3GPP TSG-CN Plenary Meeting #22 **NP- 030539**
Maui, Hawaii USA. 10th - 12st December 2003. **[N3-030837]**

CR-Form-v7

CHANGE REQUEST

⌘ **29.007** **CR** **094** ⌘ **rev** **-** ⌘ Current version: **4.9.0** ⌘

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

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Backward signalling of service information between VMSC and GMSC for MTC
Source:	⌘	T-Mobile
Work item code:	⌘	Circuit switched Bearer Services
Date:	⌘	10/12/2003
Category:	⌘	**F**
Release:	⌘	Rel-4

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

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	Information on used services for MTCs is visible at the VMSC after negotiation with the UE, but not necessarily at the GMSC. In order to perform service related functions at GMSC (e.g. accounting) this information has to be transferred from the VMSC to the GMSC and possibly moreover to the connected networks. The solution provided by this CR is: - to map the PLMN BC negotiated with the UE into an ISDN BC as it is the case for MOC (according to table 7A) and then - to transfer the ISDN BC, LLC together with possible HLC in the access transport IE of the ISUP answer message (ANM) from the VMSC to the GMSC.
Summary of change:	⌘	See attached pages
Consequences if not approved:	⌘	CN3 is requested by CN#21 and SA#21 to provide a solution for issues discussed in NP-030431.

Clauses affected:	⌘	9.2.2.1,9.2.2.2,10,10.2.2.2,10.2.2.4,10.2.2.5

		Y	N			
Other specs Affected:	⌘		X	Other core specifications	⌘	
			X	Test specifications		
			X	O&M Specifications		

Other comments:	⌘	CRs back to R99 required

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

********* FIRST 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 PLMN Bearer Capability (PLMN BC) information element with contents according to 3GPP TS 27.001 and coded as per 3GPP TS 24.008. 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 PLMN BC reflecting the service associated with the called MSISDN, i.e. the PLMN BC is 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 PLMN BC associated with the MSRN are retrieved from the VLR and sent to the MS at call set-up.

Where the PLMN specific parameter "connection element" contained in the retrieved PLMN BC-IE, indicates dual capabilities then the VMSC shall set it according to its capabilities/preferences. Additionally the parameters correlated to "connection element" shall be modified in accordance with 3GPP TS 27.001.

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 PLMN Basic Service (see application rules in subclause 10.2.2), then the VMSC in providing the PLMN 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 3GPP TS 27.001) and the call will be accepted or rejected as appropriate.

The UE may negotiate parameters with the MSC according to the rules defined in 3GPP TS 27.001. If the UE proposes to the network to modify the User Rate as well as the correlated parameters Modem Type and Intermediate Rate in the call confirmed message or if the UE proposes to the network to modify the Fixed Network User Rate and Other Modem Type parameters for multislot, 14.4kbit/s, EDGE and Iu Mode operations, the network may accept or release the call (see 3GPP TS 27.001).

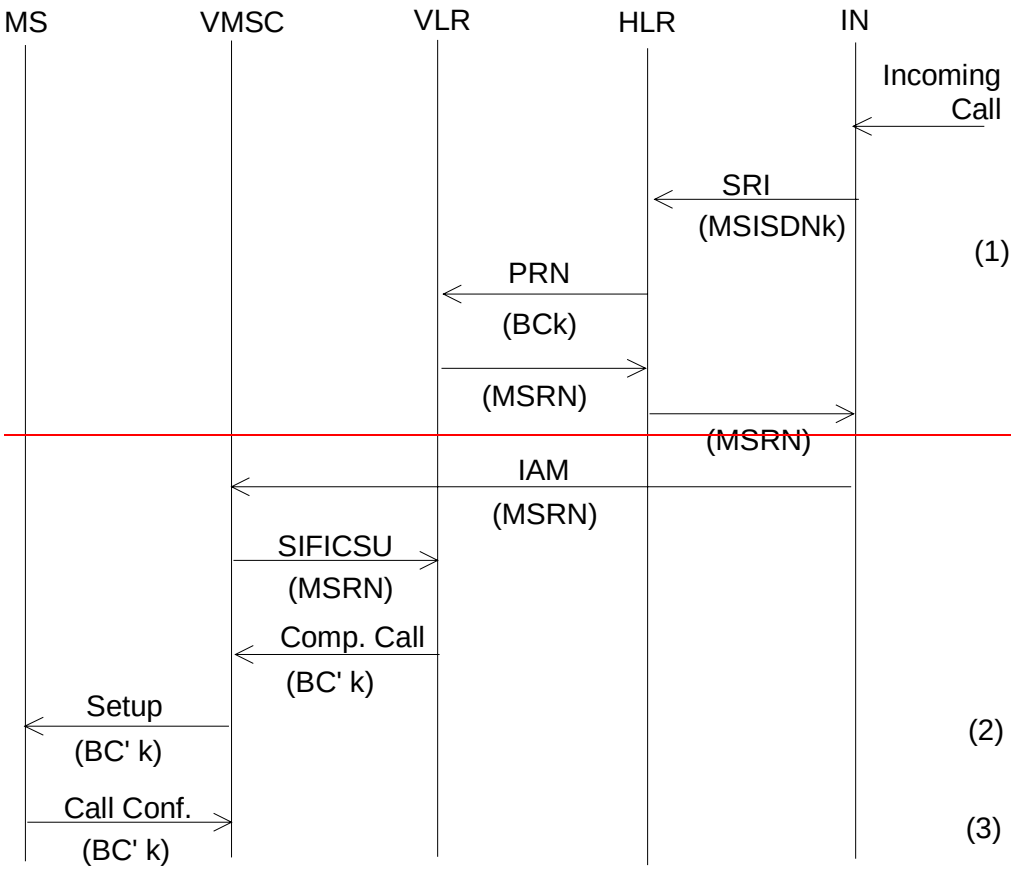
This negotiation takes place by means of the MS reflecting back to the MSC a complete bearer capability information element in the call confirmed message, with the relevant parameters changed. If this does not take place (i.e. if there is no PLMN BC present in the call confirmed message), than the MSC will assume that the values originally transmitted to the MS are accepted with the following exceptions:

