

3GPP TSG CN Plenary Meeting #17
4th – 6th September 2002 Biarritz, FRANCE.

NP-020444

Source: TSG CN WG4
Title: TrFO/Codec control
Agenda item: 7.7
Document for: APPROVAL

Spec	CR	Rev	Doc-2nd-Level	Phase	Subject	Cat	Ver_C
23.153	040		N4-020940	Rel-4	Initial Bitrate For TrFO	F	4.4.0
23.153	041		N4-020941	Rel-5	Initial Bitrate For TrFO	A	5.1.0
23.153	042	1	N4-021003	Rel-4	Handling of UMTS_AMR & UMTS_AMR_2 codecs in OoBTC	F	4.4.0
23.153	043	1	N4-021004	Rel-5	Handling of UMTS_AMR & UMTS_AMR_2 codecs in OoBTC	A	5.1.0

CR-Form-v7

CHANGE REQUEST

⌘ **23.153 CR 040** ⌘ rev **-** ⌘ Current version: **4.4.0** ⌘

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:	⌘ Initial Bitrate For TrFO		
Source:	⌘ CN4		
Work item code:	⌘ OoBTC	Date:	⌘ 03/07/02
Category:	⌘ F	Release:	⌘ REL-4
	Use <u>one</u> 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 <u>one</u> 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:	⌘ Initial bitrate/first rate control is not handled/described. Some changes have been made in RAN3 specification (25.415) to describe the initial bitrate definition within the luUP protocol. The handling of this is missing from 23.153
	This CR is category F – essential correction.
Summary of change:	⌘ Initial bitrate is received during the Initialisation and shall be noted by each MGW. At call establishment the terminating MGW shall handle the initial bitrate and be treated as an initial rate control. The MGW shall send a rate control PDU if the initialisation frame is not being transferred to the next node.
Consequences if not approved:	⌘ Nodes and RAN may not be using the same initial mode at call establishment.

Clauses affected:	⌘						
Other specs affected:	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px;">Y</td> <td style="width: 20px;">N</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> </table> Other core specifications	Y	N	<input type="checkbox"/>	<input checked="" type="checkbox"/>	⌘	
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	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px;">Y</td> <td style="width: 20px;">N</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> </table> Test specifications	Y	N	<input type="checkbox"/>	<input checked="" type="checkbox"/>	⌘	
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Y	N						
<input type="checkbox"/>	<input checked="" type="checkbox"/>						
Other comments:	⌘						

How to create CRs using this form:

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- 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.

5.4.2 RFCI Storage

The RNC shall allocate RAB Subflow Combination Indicators to the SDU formats (SDU formats sent to the RNC by the MSC in the RAB Assignment). This allocation is then sent in the Iu Framing Initialisation PDU by the RNC in the User Plane. For further details see [3] and [4].

During the TrFO call establishment each MGW linked into the call shall store the RFCIs received from Iu Framing PDU Type 14. The first subflow combination in the initialisation frame corresponds to an Initial Rate Control, i.e. indicates the highest rate for shall be the first speech mode to be used in the direction of the Initialisation Acknowledgement frame.

After the out of band codec negotiation has been performed, if the originating side is a UTRAN, then on request from the MSC for a RAB Assignment, it shall initiate the Iu user plane. If the originating side is a network that does not support Iu Framing then the Iu Framing initialisation is initiated by the GMSC, as described in detail in Clause 6.7. An Initialisation Protocol Data Unit (PDU) shall be sent to the first MGW in the call connection. Each initialisation leg is acknowledged per TrFO Link, i.e. per MGW-MGW interface. The subsequent initialisation is performed using the same RFCI set as received from the preceding node, independently of the Stream mode directions (i.e. if the terminations are not through connected).

This is shown figure 5.4.2/1.

