3GPP TSG CN Plenary Meeting #20 **NP-030211**
4th – 6th June 2003 Hämeenlinna, FINLAND.

Source: TSG CN WG4

Title: Corrections on OoBTC

Agenda item: 7.7

Document for: APPROVAL

Spec	CR	Rev	Doc-2nd-Level	Phase	Subject	Cat	Ver_C
23.153	056		N4-030539	Rel-4	Clarification of handling of DTMF in TrFO	F	4.7.0
23.153	057		N4-030540	Rel-5	Clarification of handling of DTMF in TrFO	A	5.4.0
23.153	060		N4-030543	Rel-4	Clarification of IuUP Initialisation during codec modification	F	4.7.0
23.153	061		N4-030544	Rel-5	Clarification of IuUP Initialisation during codec modification	A	5.4.0
29.232	055	1	N4-030545	Rel-4	Independence Of SDU and Application	F	4.7.0
29.232	056	1	N4-030546	Rel-5	Independence Of SDU and Application	A	5.5.0
23.153	054	2	N4-030699	Rel-4	Clarification of use of Default PCM codec and handling of the Codec List	F	4.7.0
23.153	055	1	N4-030700	Rel-5	Clarification of use of Default PCM codec and handling of the Codec List	A	5.4.0
23.153	058	2	N4-030701	Rel-4	Clarification of use of TMR for codec negotiation	F	4.7.0
23.153	059	1	N4-030702	Rel-5	Clarification of use of TMR for codec negotiation	A	5.4.0

3GPP TSG CN WG#4 Meeting #19
San Diego, US, 19th-23rd May 2003

N4-030699

CR-Form-v7

CHANGE REQUEST

⌘ **23.153** **CR** **054** ⌘**rev** **2** ⌘ Current version: **4.7.0** ⌘

*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:	⌘	Clarification of use of Default PCM codec and handling of the Codec List
Source:	⌘	CN4
Work item code:	⌘	OoBTC
Date:	⌘	6/5/2003
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:	⌘	The OoBTC specification defines a default PCM codec (e.g. G711) and describes the call scenarios where compressed voice cannot be achieved and then default PCM is selected (this codec is used also for TFO cases). It is not stated clearly however that in order for this to be achieved the codec must be included in the codec list. In order to prevent interworking problems (one manufacturer assumes as it is default it does not need to be included) and to prevent calls being cleared due to an empty list (protocol error) this issue needs to be clarified. Also the default PCM codec should not include codec types that cannot support the TrFO/TFO features. The list of PCM codecs defined in ITU are not needed by 3GPP PLMNs – for example 56 kb/s codecs should not be supported. **This is an essential correction**
Summary of change:	⌘	Default PCM codec shall always be included in the codec list
Consequences if not approved:	⌘	Interworking problems – calls could fail.

Clauses affected:	⌘	3.1, 4.1

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

Other comments: ⌘

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following definition apply:

Codec: device to encode information from its original representation into an encoded form and to decode encoded information into its original representation

Tandem Free Operation: configuration of a connection with two transcoders that support TFO protocol and whose external coding schemes are compatible, thus enabling compressed speech to pass between them

NOTE 1: When the TFO protocol is not supported by both transcoders or the coding schemes are not compatible then normal "Tandem" operation occurs and PCM encoded speech is passed between them.

Transcoder: device to change the encoding of information from one particular encoding scheme to a different one, most commonly to/from a compressed speech algorithm from/to PCM.

Transcoder Free Operation: configuration of a speech or multimedia call for which no transcoder device is physically present in the communication path and hence no control or conversion or other functions can be associated with it

Out of Band Transcoder Control: capability of a system to negotiate the types of codecs and codec modes on a call per call basis through out-of-band signalling, required to establish Transcoder Free Operation.

Default PCM Codec: network default 64kb/s codec for speech in PCM domain

NOTE 2: For example ITU G.711 A-law.

Transcoding free link (TrFL): bearer link, where compressed voice is being carried between bearer endpoints

NOTE 3: Within the UMTS network, the compressed voice is transmitted in Iu/ Nb User Plane format, depending on the related interface.

Tandem free link (TFOL): bearer link between transcoders that are operating in Tandem Free Operation mode, i.e. bypassing the transcoding functions

NOTE 4: The involved transcoders can be a UMTS transcoder or a GSM TRAU with TFO functionality.

Transcoder free operation (TrFO): calls that have no transcoders involved in the connection between the source codecs

NOTE 5: For mobile to mobile calls this is UE to UE, although the connection could be UE to another type of terminal. TrFO operation is considered a concatenation of TrFLs between RNCs.

NOTE 6: In case of mobile to fixed network calls the term "Transcoder free operation" is applicable for the TrFLs carrying compressed speech. The TrFO usually ends at the Gateway to the PSTN where the speech is transcoded e.g. to G.711.

Tandem free and Transcoding free operation (TaTrFO): concatenation of "transcoding free links" and "tandem free links"

Iu Framing: framing protocol used for the speech packets on both the Iu User Plane interface and the Nb User Plane interface

NOTE 7: The Iu framing protocol is specified by [4].

4.1 OoBTC Requirements

The OoBTC mechanism shall support the following:

- The capability to negotiate the preferred codec type to be used between two end nodes and to avoid the use of transcoders in the network at call set-up.

The originating UE indicates the list of its supported codec types for codec negotiation. This list shall be conveyed to the terminating MSC. The terminating UE indicates its list of supported codec types to the terminating MSC. The terminating MSC shall convey the selected codec to the originating MSC, which then indicates the selected codec to the originating UE.

Where no compatible codec type can be selected between the UEs then the default PCM coding shall be selected. Therefore, the default PCM codec shall always be included in the codec list for OoBTC. The originating MSC shall insert a transcoder in the path from the originating UE. Codec selection for the terminating UE is then performed within the terminating MSC, independently of the originating MSC.