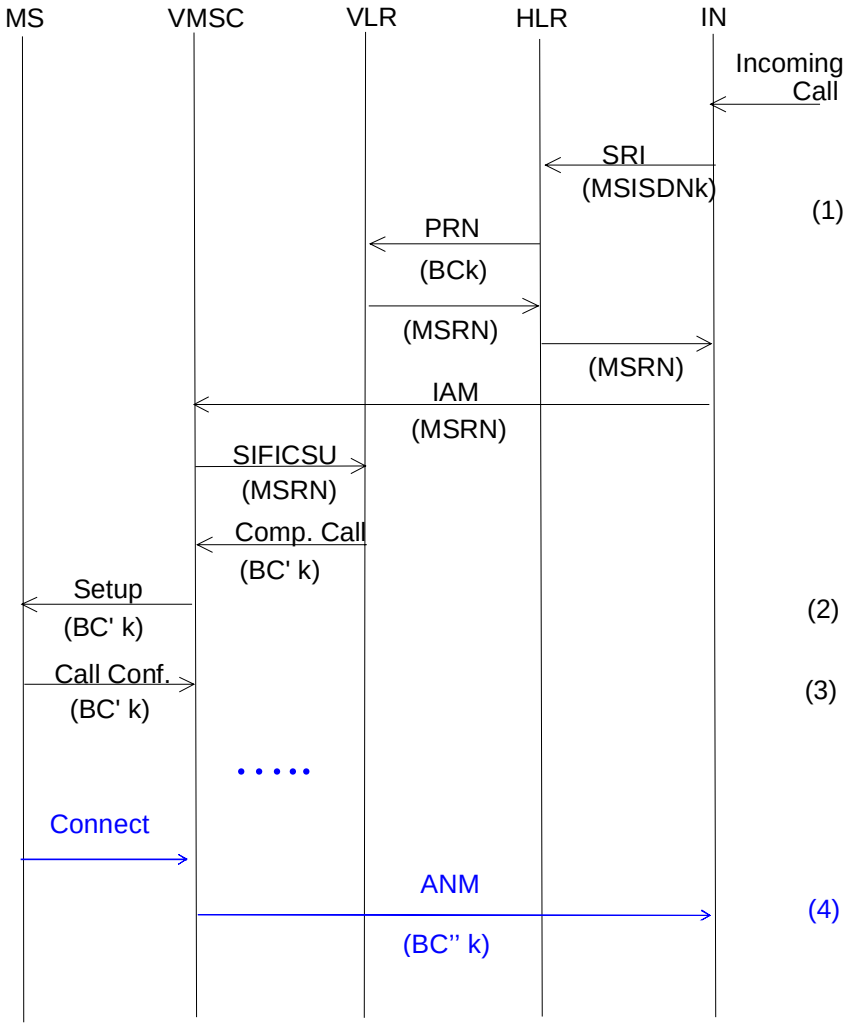
- If in GSM, the PLMN-BC sent with the set-up message contained the "fixed network user rate", "other modem type" and if applicable the "user initiated modification indicator" parameters and no multislot, 14.4 kbit/s, and/or EDGE related parameters (refer to 3GPP TS 27.001 and 24.008) are received in the PLMN-BC of the call confirmed message or no PLMN-BC is received, the MSC shall discard the "fixed network user rate", "other modem type" and "user initiated modification indicator" parameters - the MSC shall use the fall-back bearer service indicated by the remaining parameters of the PLMN-BC on a singleslot configuration (refer to 3GPP TS 48.020 and 3GPP TS 44.021) on the MSC/IWF-BSS link.