Figure 5.4.2/1: RFCI Storage and subsequent initialisation in MGW

When the MGW terminations are through-connected and the RFCIs at both terminations are matching, then the MGW may revert to transparent mode; the RNCs shall not perform any subsequent Iu Framing initialisations without explicit request by the serving MSCs.

All succeeding MGWs in the path shall behave in a similar way as described above.

5.4.3 RFCI Value Correction

At the terminating end of a TrFO connection with Iu Framing initialised to the terminating MGW, the originating RFCI allocation is stored. The terminating RNC is then requested to perform a RAB Assignment towards the terminating MGW. This results in an Iu Framing initialisation, where the allocation of the RFCI values is independent from the Originating RNC's allocation. These values may then be different to the originating RNC's set.

The terminating MGW shall acknowledge the Iu Framing Initialisation and compare the RFCI values stored from the originating side. If the allocated index values do not match, then the MGW shall perform one of the following procedures either:

- 1) initiate an Iu Framing Initialisation PDU towards the terminating RNC with the RFCI allocation as defined by the preceding node (previously stored in the MGW. This behavior is shown in figure 5.4.3/1 and termed "RFCI value correction"). As the first Subflow combination received from the terminating RNC corresponds to an initial (maximum) rate control the MGW shall send a Rate Control PDU indicating this maximum speech mode back to the preceding node in the core-network.~~or~~
- 2) map the RFCI indices of the incoming side to the corresponding RFCI indices at the outgoing side for all SDUs passed between the Iu Framing protocol terminations. As the first Subflow combination in the IuUP initialisation corresponds to an indicates the initial rate control, i.e. indicates maximum rate for the mode to be used (in direction of Initialisation acknowledgement frame) it is and therefore the treated as the initial maximum rate control (see [4]) the MGW shall initiate a Rate Control PDU indicating this maximum speech mode toward the terminating RNC and toward the preceding core network node. Similarly as the first Subflow combination received from the terminating RNC corresponds to an initial (maximum) rate control the MGW shall send a Rate Control PDU indicating this maximum speech mode back to the preceding node in the core-network. For further details on the rate control see clause 5.7

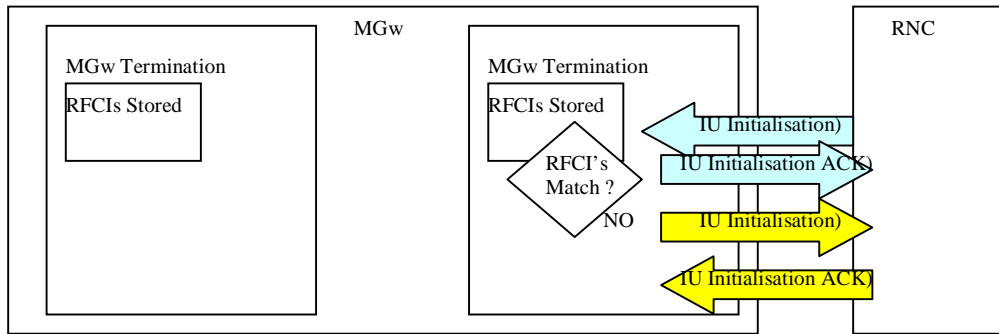


Figure 5.4.3/1:RFCI Value Correction

Further details of the TrFO call establishment are described in clause 6.

This resolution handling is required also during RNC relocation; further details are described in clause 6.

5.7 Inband Rate Control

Inband rate control shall only allow the RNCs to set the maximum codec mode (maximum bitrate) from the set of codec modes that have been negotiated out of band. This procedure is called Maximum Rate Control. The final maximum mode selected results from a rate control request from one side and the maximum rate supported at the receiving side; the lower rate of these is selected. This is known as Distributed Rate Decision. In TrFO maximum rate control shall be supported through the Iu Framing protocol and through transit networks supporting compressed voice. The maximum rate control procedures are further defined within the Iu Framing protocol [4].