NOTE: For a codec type supporting various modes, the described functionality shall also be applicable to negotiate the set of codec modes common to originating and terminating UEs. Other negotiations such as Initialisation and Rate control are performed at a later point in time by the Iu framing protocol.

- The capability to control the presence of transcoders in the network after call set-up.

Where a change to the call state of a transcoder free connection occurs, such that compressed speech cannot be maintained, it shall be possible to insert a transcoder or pair of transcoders where needed in the path. If this results in change to the encoding of the speech in other nodes then it shall be possible to inform the end points of this segment that the speech coding is changed. Such examples where this could occur are:

- SS interruptions (e.g. A to B call connection becomes to multiparty call connection.)
- Handover to an incompatible partner.
- Synchronisation loss

Where a change in call state as described above is temporary then it shall be possible to return to a transcoder free connection by removing the inserted transcoders and informing the endpoints that the connection has resumed to compressed speech encoding.

- The codec types comprise codecs for speech in the first phase of the present document. The transcoder control should have enough expandability to support future enhancements of codec types.
- The transcoder control procedure shall not cause a perceivable time lag in the cases of establishing transcoder free connection and reverting to normal (double transcoded) call connection in the cases described above for control of the presence of transcoders.
- The capability to insert transcoder (in cases where a TrFO connection is not possible) at the most appropriate location, i.e. to save bandwidth it should be located at the CN edge between an ATM or IP transport network and a STM network. When Transcoders are inserted, the OoBTC procedures shall provide support for TFO for inband codec negotiation and transmission of compressed speech.

  When a transport network cannot maintain compressed voice then reversion to the default PCM coding shall occur. A transcoder shall be inserted at that point and OoBTC procedures terminated. TrFO link is then possible between that point and the preceding nodes.

  When a Non-TrFO call reaches the UMTS CN then OoBTC procedures are initiated from that point and after codec negotiation has been performed, if compressed voice can be supported through the CN then a transcoder is inserted at the edge of the CN.
- The OoBTC signalling procedures shall be supported by the call control protocol on the Nc interface, for example codec negotiation, codec modification, codec list modification, codec renegotiation, and codec list re-negotiation. BICC CS2 (see 3GPP TS 29.205 [6]) supports such a mechanism, through the APM procedures defined by [7].
- The OoBTC signalling procedures shall be supported by the bearer control protocol on the Iu and Nb interfaces, for example to increase the bandwidth of the bearer (if needed) in the procedures for the codec modification.

3GPP TSG CN WG#4 Meeting #19 **N4-030700**
San Diego, US, 19th-23rd May 2003

CR-Form-v7

CHANGE REQUEST

⌘ **23.153** **CR** **055** ⌘**rev** **1** ⌘ Current version: **5.4.0** ⌘

*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:	⌘	Clarification of use of Default PCM codec and handling of the Codec List
Source:	⌘	CN4
Work item code:	⌘	OoBTC
Date:	⌘	6/5/2003
Category:	⌘	**A**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
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Use one of the following releases:
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Rel-5 (Release 5)
Rel-6 (Release 6)

Reason for change:	⌘	The OoBTC specification defines a default PCM codec (e.g. G711) and describes the call scenarios where compressed voice cannot be achieved and then default PCM is selected (this codec is used also for TFO cases). It is not stated clearly however that in order for this to be achieved the codec must be included in the codec list. In order to prevent interworking problems (one manufacturer assumes as it is default it does not need to be included) and to prevent calls being cleared due to an empty list (protocol error) this issue needs to be clarified. Also the default PCM codec should not include codec types that cannot support the TrFO/TFO features. The list of PCM codecs defined in ITU are not needed by 3GPP PLMNs – for example 56 kb/s codecs should not be supported.
Summary of change:	⌘	Default PCM codec shall always be included in the codec list, the default is defined already in 23.153 but clarified to be only 64kb/s -this is all that can be supported on Nb – the PCM codec is not negotiated. An empty codec list is a protocol error and shall be discarded. The call shall continue as if no codec list were received (BAT compatiblity report returned to preceeding node) – i.e. default PCM selected.
Consequences if not approved:	⌘	Interworking problems – calls could fail.

Clauses affected:	⌘	3.1, 4.1

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

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.

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NOTE 2: For example ITU G.711 A-law.

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NOTE: For a codec type supporting various modes, the described functionality shall also be applicable to negotiate the set of codec modes common to originating and terminating UEs. Other negotiations such as Initialisation and Rate control are performed at a later point in time by the Iu framing protocol.

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Where a change in call state as described above is temporary then it shall be possible to return to a transcoder free connection by removing the inserted transcoders and informing the endpoints that the connection has resumed to compressed speech encoding.

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- The transcoder control procedure shall not cause a perceivable time lag in the cases of establishing transcoder free connection and reverting to normal (double transcoded) call connection in the cases described above for control of the presence of transcoders.
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  When a transport network cannot maintain compressed voice then reversion to the default PCM coding shall occur. A transcoder shall be inserted at that point and OoBTC procedures terminated. TrFO link is then possible between that point and the preceding nodes.

  When a Non-TrFO call reaches the UMTS CN then OoBTC procedures are initiated from that point and after codec negotiation has been performed, if compressed voice can be supported through the CN then a transcoder is inserted at the edge of the CN.
- The OoBTC signalling procedures shall be supported by the call control protocol on the Nc interface, for example codec negotiation, codec modification, codec list modification, codec renegotiation, and codec list re-negotiation. BICC CS2 (see 3GPP TS 29.205 [6]) supports such a mechanism, through the APM procedures defined by [7].
- The OoBTC signalling procedures shall be supported by the bearer control protocol on the Iu and Nb interfaces, for example to increase the bandwidth of the bearer (if needed) in the procedures for the codec modification.