- On the other hand, if in GSM, the PLMN-BC received with the call confirmed message contain(s) multislot, 14.4kbit/s or EDGE-related parameters the MSC shall apply on the MSC/IWF-BSS link a singleslot or multislot configuration according to the rules defined in 3GPP TS 44.021, 3GPP TS 48.020 and 3GPP TS 24.022. 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.

- If in UMTS, the PLMN-BC sent with the set-up message contained the "fixed network user rate", "other modem type" and if applicable the "user initiated modification indicator" parameters, but no related parameters (refer to 3GPP TS 27.001 and 24.008) are received in the PLMN-BC of the call confirmed message or no PLMN-BC is received, the MSC shall release the call.

The VMSC may map the received PLMN BC into an ISDN BC according to the rules defined in table 7A. This ISDN BC can be transported together with possibly available LLC and HLC in the access transport parameter of the Answer message (ANM) according to ITU-T Q.763.





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 Confirmed" message, the MS may modify some parameters of the BC. See subclause 9.2.2.
(4) The VMSC may map the PLMN BC (BC'k) into an ISDN BC (BC''k) according to the rules defined in table 7A.

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.
ANM- Answer Message

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

********* NEXT MODIFIED SECTION **********

9.2.2.2 Single-numbering Scheme

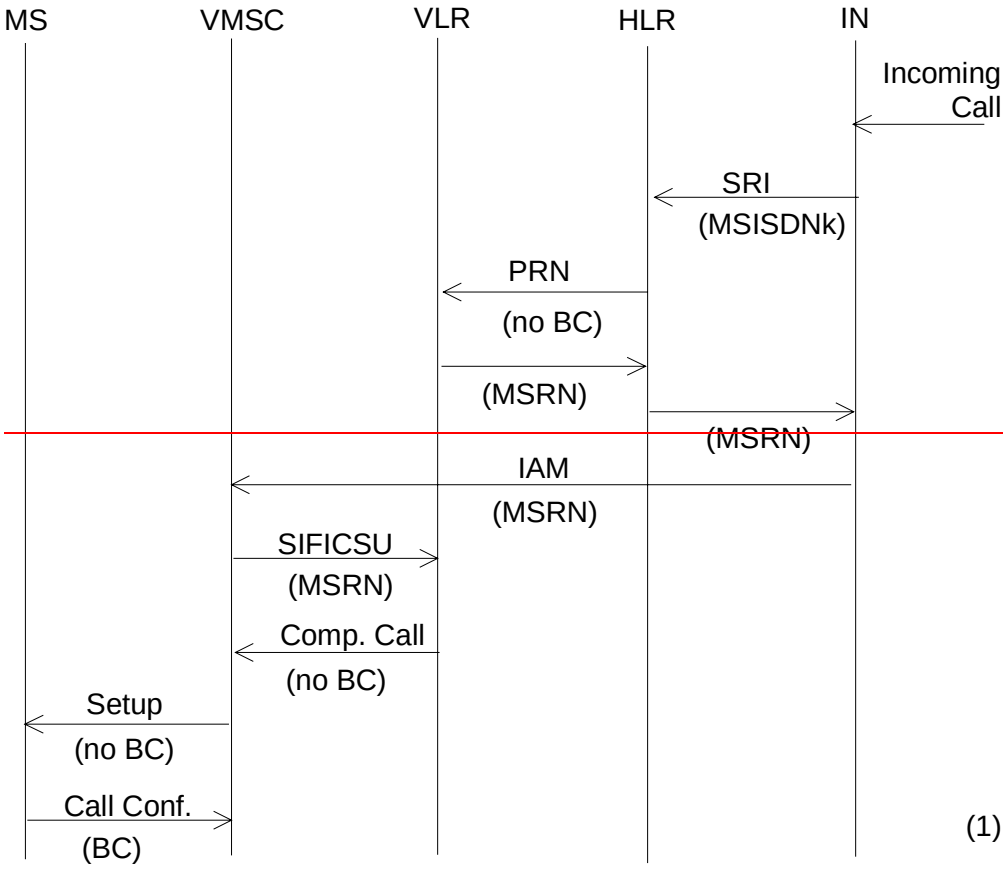
In the single-numbering scheme, the HPLMN will allocate one MSISDN to a subscriber, applicable to all services.

