocol default layer 1 protocol | 5 #5..1 | User info. layer 1 protocol see section under rate adaptation for 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 COPnoFICt videotex profile 1 (note 7) X.75 layer 2 modified (CAPI) | 6 | User info. layer 2 prot. (note 6) X.25 link level no comparable value no comparable value no comparable value X.25 link level |
| 6d #5..1 | Fixed network user rate (note 15) FNUR not applicable (note 7) 9,6 kbit/s 12 kbit/s (note 7) 14,4 kbit/s 19,2 kbit/s 28,8 kbit/s 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 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 25: The case of FTM is identified by Rate adaptation in the GSM BC-IE set to "CCITT X.31 flag stuffing", Connection element set to "non-transparent", and Synchronous/asynchronous set to "asynchronous". The parameter values shall be set according to Note 16 in case FNUR is 64 kbit/s and according to Note 18 if Other ITC is RDI.

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 (note 23) | 3 #3..1 | Information transfer capability speech unrestricted digital 3,1 kHz audio ex PLMN (note2) facsimile group 3 (note 3) other ITC (see octet 5a) not supported not supported |
| | | 5a #7..6 | Other ITC restricted digital |
| 4 #7..6 | Transfer mode circuit mode packet mode | 3 #4 | Transfer mode circuit mode 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) |
| | 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) not supported (note 20) not supported (note 20) not supported (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 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 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 |

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“. All the corresponding fields in the GSM BC shall be derived from the ISDN LLC.

- 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.

*** Next modified section ***

10.2.4.15 Interworking in Frame Tunneling Mode

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

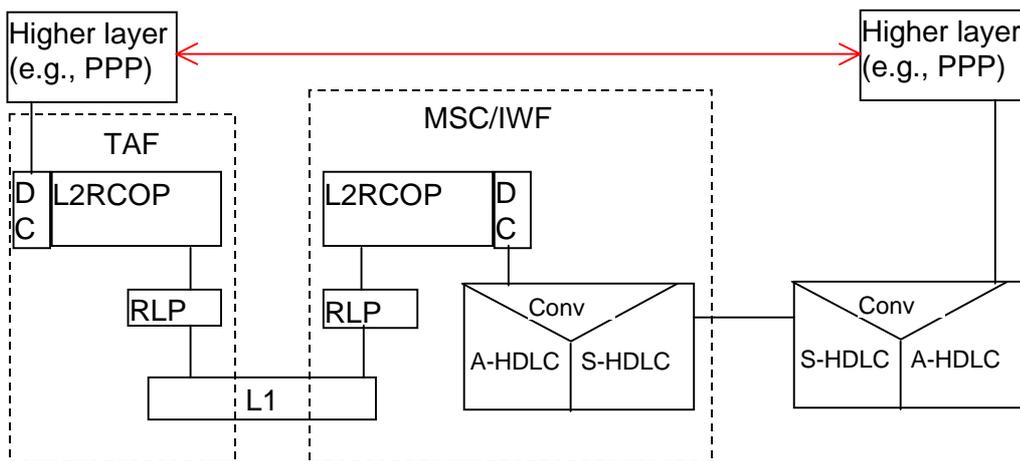


Figure xx The FTM protocol stack

Data compression between the TAF and the IWF is optionally applied. The asynchronous to synchronous HDLC conversion follows from ISO 3309[45].

A particular aspect of the asynchronous HDLC protocol is the provision of control character transparency. This means that flags (0x7E) and the control escape character (0x7D) are escaped, by insertion of the control escape character in front of the character to be escaped, and that the 6th bit of the escaped character is complemented (i.e., the escaped character is XOR'ed with 0x20). ISO 3309 allows additional control characters to be escaped by prior agreement or negotiation between the peer entities. For instance, in PPP [46], a negotiation procedure is defined using an Asynchronous Control Character Map (ACCM). By examining the contents of the HDLC frames that pass through it, the IWF shall identify whether the higher layer protocol is PPP, in which case, it shall detect and interpret the ACCM negotiation result. If PPP is used, the conversion function in the IWF shall apply a default ACCM until another is negotiated.