3GPP TSG CN WG#4 Meeting #19
San Diego, US, 19th-23rd May 2003

N4-030539

CR-Form-v7

CHANGE REQUEST

⌘ **23.153** **CR** **056** ⌘**rev** **-** ⌘ Current version: **4.7.0** ⌘

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

Title:	⌘	Clarification of handling of DTMF in TrFO
Source:	⌘	CN4
Work item code:	⌘	OoBTC
Date:	⌘	6/5/2003
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)*
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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:	⌘	**This is an essential correction.** Although in most cases where CELP codecs are used the DTMF tone is corrupted and cannot be used for control procedures, for some of the AMR modes some digits may be recognised. Duplication of DTMF digits can occur if TrFO links are used between PCM links and OoB digits are added to the PCM stream that also contains decoded "ghost" digits from the compressed stream.
Summary of change:	⌘	Clarify that when encoding from PCM to compressed - DTMF digits should be removed to prevent possible duplicate detection further along the call chain.
Consequences if not approved:	⌘	Duplication of digits and hence user identification/controlled procedures would fail.

Clauses affected:	⌘	5.9

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

Other comments:	⌘	

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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.

5.9 DTMF Handling For TrFO Connections

DTMF from the UE is sent via DTAP procedures out-band. For a TrFO call the Originating MSC shall use an out-band DTMF procedure, all CN nodes shall support this procedure in their call control protocol. The out-band DTMF procedure shall also be used when TrFO is not achieved in order that TFO is possible. Insertion of DTMF in the PCM payload can result in the break of the TFO connection.

For terminating calls DTMF may need to be received by the core network (for voice-prompted services, voicemail control procedures etc). If the DTMF is received out-band then out-band procedures shall be maintained in core network.

If the DTMF is received for a TrFO call from an external network inband, in I.366.2 profile or RTP payload type, then the gateway MGW which interworks between Iu Framing and the external framing protocol shall report the DTMF tones via H.248 procedures to its server. The server shall then use out-band procedures to pass the DTMF through the CN. See Figure 5.9/1.

The same shall apply if a DTMF tone is received for a TrFO call from an external network inband in a PCM coded stream. The DTMF tone shall be detected by the MGW and reported via H.248 procedures to its server. In order to prevent duplication of DTMF tones due to subsequent PCM legs in the call, when encoding to compressed codecs the detected tones shall not be allowed to continue in the compressed stream; the DTMF Digits shall be deleted by the MGW before entering the speech encoding stage.

The MGW may also optionally pass DTMF inband where such an option exists for the Nb interface, and is supported by the proceeding MGW.

Transcoding to default PCM to send DTMF tones shall be avoided for TrFO connections.

3GPP TSG CN WG#4 Meeting #19
San Diego, US, 19th-23rd May 2003

N4-030540

CR-Form-v7

CHANGE REQUEST

⌘ **23.153** **CR** **057** ⌘ **rev** **-** ⌘ Current version: **5.4.0** ⌘

*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:	⌘	Clarification of handling of DTMF in TrFO
Source:	⌘	CN4
Work item code:	⌘	OoBTC
Date:	⌘	6/5/2003
Category:	⌘	**A**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
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R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	Although in most cases where CELP codecs are used the DTMF tone is corrupted and cannot be used for control procedures, for some of the AMR modes some digits may be recognised. Duplication of DTMF digits can occur if TrFO links are used between PCM links and OoB digits are added to the PCM stream that also contains decoded “ghost” digits from the compressed stream.
Summary of change:	⌘	Clarify that when encoding from PCM to compressed - DTMF digits should be removed to prevent possible duplicate detection further along the call chain.
Consequences if not approved:	⌘	Duplication of digits and hence user identification/controlled procedures would fail.

Clauses affected:	⌘	5.9			
Other specs affected:	⌘	**Y**	**N**		⌘
			X	Other core specifications	
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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For terminating calls DTMF may need to be received by the core network (for voice-prompted services, voicemail control procedures etc). If the DTMF is received out-band then out-band procedures shall be maintained in core network.

If the DTMF is received for a TrFO call from an external network inband, in I.366.2 profile or RTP payload type, then the gateway MGW which interworks between Iu Framing and the external framing protocol shall report the DTMF tones via H.248 procedures to its server. The server shall then use out-band procedures to pass the DTMF through the CN. See Figure 5.9/1.

The same shall apply if a DTMF tone is received for a TrFO call from an external network inband in a PCM coded stream. The DTMF tone shall be detected by the MGW and reported via H.248 procedures to its server. In order to prevent duplication of DTMF tones due to subsequent PCM legs in the call, when encoding to compressed codecs the detected tones shall not be allowed to continue in the compressed stream; the DTMF Digits shall be deleted by the MGW before entering the speech encoding stage.

The MGW may also optionally pass DTMF inband where such an option exists for the Nb interface, and is supported by the proceeding MGW.

Transcoding to default PCM to send DTMF tones shall be avoided for TrFO connections.

3GPP TSG CN WG#4 Meeting #19
San Diego, US, 19th-23rd May 2003

N4-030701

CR-Form-v7

CHANGE REQUEST

⌘ **23.153** **CR** **058** ⌘**rev** **2** ⌘ Current version: **4.7.0** ⌘

*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:	⌘	Clarification of use of TMR for codec negotiation
Source:	⌘	CN4
Work item code:	⌘	OoBTC
Date:	⌘	6/5/2003
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:	⌘	Not clear if TMR is unchanged for TrFO calls. During the SCUDIF work which makes use of the OoBTC protocol the question arose whether the TMR value was relevant as the BICC signalling includes speech codecs and from this the transmission requirements can be obtained. For SCUDIF the TMR depended on which "service" was actually selected and therefore an arbitrary value (=speech) was selected. However as TrFO can be initiated at the PLMN border with PSTN then calls may be received with TMR=3.1khz. This CR clarifies that the TMR value is unchanged by adding OoBTC signalling. **This is an Esential Correction**
Summary of change:	⌘	Clarification that TMR is not changed due to OoBTC. TMR = speech is set only when call is known to be speech otherwise 3.1Khz is used.
Consequences if not approved:	⌘	Interworking problems – if TMR is changed then compress codecs could be inserted when they should not.