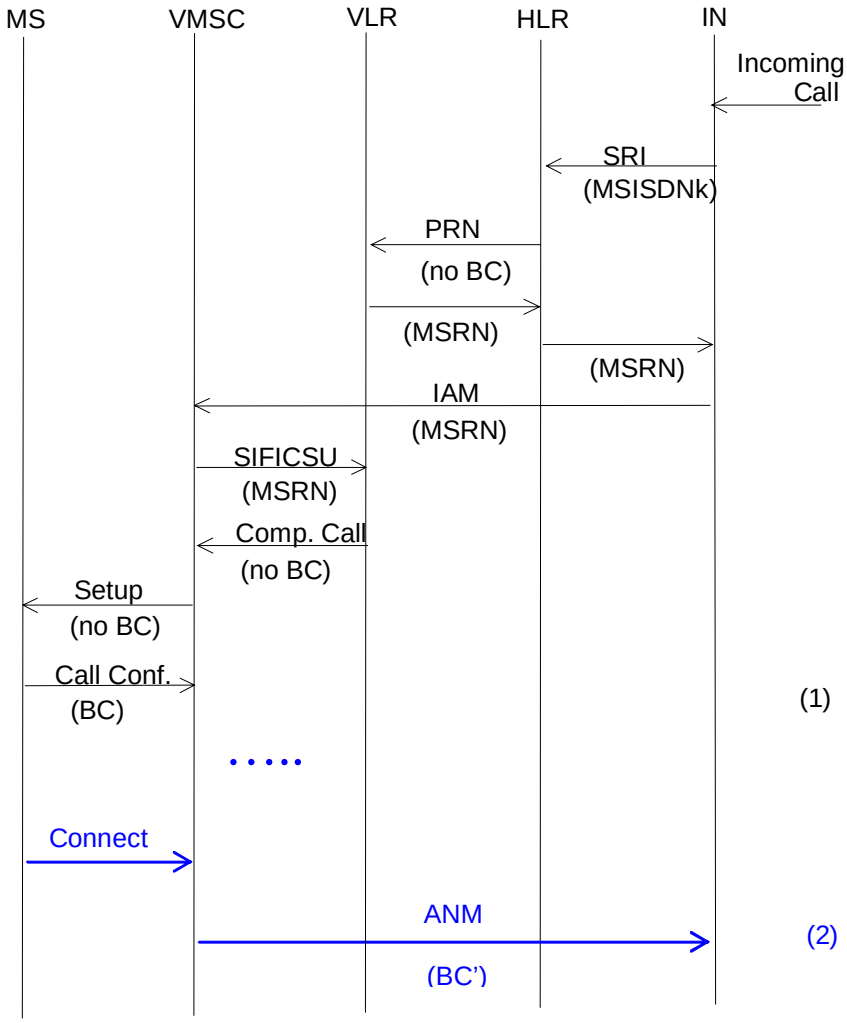
In this case, when the HLR receives an interrogation relating to an incoming call without compatibility information exhaustive for deducing a PLMN Basic Service (i.e. the MAP "Send Routing Information" procedure), the request to the VLR for a roaming number will not contain compatibility information i.e. a PLMN BC.

At the VLR, when the incoming call arrives, there is no PLMN BC associated with the MSRN and so the call set-up to the UE will not contain the PLMN BC information element.

In this case, the MS will return a complete single or dual PLMN BC in the Call Confirmed message, indicating the service required by the mobile subscriber. The VMSC will analyse this PLMN BC and optionally perform subscription checking (see 3GPP TS 42.001). If the requested PLMN BC can be supported the call is established, otherwise the call will be released.

The VMSC may map the received PLMN BC into an ISDN BC according to the rules defined in table 7A. This ISDN BC can be transported together with possibly available LLC and HLC in the access transport parameter of the Answer message (ANM) according to ITU-T Q.763.





NOTE: (1) This BC is derived from information stored in the MS, according to its configuration.
(2) The VMSC may map the PLMN BC (BC) into an ISDN BC (BC') according to the rules defined in table 7A
(~~2~~3) Abbreviations: see figure 2.

Figure 3: Call Flow for a mobile terminated, PSTN originated call where the compatibility information provided are not exhaustive for deducing a PLMN Bearer Service; HLR uses single MSISDN numbers (no corresponding BC stored). Per call MSRN allocation

********* NEXT MODIFIED SECTION **********

10 Interworking to the ISDN

The interworking to the ISDN is specified on the principle of the network supporting standardized associated signalling protocol as outlined in clause 6, i.e. DSS1 and ISUP. An ISDN not complying with this definition differs - for the purpose of the present document - in that it does not support the compatibility information to that degree necessary for deducing a PLMN Basic Service. These networks will find their reflection in the following where those implications are to be set out.

The calling address sent in a mobile originated call to the ISDN is always the basic MSISDN even if the ISDN user shall use a different MSISDN (multi numbering scheme, see subclause 9.2.2 case a) for a mobile terminated call (call back) as only the basic MSISDN is available at the VLR (see 3GPP TS 29.002).