When the MSC requests for a RAB to be assigned, it shall always define 1 speech mode SDU (lowest rate), and DTX SDU as non-rate controllable. Other SDU formats for higher rates shall be defined as rate controllable. The first subflow combination in the IuUP initialisation shall be treated as an initial maximum rate control. Where a node is in TrFO break (e.g. the terminating MGW) this initial maximum rate control received at a given MGW/IuUP termination shall be signalled to the other TrFO link using the IuUP Rate Control PDU unless the IuUP Initialisation frame is to be sent on to the next link as in RFCI Value Correction (see clause 5.4.3).

At SRNS relocation the new RNC shall send a rate control frame at Relocation Detect indicating its current maximum rate, it will receive in the acknowledgement the current maximum rate from the far end. This procedure is called Immediate Rate Control. Again the distributed rate decision means both RNCs will operate within a common limit.

CR-Form-v7

CHANGE REQUEST

⌘ **23.153 CR 041** ⌘ rev **-** ⌘ Current version: **5.1.0** ⌘

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

Proposed change affects: UICC apps ME Radio Access Network Core Network

Title:	⌘	Initial Bitrate For TrFO	
Source:	⌘	CN4	
Work item code:	⌘	OoBTC	Date: ⌘ 03/07/02
Category:	⌘	A	Release: ⌘ REL-5
		Use <u>one</u> of the following categories:	Use <u>one</u> of the following releases:
		F (correction)	2 (GSM Phase 2)
		A (corresponds to a correction in an earlier release)	R96 (Release 1996)
		B (addition of feature),	R97 (Release 1997)
		C (functional modification of feature)	R98 (Release 1998)
		D (editorial modification)	R99 (Release 1999)
		Detailed explanations of the above categories can be found in 3GPP TR 21.900.	Rel-4 (Release 4)
			Rel-5 (Release 5)
			Rel-6 (Release 6)

Reason for change:	⌘	Initial bitrate/first rate control is not handled/described. Some changes have been made in RAN3 specification (25.415) to describe the initial bitrate definition within the luUP protocol. The handling of this is missing from 23.153
		This CR is category F – essential correction. This is mapped from REL4.
Summary of change:	⌘	Initial bitrate is received during the Initialisation and shall be noted by each MGW. At call establishment the terminating MGW shall handle the initial bitrate and be treated as an initial rate control. The MGW shall send a rate control PDU if the initialisation frame is not being transferred to the next node.
Consequences if not approved:	⌘	Nodes and RAN may not be using the same initial mode at call establishment.

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Other comments:	⌘												

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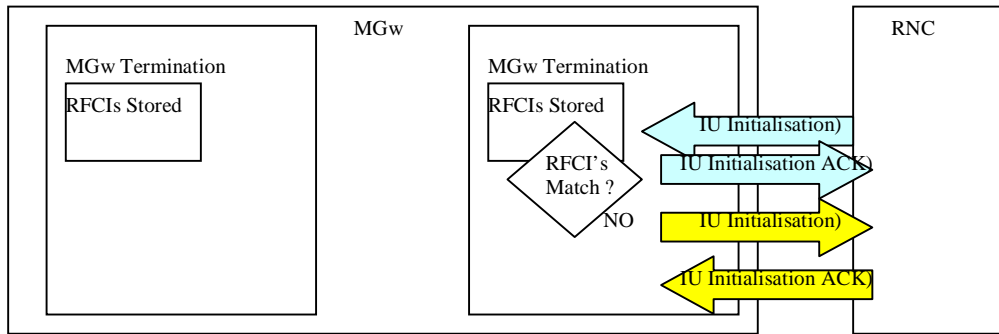


Figure 5.4.3/1:RFCI Value Correction

Further details of the TrFO call establishment are described in clause 6.

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At SRNS relocation the new RNC shall send a rate control frame at Relocation Detect indicating its current maximum rate, it will receive in the acknowledgement the current maximum rate from the far end. This procedure is called Immediate Rate Control. Again the distributed rate decision means both RNCs will operate within a common limit.