Clauses affected:	⌘	4.1

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

Other comments:	⌘	

4.1 OoBTC Requirements

The OoBTC mechanism shall support the following:

- The capability to negotiate the preferred codec type to be used between two end nodes and to avoid the use of transcoders in the network at call set-up.

The originating UE indicates the list of its supported codec types for codec negotiation. This list shall be conveyed to the terminating MSC. The terminating UE indicates its list of supported codec types to the terminating MSC. The terminating MSC shall convey the selected codec to the originating MSC, which then indicates the selected codec to the originating UE.

Where no compatible codec type can be selected between the UEs then the default PCM coding shall be selected. The originating MSC shall insert a transcoder in the path from the originating UE. Codec selection for the terminating UE is then performed within the terminating MSC, independently of the originating MSC.

NOTE: For a codec type supporting various modes, the described functionality shall also be applicable to negotiate the set of codec modes common to originating and terminating UEs. Other negotiations such as Initialisation and Rate control are performed at a later point in time by the Iu framing protocol.

- The capability to control the presence of transcoders in the network after call set-up.

Where a change to the call state of a transcoder free connection occurs, such that compressed speech cannot be maintained, it shall be possible to insert a transcoder or pair of transcoders where needed in the path. If this results in change to the encoding of the speech in other nodes then it shall be possible to inform the end points of this segment that the speech coding is changed. Such examples where this could occur are:

- SS interruptions (e.g. A to B call connection becomes to multiparty call connection.)
- Handover to an incompatible partner.
- Synchronisation loss

Where a change in call state as described above is temporary then it shall be possible to return to a transcoder free connection by removing the inserted transcoders and informing the endpoints that the connection has resumed to compressed speech encoding.

- The codec types comprise codecs for speech in the first phase of the present document. The transcoder control should have enough expandability to support future enhancements of codec types.
- The transcoder control procedure shall not cause a perceivable time lag in the cases of establishing transcoder free connection and reverting to normal (double transcoded) call connection in the cases described above for control of the presence of transcoders.
- The capability to insert transcoder (in cases where a TrFO connection is not possible) at the most appropriate location, i.e. to save bandwidth it should be located at the CN edge between an ATM or IP transport network and a STM network. When Transcoders are inserted, the OoBTC procedures shall provide support for TFO for inband codec negotiation and transmission of compressed speech.

  When a transport network cannot maintain compressed voice then reversion to the default PCM coding shall occur. A transcoder shall be inserted at that point and OoBTC procedures terminated. TrFO link is then possible between that point and the preceding nodes.

  When a Non-TrFO call reaches the UMTS CN then OoBTC procedures are initiated from that point and after codec negotiation has been performed, if compressed voice can be supported through the CN then a transcoder is inserted at the edge of the CN.

- The OoBTC signalling procedures shall be supported by the call control protocol on the Nc interface, for example codec negotiation, codec modification, codec list modification, codec renegotiation, and codec list re-negotiation. BICC CS2 (see 3GPP TS 29.205 [6]) supports such a mechanism, through the APM procedures defined by [7].

- If TMR = 3.1Khz Audio is set for incoming calls, this shall be kept if OoBTC is intiated at the edge of the PLMN.

- For mobile originating calls, TMR=speech shall be used for speech calls with ~~no~~ OoBTC. For other TMR values OoBTC shall not be used ~~otherwise~~.

- The OoBTC signalling procedures shall be supported by the bearer control protocol on the Iu and Nb interfaces, for example to increase the bandwidth of the bearer (if needed) in the procedures for the codec modification.

3GPP TSG CN WG#4 Meeting #19
San Diego, US, 19th-23rd May 2003

N4-030702

CR-Form-v7

CHANGE REQUEST

⌘ **23.153** **CR** **059** ⌘ **rev** **1** ⌘ Current version: **5.4.0** ⌘

*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:	⌘	Clarification of use of TMR for codec negotiation
Source:	⌘	CN4
Work item code:	⌘	OoBTC
Date:	⌘	6/5/2003
Category:	⌘	**A**
Release:	⌘	Rel-5

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)*
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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:	⌘	Not clear if TMR is unchanged for TrFO calls. During the SCUDIF work which makes use of the OoBTC protocol the question arose whether the TMR value was relevant as the BICC signalling includes speech codecs and from this the transmission requirements can be obtained. For SCUDIF the TMR depended on which "service" was actually selected and therefore an arbitrary value (=speech) was selected. However as TrFO can be initiated at the PLMN border with PSTN then calls may be received with TMR=3.1khz. This CR clarifies that the TMR value is unchanged by adding OoBTC signalling.
Summary of change:	⌘	Clarification that TMR is not changed due to OoBTC. TMR = speech is set only when call is known to be speech otherwise 3.1Khz is used.
Consequences if not approved:	⌘	Interworking problems – if TMR is changed then compress codecs could be inserted when they should not.

Clauses affected:	⌘	4.1
Other specs affected:	⌘	Y N ☐ X Other core specifications ☐ X Test specifications ☐ X O&M Specifications
Other comments:	⌘	

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Where no compatible codec type can be selected between the UEs then the default PCM coding shall be selected. The originating MSC shall insert a transcoder in the path from the originating UE. Codec selection for the terminating UE is then performed within the terminating MSC, independently of the originating MSC.

NOTE: For a codec type supporting various modes, the described functionality shall also be applicable to negotiate the set of codec modes common to originating and terminating UEs. Other negotiations such as Initialisation and Rate control are performed at a later point in time by the Iu framing protocol.

- The capability to control the presence of transcoders in the network after call set-up.