The scope of this clause is to describe the handling of the content of the Information Elements where "content" is understood to be the value of the parameter fields of the Information Elements, namely BC-IE, HLC and LLC, after the length indicator. For the transport of these Information Elements within the PLMN refer to 3GPP TS 29.002.

The handling of multislot, 14.4kbit/s, EDGE and Iu Mode related parameter of the call control signalling and the applicability of single- or multislot configurations (see 3GPP TS 48.020 and 3GPP TS 44.021) is the same as for the PSTN interworking cases.

~~The UE may negotiate parameters with the MSC according to the rules defined in 3GPP TS 27.001. If the UE proposes 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 (see 3GPP TS 27.001). For multislot, 14.4kbit/s, EDGE and Iu Mode operations, the MS may also propose to the network to modify the Fixed Network User Rate and Other Modem Type parameters (see 3GPP TS 27.001). In case a transparent service is used, the call shall be released. For a non-transparent service with flow control, the MSC/IWF shall use towards the fixed network the unmodified "fixed network user rate" and shall use the "wanted air interface user rate" or the modified "fixed network user rate" towards the mobile station.~~

********* NEXT MODIFIED SECTION **********

10.2.2.2 Functions in GMSC

At call Set-up, the interrogating node passes in the "send routing information" to the HLR, the ISDN BC, LLC and HLC received in the initial address message. The coding of these parameters shall comply with ITU-T Recommendation Q.931 (05/98). For MT calls, and for backward compatibility purposes only, the mapping of the modem type according to ETS 300-102-1 (12/90) shall also be accepted, see note 12 of table 7B.

The information possibly signaled backwards from the VMSC to the GMSC contained in the access transport parameter of the Answer message (ANM) can be used to perform service related functions (e.g.accounting) at the GMSC.

********* NEXT MODIFIED SECTION **********

10.2.2.4 Functions in VMSC

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

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

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

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

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

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

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

If ITC = 3,1 kHz audio and User Rate = 28,8 kbit/s and Modem Type = V.34 and the stored BC indicates Multimedia.

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

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

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

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

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

7) If the ISDN BC received in the IAM has the ITC field set to the value "Speech" and the ITC field of the ISDN BC received with the IAM differs from the ITC field of the BC stored in the VLR for this call, the VLR BC/LLC/HLC is considered applicable. If no PLMN or ISDN BC is retrieved from the VLR, the call is handled as in subclause 9.2.2 case b.

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

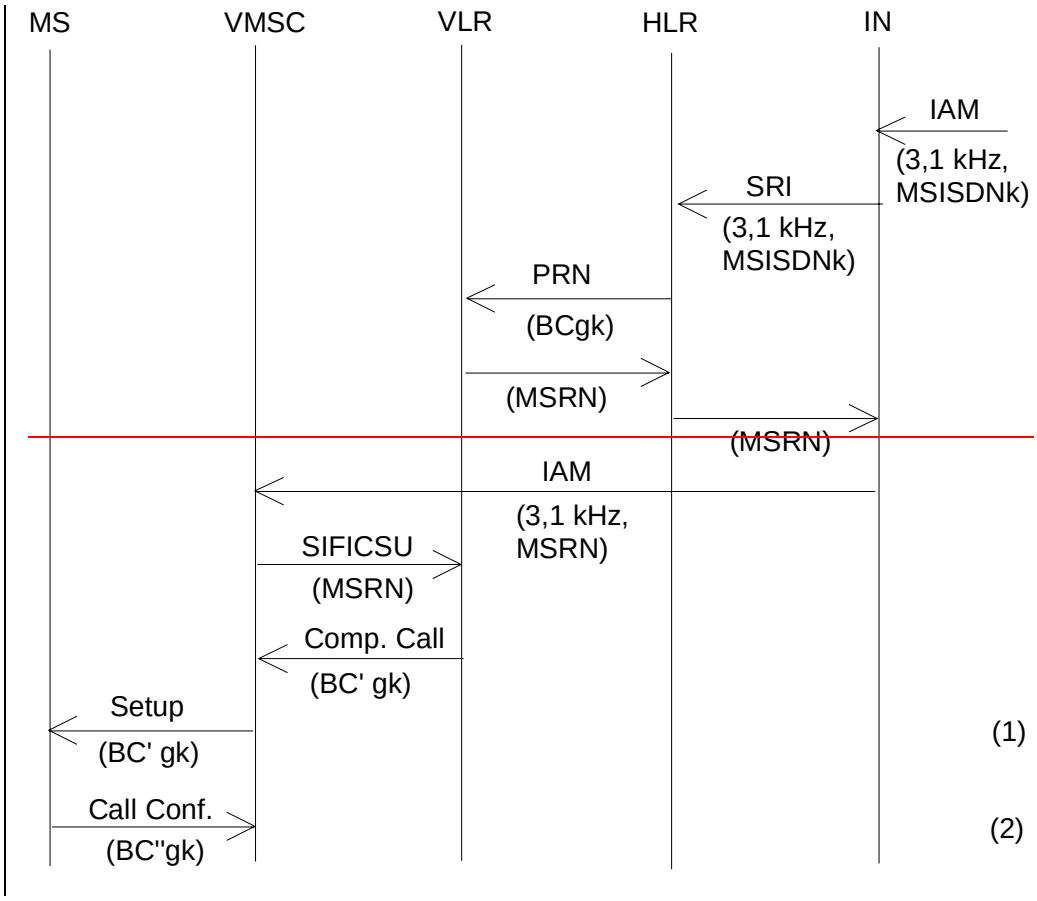
The mapping between PLMN and ISDN BCs is shown in table 7.