CHANGE REQUEST

⌘ **23.153 CR 042** ⌘ rev **1** ⌘ Current version: **4.4.0** ⌘

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:	⌘	Handling of UMTS_AMR & UMTS_AMR_2 codecs in OoBTC	
Source:	⌘	CN4	
Work item code:	⌘	OoBTC	Date: ⌘ 03/07/02
Category:	⌘	F	Release: ⌘ REL-4
		Use <u>one</u> 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 <u>one</u> 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:	⌘	UMTS_AMR_2 and UMTS_AMR handling needs clarifying. In current specifications it states that if a Ue supports both types then only UMTS_AMR_2 shall be indicated in the OoBTC protocol however it does not describe how the far end node shall reply if it only supports UMTS_AMR. According to the ITU-T codec negotiation rules only codecs included in the list can be selected.
		This CR is category F – essential correction.
Summary of change:	⌘	It shall be allowed to signal UMTS_AMR codepoint in return when UMTS_AMR_2 was signalled forward – i.e. as UMTS_AMR is a subset of UMTS_AMR_2 by signalling only the UMTS_AMR_2 codepoint it is inferred that support of both codec types exists.
Consequences if not approved:	⌘	Codec negotiation with these codec types is not clear and could result in failure for TrFO.

Clauses affected:	⌘									
Other specs affected:	⌘	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="width: 20px;">Y</td> <td style="width: 20px;">N</td> </tr> <tr> <td style="width: 20px;"> </td> <td style="width: 20px;">X</td> </tr> <tr> <td style="width: 20px;"> </td> <td style="width: 20px;">X</td> </tr> <tr> <td style="width: 20px;"> </td> <td style="width: 20px;">X</td> </tr> </table> Other core specifications ⌘ Test specifications ⌘ O&M Specifications ⌘	Y	N		X		X		X
Y	N									
	X									
	X									
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5.6 CN Node handling of Codec Types & Codec Modes

The supported codec list received by the MSC in DTAP protocol [2] has no priority, whereas the list sent in the OoBTC procedures is sent with a level of preference.

The default Codec Type for “R99 UMTS only” terminals is UMTS_AMR, the default Codec Type for all terminals supporting GSM and UMTS radio access is UMTS_AMR_2, see [5] for the detailed description. The UMTS_AMR_2 is a superset of the UMTS_AMR. It behaves as a FR_AMR codec in the UL and as a UMTS_AMR codec in the DL. This allows UMTS terminals to operate in TFO with GSM terminals. The UMTS_AMR_2 is fully compatible with UMTS_AMR in TFO and TrFO and fully compatible with R99 CN nodes (TC in MGW).

If the UE supports both Codec Types (UMTS_AMR and UMTS_AMR_2), then the MSC shall indicate only the UMTS_AMR_2 in the OoBTC codec negotiation. If no Codec List IE is received and the UE is “UMTS only”, then the MSC shall assume UMTS_AMR as supported Codec Type. If no Codec List IE is received, but the UE is “dual system”, then the MSC shall assume UMTS_AMR_2 as the supported codec type. The MSC shall assume “dual system” support only if the UE indicates at least one GSM speech version in Octet 3a etc. of the Bearer Capability.

When a codec list contains UMTS_AMR_2 and a node in the network participating in the codec negotiation only supports UMTS_AMR then it shall indicate UMTS_AMR back although the codepoints as defined in [5] are different and only the UMTS_AMR_2 codepoint is included in the codec list it shall be allowed to signal back the codepoint for UMTS_AMR as this is a subset of the UMTS_AMR_2 codec and thus its support is implied. Similarly, if a node receives only UMTS_AMR in the codec list but it supports UMTS_AMR_2 it shall reply with the codepoint for UMTS_AMR as this is the subset that is compatible.