Where a change to the call state of a transcoder free connection occurs, such that compressed speech cannot be maintained, it shall be possible to insert a transcoder or pair of transcoders where needed in the path. If this results in change to the encoding of the speech in other nodes then it shall be possible to inform the end points of this segment that the speech coding is changed. Such examples where this could occur are:

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- Handover to an incompatible partner.
- Synchronisation loss

Where a change in call state as described above is temporary then it shall be possible to return to a transcoder free connection by removing the inserted transcoders and informing the endpoints that the connection has resumed to compressed speech encoding.

- The codec types comprise codecs for speech in the first phase of the present document. The transcoder control should have enough expandability to support future enhancements of codec types.
- The transcoder control procedure shall not cause a perceivable time lag in the cases of establishing transcoder free connection and reverting to normal (double transcoded) call connection in the cases described above for control of the presence of transcoders.
- The capability to insert transcoder (in cases where a TrFO connection is not possible) at the most appropriate location, i.e. to save bandwidth it should be located at the CN edge between an ATM or IP transport network and a STM network. When Transcoders are inserted, the OoBTC procedures shall provide support for TFO for inband codec negotiation and transmission of compressed speech.

  When a transport network cannot maintain compressed voice then reversion to the default PCM coding shall occur. A transcoder shall be inserted at that point and OoBTC procedures terminated. TrFO link is then possible between that point and the preceding nodes.

  When a Non-TrFO call reaches the UMTS CN then OoBTC procedures are initiated from that point and after codec negotiation has been performed, if compressed voice can be supported through the CN then a transcoder is inserted at the edge of the CN.

- The OoBTC signalling procedures shall be supported by the call control protocol on the Nc interface, for example codec negotiation, codec modification, codec list modification, codec renegotiation, and codec list re-negotiation. BICC CS2 (see 3GPP TS 29.205 [6]) supports such a mechanism, through the APM procedures defined by [7].

- If TMR = 3.1Khz Audio is set for incoming calls, this shall be kept if OoBTC is intiated at the edge of the PLMN.

For mobile originating calls, TMR=speech shall be used for speech calls with OoBTC. For other TMR values OoBTC shall not be used.

- The OoBTC signalling procedures shall be supported by the bearer control protocol on the Iu and Nb interfaces, for example to increase the bandwidth of the bearer (if needed) in the procedures for the codec modification.

3GPP TSG CN WG#4 Meeting #19
San Diego, US, 19th-23rd May 2003

N4-030543

CR-Form-v7

CHANGE REQUEST

⌘ **23.153** **CR** **060** ⌘ **rev** **-** ⌘ Current version: **4.7.0** ⌘

*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:	⌘	Clarification of IuUP Initialisation during codec modification
Source:	⌘	CN4
Work item code:	⌘	OoBTC
Date:	⌘	6/5/2003
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:	⌘	If the SDU requirements for a new codec are identical to the SDU requirements for the existing codec then at codec modification the MGW shall not re-initialise the User Plane through the core-network or expect to receive an IuUP Init. Currently the specification is unclear in this respect.
Summary of change:	⌘	Clarification that the MGW only re-initialises the User Plane if the SDU formats change.
Consequences if not approved:	⌘	Interworking problems – one MGW may expect an IuUP init when its peer does not send one, and vice versa.

Clauses affected:	⌘	4.1

		Y	N			
Other specs affected:	⌘	X		Other core specifications	⌘	TS 29.232
			X	Test specifications		
			X	O&M Specifications		

Other comments:	⌘	

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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.

5.8.4 Detailed Procedures For Iu Framing Protocol & Codec Modification

The IuFP must be initialised sequentially from one end to the other in order to store new RFCIs in each node to allow TrFO to resume. The IuFP shall be initialised in the backward direction with respect to the Codec Modification/Modify To Selected Codec message as shown in Figure 5.8.4/1.