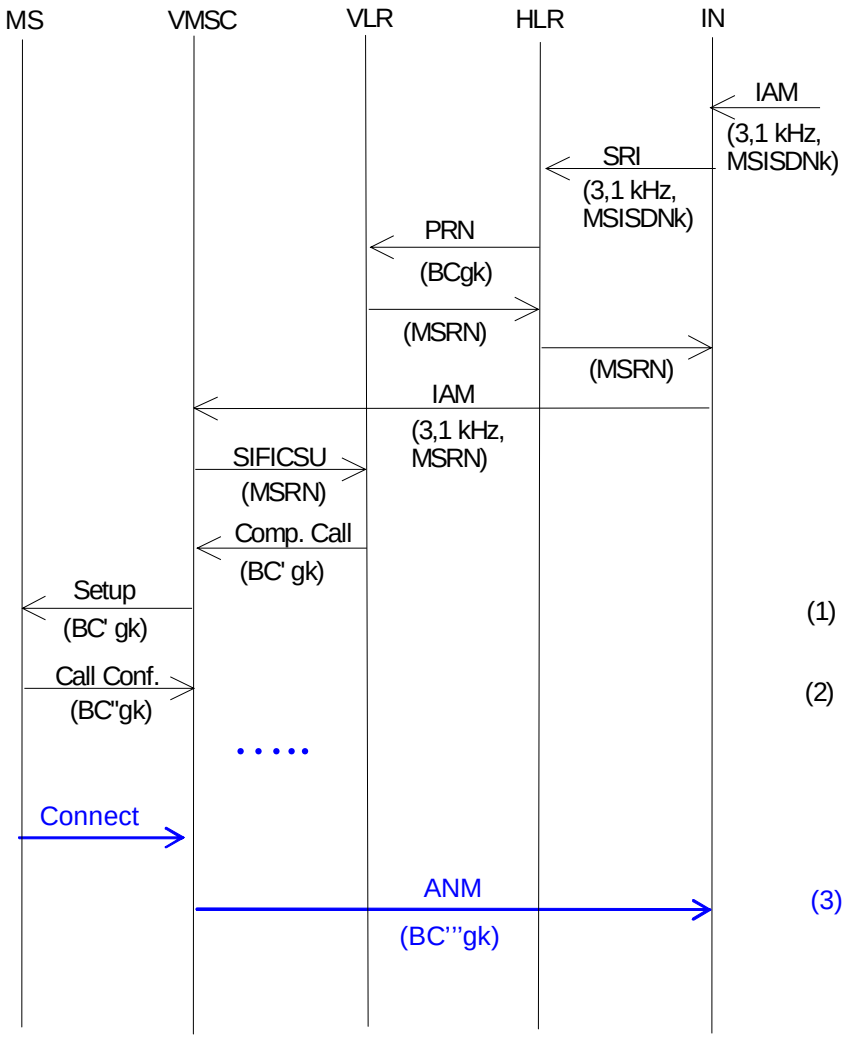
The UE may negotiate parameters with the MSC according to the rules defined in 3GPP TS 27.001. If the UE proposes to the network to modify the User Rate as well as the correlated parameters Modem Type and Intermediate Rate in the call confirmed message, the network may accept or release the call (see 3GPP TS 27.001). For multislot, 14.4kbit/s, EDGE and Iu Mode operations, the MS may also propose to the network to modify the Fixed Network User Rate and Other Modem Type parameters (see 3GPP TS 27.001). In case a transparent service is used, the call shall be released. For a non-transparent service with flow control, the MSC/IWF shall use towards the fixed network the unmodified "fixed network user rate" and shall use the "wanted air interface user rate" or the modified "fixed network user rate" towards the mobile station.