In order to support interworking with 2G systems it is recommended that MGWs support 2G EFR codecs (GSM_EFR, PDC_EFR, TDMA_EFR). In order to avoid modifications during handover between 2G and 3G systems the MSC nodes may give preference to a suitable 2G codec.

The originating CN node, while performing speech service negotiation with a terminating CN node, shall indicate the maximum number of codec modes that shall be selected during speech codec negotiation. This maximum number of supported codec modes may depend on optimisation strategies applied by the originating CN node. The recommended value is “four” (see [10]).

The terminating CN node receiving this information compares the maximum number of codec modes received by the originating CN with its own one and shall decide on the minimum of both numbers to be applied as result of the negotiation.

The decision about the actual codec modes to be selected as the Active Codec Set (ACS) shall be left to the terminating CN node. In order to provide harmonisation of out of band codec negotiation (TrFO) and inband codec negotiation (TFO) very similar codec selection mechanisms as those being defined for TFO shall be applied for TrFO, see [10]. These rules shall be taken into account when forwarding a codec list from the originating node to proceeding node, both for TrFO and TFO.

Whenever one or several TrFO links have been already established and initialised, the CN node (e.g. the serving CN in case of Call Hold scenarios, the visited CN node in case of Call Forwarding scenarios, etc.) initiating a subsequent codec negotiation, shall give the already negotiated codec type, including its ACS, highest preference to reduce the possibility of performing bearer re-establishment or UP re-initialisation of the already established and initialised TrFO links.

When the MSC node requests a RAB assignment the Subflow Combinations provided shall either all be initialised by the RNC or all rejected with appropriate cause code.

The MSC shall always assume "Discontinuous Transmission (DTX)" as mandatory and shall define “SID” SDUs in addition to the negotiated speech codec modes. This is because for TrFO the RAB requested by one RNC must match that requested by the peer RNC – they are effectively the same RAB. If one MSC requires DTX support then the RAB requested by the far end MSC must also support DTX (even if it is not desired by that MSC). As no Out Of Band negotiation for DTX is supported nor DTX control to the UE, DTX shall be mandatory for TrFO connections.

CHANGE REQUEST

⌘ **23.153 CR 043** ⌘ rev **1** ⌘ Current version: **5.1.0** ⌘

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

Proposed change affects: UICC apps ME Radio Access Network Core Network

Title:	⌘	Handling of UMTS_AMR & UMTS_AMR_2 codecs in OoBTC	
Source:	⌘	CN4	
Work item code:	⌘	OoBTC	Date: ⌘ 03/07/02
Category:	⌘	A	Release: ⌘ REL-5
		Use <u>one</u> 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 <u>one</u> 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:	⌘	UMTS_AMR_2 and UMTS_AMR handling needs clarifying. In current specifications it states that if a Ue supports both types then only UMTS_AMR_2 shall be indicated in the OoBTC protocol however it does not describe how the far end node shall reply if it only supports UMTS_AMR. According to the ITU-T codec negotiation rules only codecs included in the list can be selected.
		This CR is category F – essential correction – mapped from REL-4.
Summary of change:	⌘	It shall be allowed to signal UMTS_AMR codepoint in return when UMTS_AMR_2 was signalled forward – i.e. as UMTS_AMR is a subset of UMTS_AMR_2 by signalling only the UMTS_AMR_2 codepoint it is inferred that support of both codec types exists.
Consequences if not approved:	⌘	Codec negotiation with these codec types is not clear and could result in failure for TrFO.

Clauses affected:	⌘									
Other specs affected:	⌘	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> </tr> </table> Other core specifications ⌘ Test specifications ⌘ O&M Specifications ⌘	Y	N	X	X	X	X	X	X
Y	N									
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X	X									
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Other comments:	⌘									

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at <http://www.3gpp.org/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.

5.6 CN Node handling of Codec Types & Codec Modes

The supported codec list received by the MSC in DTAP protocol [2] has no priority, whereas the list sent in the OoBTC procedures is sent with a level of preference.