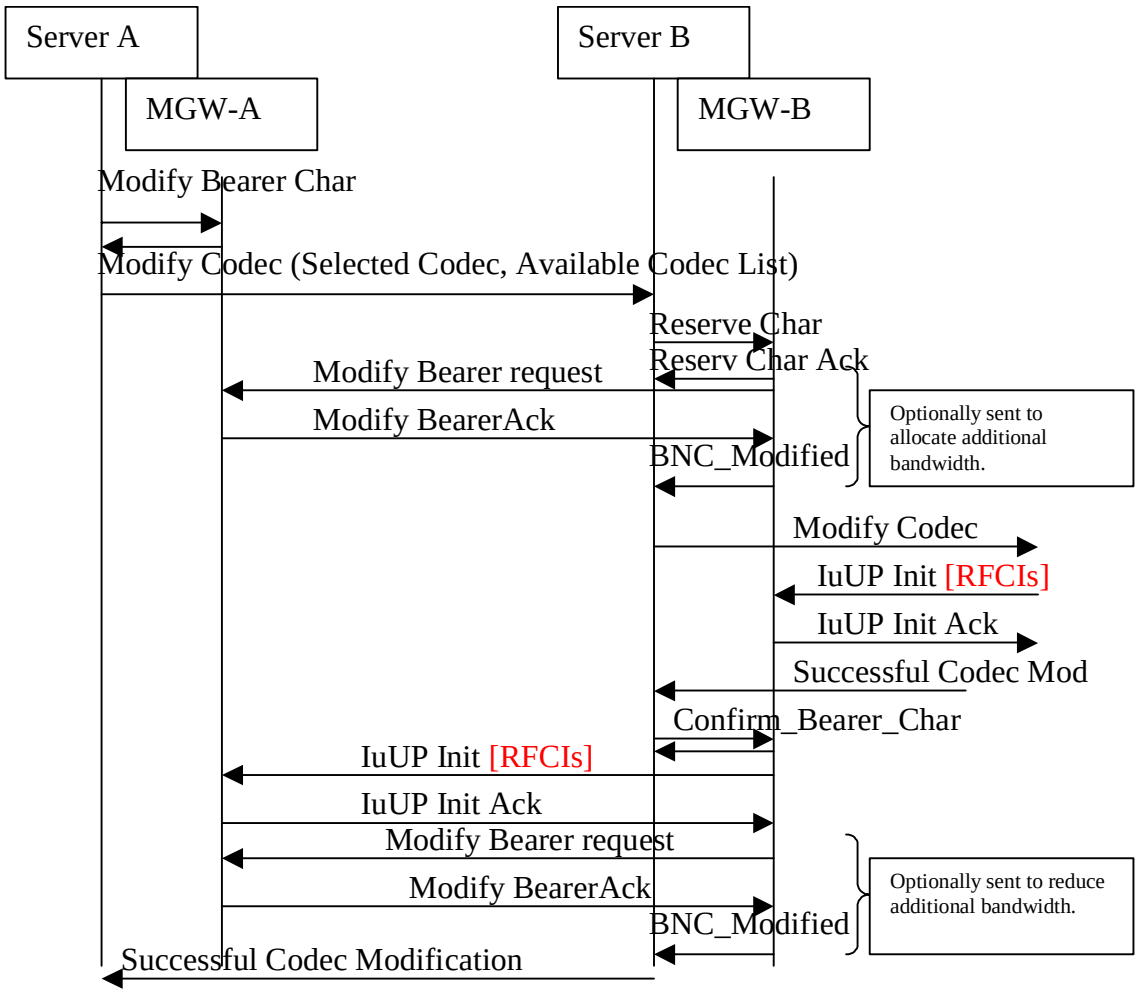

Figure 5.8.3.4/1: Successful Codec Modification including IuFP

A MGW receiving a Modify Bearer Characteristics procedure shall be prepared to receive an incoming modify bearer procedure, this may be to increase the bandwidth prior to IuUP Initialisation or to reduce the bandwidth after the IuUP Intialisation. If ~~As~~ the new codec indicated in the Modify Bearer Characteristics procedure has different SDU format requirements~~s~~ from the codec that is currently used the MGW shall be prepared to receive an IuUP Initialisation for the new codec. If the SDU formats for both the old codec and the new codec are identical then no IuUP initialisation shall occur. The MGWs shall be prepared for the new codec type on receipt of the Modify_Bearer_Char procedure.

Each termination receiving a Reserve_Char will initiate bearer level modification to the preceeding node if needed - i.e. if the bandwidth needs to be increased to support the new IuUP. No IuUP initialisation occurs at this point in time. If the Codec Modification Request is terminated by a MGW the IuUP init through the core-network is triggered by the setting of the 3GUP package property “initialisation direction” to “OUT” in either the Reserve_Char or the Confirm_Char procedure; the MGW shall then start the IuUP Initialisation out from that Termination. If the node terminating the modification is an RNC then it will generate a new IuUP Initialisation toward its access MGW, each Termination shall have the initialisation direction set to “IN”. Each MGW shall in turn acknowledge the IuUP Init to the succeeding node (with respect to the modification request) and forward the RFCIs in an IuUP Initialisation to the preceding MGW (as for call set-up). After completing the Iu UP initialisation and receiving the“Confirm Characteristics” procedure, the MGW may decrease the bandwidth of the corresponding bearer performing the “Modify

Bearer" procedure (if needed) - no bearer bandwidth reduction shall be initiated while the UP is still initialised for the old codec. If the SDU formats for both the old codec and the new codec are identical then no IuUP initialisation shall occur. The MGWs shall be prepared for the new codec type on receipt of the Reserve_Char procedure.

An example call sequence is shown in Figure 5.8.4/2.