The VMSC may map the received PLMN BC into an ISDN BC according to the rules defined in table 7A. This ISDN BC can be transported together with possibly available LLC and HLC in the access transport parameter of the Answer message (ANM) according to ITU-T Q.763.

********* NEXT MODIFIED SECTION **********

10.2.2.5 Call Flows

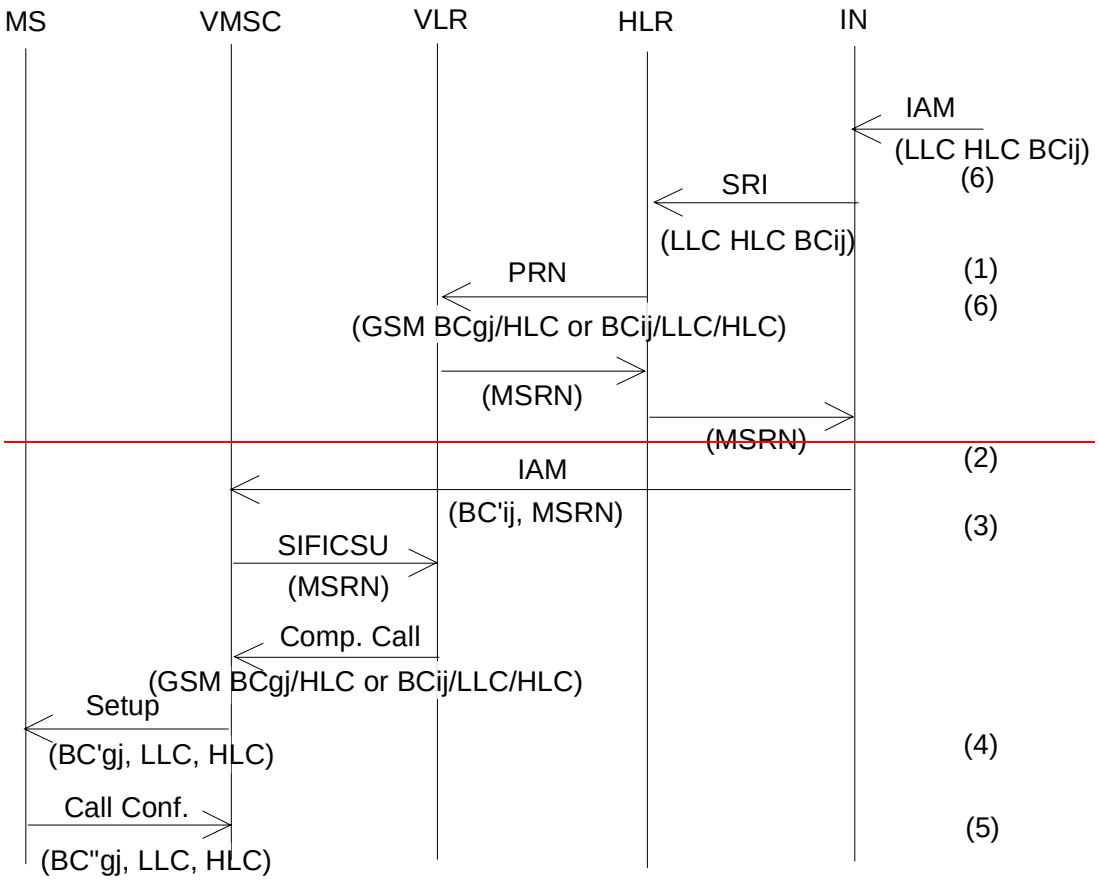

MS
VMSC
VLR
HLR
IN
IAM
(3,1 kHz, MSISDNk)
SRI
(3,1 kHz, MSISDNk)
PRN
(BCgk)
(MSRN)
(MSRN)
IAM
(3,1 kHz, MSRN)
SIFICSU
(MSRN)
Comp. Call
(BC' gk)
Setup
(BC' gk)
(1)
Call Conf.
(BC''gk)
(2)