The default Codec Type for “R99 UMTS only” terminals is UMTS_AMR, the default Codec Type for all terminals supporting GSM and UMTS radio access is UMTS_AMR_2, see [5] for the detailed description. The UMTS_AMR_2 is a superset of the UMTS_AMR. It behaves as a FR_AMR codec in the UL and as a UMTS_AMR codec in the DL. This allows UMTS terminals to operate in TFO with GSM terminals. The UMTS_AMR_2 is fully compatible with UMTS_AMR in TFO and TrFO and fully compatible with R99 CN nodes (TC in MGW).

If the UE supports both Codec Types (UMTS_AMR and UMTS_AMR_2), then the MSC shall indicate only the UMTS_AMR_2 in the OoBTC codec negotiation. If no Codec List IE is received and the UE is “UMTS only”, then the MSC shall assume UMTS_AMR as supported Codec Type. If no Codec List IE is received, but the UE is “dual system”, then the MSC shall assume UMTS_AMR_2 as the supported codec type. The MSC shall assume “dual system” support only if the UE indicates at least one GSM speech version in Octet 3a etc. of the Bearer Capability.

When a codec list contains UMTS_AMR_2 and a node in the network participating in the codec negotiation only supports UMTS_AMR then it shall indicate UMTS_AMR back. although the codepoints as defined in [5] are different and only the UMTS_AMR_2 codepoint is included in the codec list it shall be allowed to signal back the codepoint for UMTS_AMR as this is a subset of the UMTS_AMR_2 codec and thus its support is implied. Similarly, if a node receives only UMTS_AMR in the codec list but it supports UMTS_AMR_2 it shall reply with the codepoint for UMTS_AMR as this is the subset that is compatible.

In order to support interworking with 2G systems it is recommended that MGWs support 2G EFR codecs (GSM_EFR, PDC_EFR, TDMA_EFR). In order to avoid modifications during handover between 2G and 3G systems the MSC nodes may give preference to a suitable 2G codec.

The originating CN node, while performing speech service negotiation with a terminating CN node, shall indicate the maximum number of codec modes that shall be selected during speech codec negotiation. This maximum number of supported codec modes may depend on optimisation strategies applied by the originating CN node. The recommended value is “four” (see [10]).

The terminating CN node receiving this information compares the maximum number of codec modes received by the originating CN with its own one and shall decide on the minimum of both numbers to be applied as result of the negotiation.

The decision about the actual codec modes to be selected as the Active Codec Set (ACS) shall be left to the terminating CN node. In order to provide harmonisation of out of band codec negotiation (TrFO) and inband codec negotiation (TFO) very similar codec selection mechanisms as those being defined for TFO shall be applied for TrFO, see [10]. These rules shall be taken into account when forwarding a codec list from the originating node to proceeding node, both for TrFO and TFO.

Whenever one or several TrFO links have been already established and initialised, the CN node (e.g. the serving CN in case of Call Hold scenarios, the visited CN node in case of Call Forwarding scenarios, etc.) initiating a subsequent codec negotiation, shall give the already negotiated codec type, including its ACS, highest preference to reduce the possibility of performing bearer re-establishment or UP re-initialisation of the already established and initialised TrFO links.

When the MSC node requests a RAB assignment the Subflow Combinations provided shall either all be initialised by the RNC or all rejected with appropriate cause code.

The MSC shall always assume "Discontinuous Transmission (DTX)" as mandatory and shall define “SID” SDUs in addition to the negotiated speech codec modes. This is because for TrFO the RAB requested by one RNC must match that requested by the peer RNC – they are effectively the same RAB. If one MSC requires DTX support then the RAB requested by the far end MSC must also support DTX (even if it is not desired by that MSC). As no Out Of Band negotiation for DTX is supported nor DTX control to the UE, DTX shall be mandatory for TrFO connections.