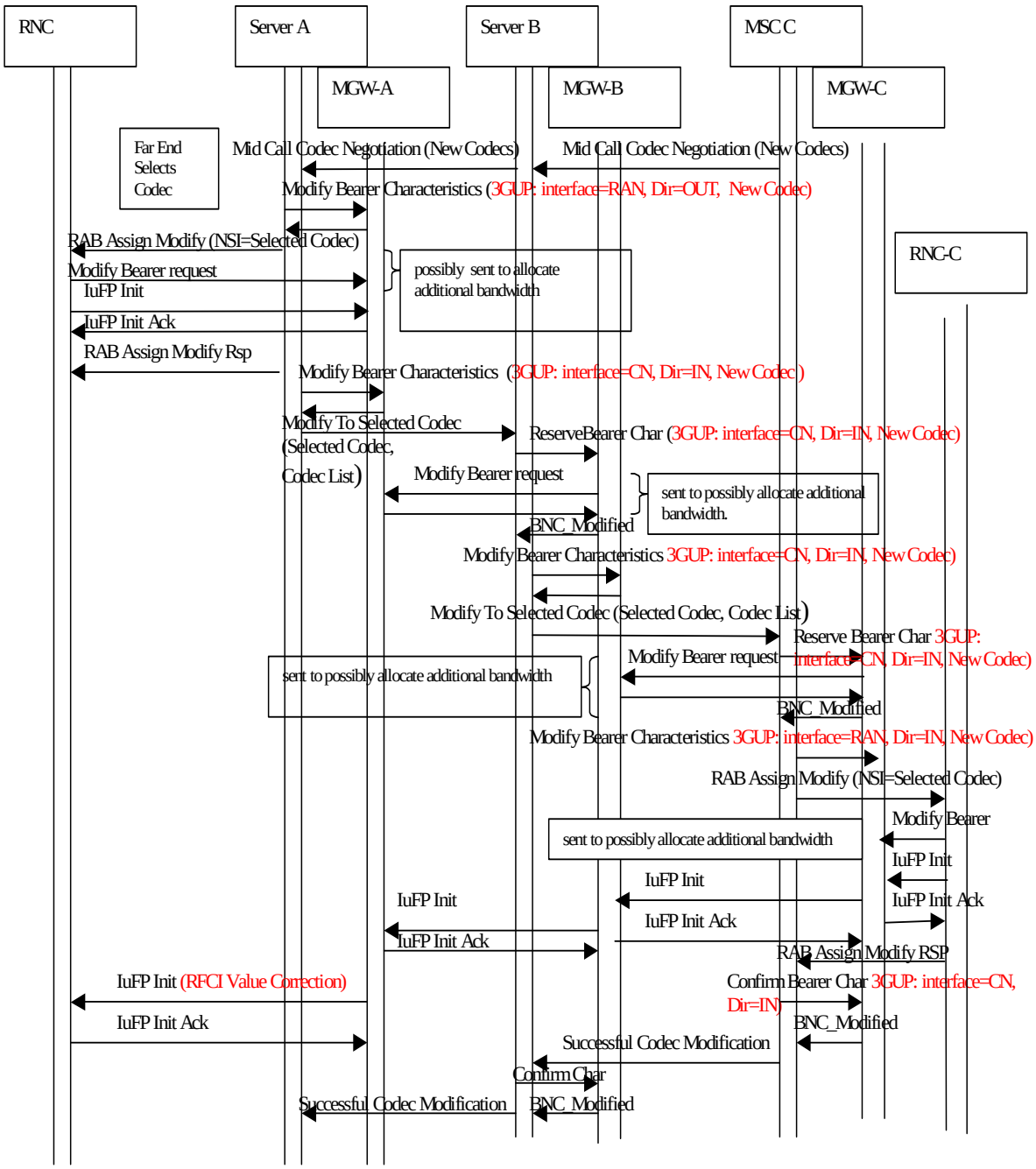

Figure 5.8.4/2: Mid Call Codec Negotiation Call Sequence

5.8.5 Unsuccessful Codec Modification

If the Codec Modification is unsuccessful at a certain node in the connection (due to the MGW rejecting a request to reserve the resources or a server rejecting the request to modify the codec) the Confirm_Char message shall be sent to a termination that previously performed a successful Reserve_Char Procedure to change the bearer back to its original bandwidth (if needed) and free up any reserved resources. However as the IuUP has not been modified, the Confirm_Char shall not trigger an IuFP re-initialisation. The basic sequence is shown in Figure 5.8.5/1 and a detailed

call flow is described in Figure 5.8.5/2. A server that performed a Modify Bearer Characteristics procedure to a termination with the new codec shall perform a subsequent Modify Bearer Characteristics procedure to that termination with the old codec in the failure case. As no IuFP initialisation occurs in the unsuccessful case the IuFP currently intialised will then match the old codec restored by the subsequent Modify Bearer Char; the MGW then knows that it can return to TrFO. If the SDU formats for both the old codec and the new codec are identical then no IuUP initialisation would be needed. The MGWs can return to TrFO when the Old Codec is signalled in the subsequent Confirm_Char or Modify_Bearer_Char procedure.

The Codec Modification Failure message shall not be returned to a preceding node until notification of the bearer level modification (BNC_Modified).

RAB Assigment Modification Failure

If the reason for failed codec modification is due to an unsuccessful RAB Modification Request then the MSC shall assume that the old RAB is resumed and thus shall restore the old codec.