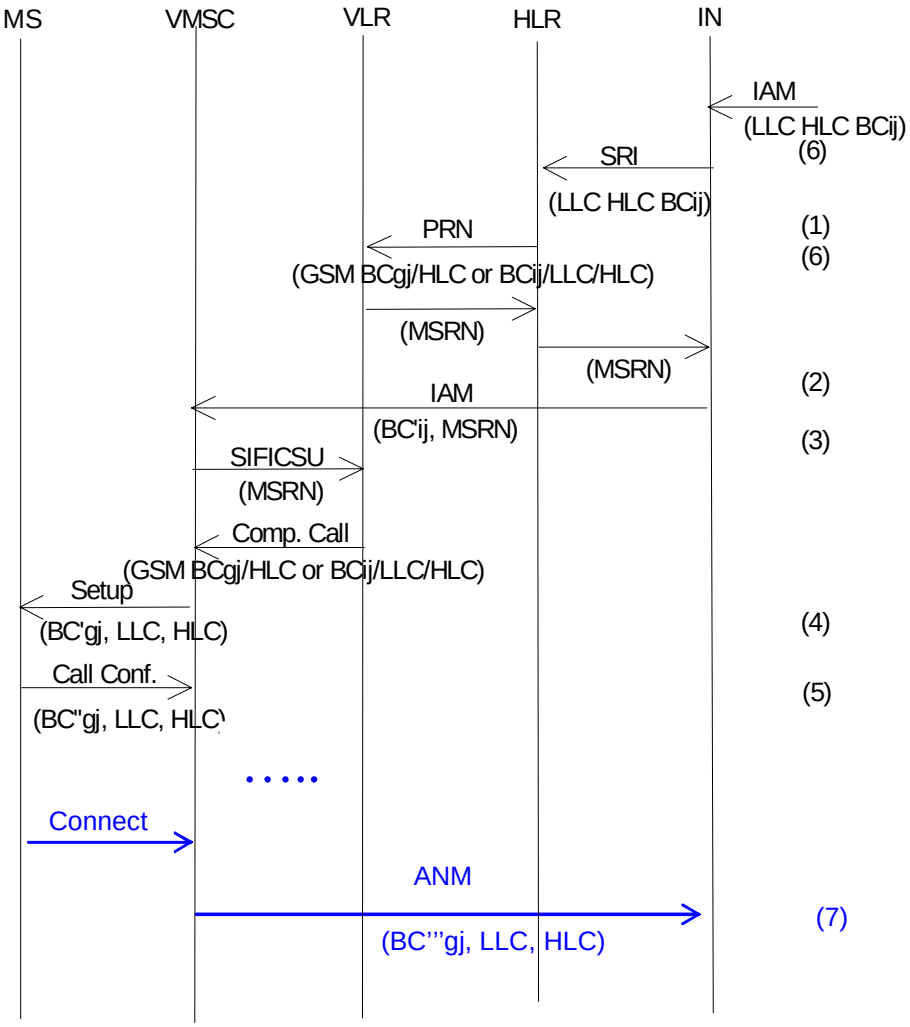

MS
VMSC
VLR
HLR
IN
IAM
(3,1 kHz,
MSISDNk)
SRI
(3,1 kHz,
MSISDNk)
PRN
(BCgk)
(MSRN)
(MSRN)
IAM
(3,1 kHz,
MSRN)
SIFICSU
(MSRN)
Comp. Call
(BC' gk)
Setup
(BC' gk)
(1)
Call Conf.
(BC''gk)
(2)
Connect
ANM
(BC'''gk)
(3)

~~Abbreviations: see figure 2.~~

NOTE: (1) Some parameters of BCgk may be provided/modified according to the MSC's capabilities/preferences. See subclause 9.2.2.
(2) In the "Call Confirm" message, the MS may modify some parameters of the PLMN BC. See subclause 9.2.2.
(3) The VMSC may map the PLMN BC (BC''gk) into an ISDN BC (BC'''gk) according to the rules defined in table 7A
(4) Abbreviations: see figure 2.

Figure 8: Call Flow for a mobile terminated, ISDN originated call where compatibility information provided are not exhaustive for deducing a PLMN Bearer Service, but Information Transfer Capability = 3,1 kHz audio, no modem type and no HLC IE indicating facsimile group 3 HLR stores PLMN BC against MSISDN number multi-numbering scheme





NOTES: (1) BCij denotes ISDN BC*; BCgj is the corresponding PLMN BC.
(2) Assumes signalling capabilities permit the transfer of BC between IN and VMSC. If this is not the case, the VLR uses the stored BC/LLC/HLC.
(3) BC'ij denotes BCij as maybe modified by intervening networks.
(4) Some parameters of BCgk may be provided/modified according to the MSC's capabilities/preferences. See subclause 9.2.2.
(5) In the "Call Confirm" message, the MS may modify some parameters of the BC. See subclause 9.2.2.
(6) For details on how the BC, HLC, and LLC are transported, refer to 3GPP TS 29.002.
* HLC and LLC refers to ISDN values.
(7) The VMSC may map the PLMN BC (BC"gj,LLC,HLC) into an ISDN BC (BC'"gj,LLC,HLC) according to the rules defined in table 7A
(~~7~~8) Abbreviations: see figure 2.

Figure 9: Call Flow for a mobile terminated, ISDN originated call where compatibility information provided are sufficient information to deduce a PLMN Bearer Service or Information Transfer Capability = 3,1 kHz audio with HLC IE indicating facsimile group 3