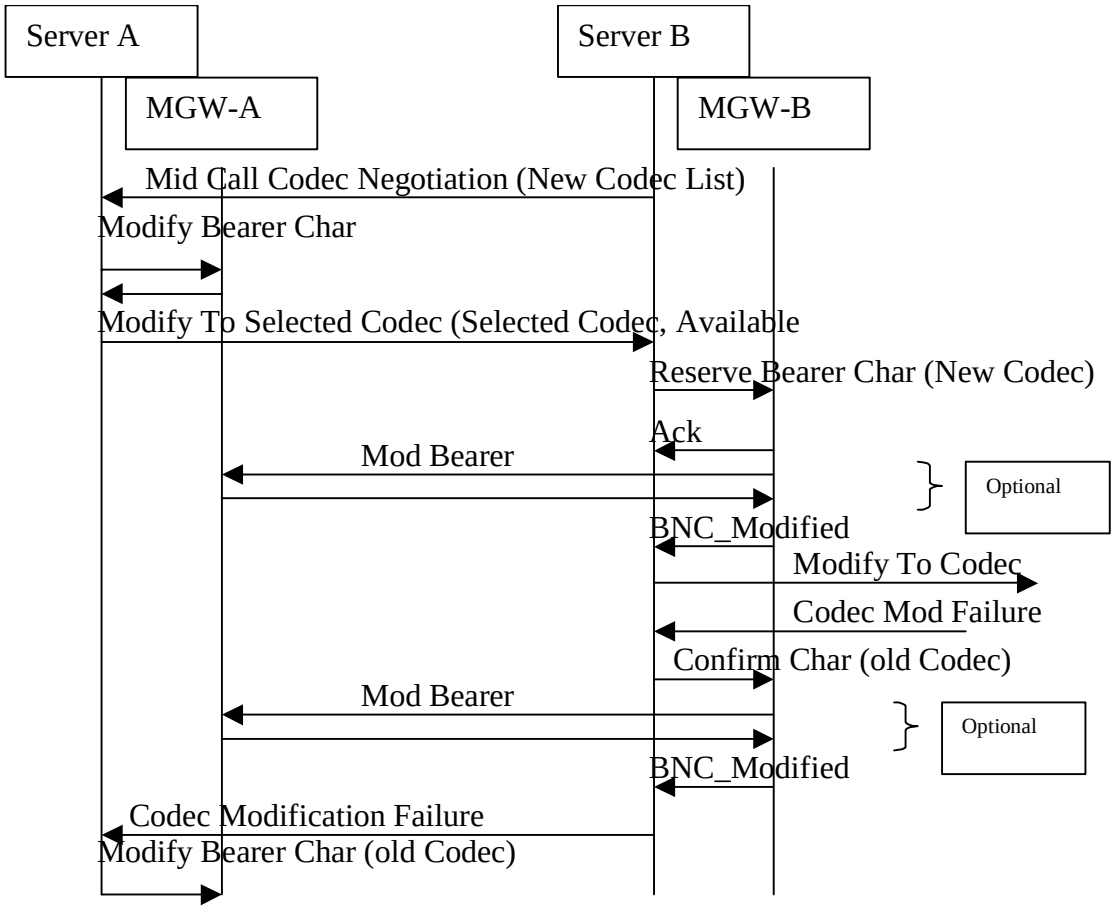

Figure 5.8.5/1: Unsuccessful Codec Modification

IuUP Initialisation Unsuccessful

If the IuUP initialisation fails (this must be due to some protocol error or transmission error because the resources have already been successfully reserved) then the UP protocol is cleared by the peers (see TS 25.415) and therefore the MGW shall notify the Server with a Bearer_Released notification, the call shall be cleared (normal MGW initiated call clearing applies – see TS 23.205 clause 7.4 [8]).

3GPP TSG CN WG#4 Meeting #19
San Diego, US, 19th-23rd May 2003

N4-030544

CR-Form-v7

CHANGE REQUEST

⌘ **23.153** **CR** **061** ⌘ **rev** **-** ⌘ Current version: **5.4.0** ⌘

*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:	⌘	Clarification of IuUP Initialisation during codec modification
Source:	⌘	CN4
Work item code:	⌘	OoBTC
Date:	⌘	6/5/2003
Category:	⌘	**A**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
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D *(editorial modification)*
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Use one of the following releases:

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R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	If the SDU requirements for a new codec are identical to the SDU requirements for the existing codec then at codec modification the MGW shall not re-initialise the User Plane through the core-network or expect to receive an IuUP Init. Currently the specification is unclear in this respect.
Summary of change:	⌘	Clarification that the MGW only re-initialises the User Plane if the SDU formats change.
Consequences if not approved:	⌘	Interworking problems – one MGW may expect an IuUP init when its peer does not send one, and vice versa.

Clauses affected:	⌘	4.1

		Y	N			
Other specs affected:	⌘	X		Other core specifications	⌘	TS 29.232
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Other comments:	⌘	

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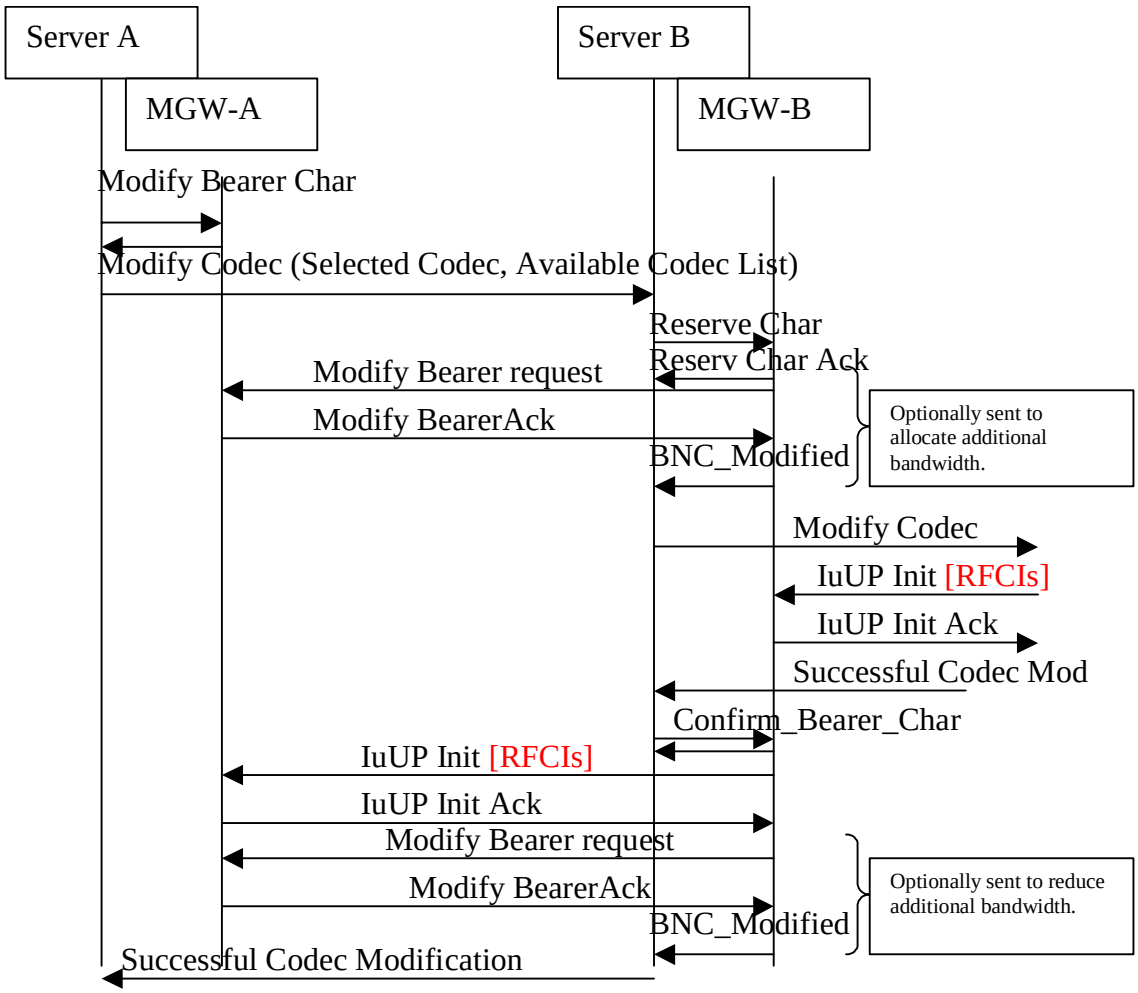

Figure 5.8.3.4/1: Successful Codec Modification including IuFP

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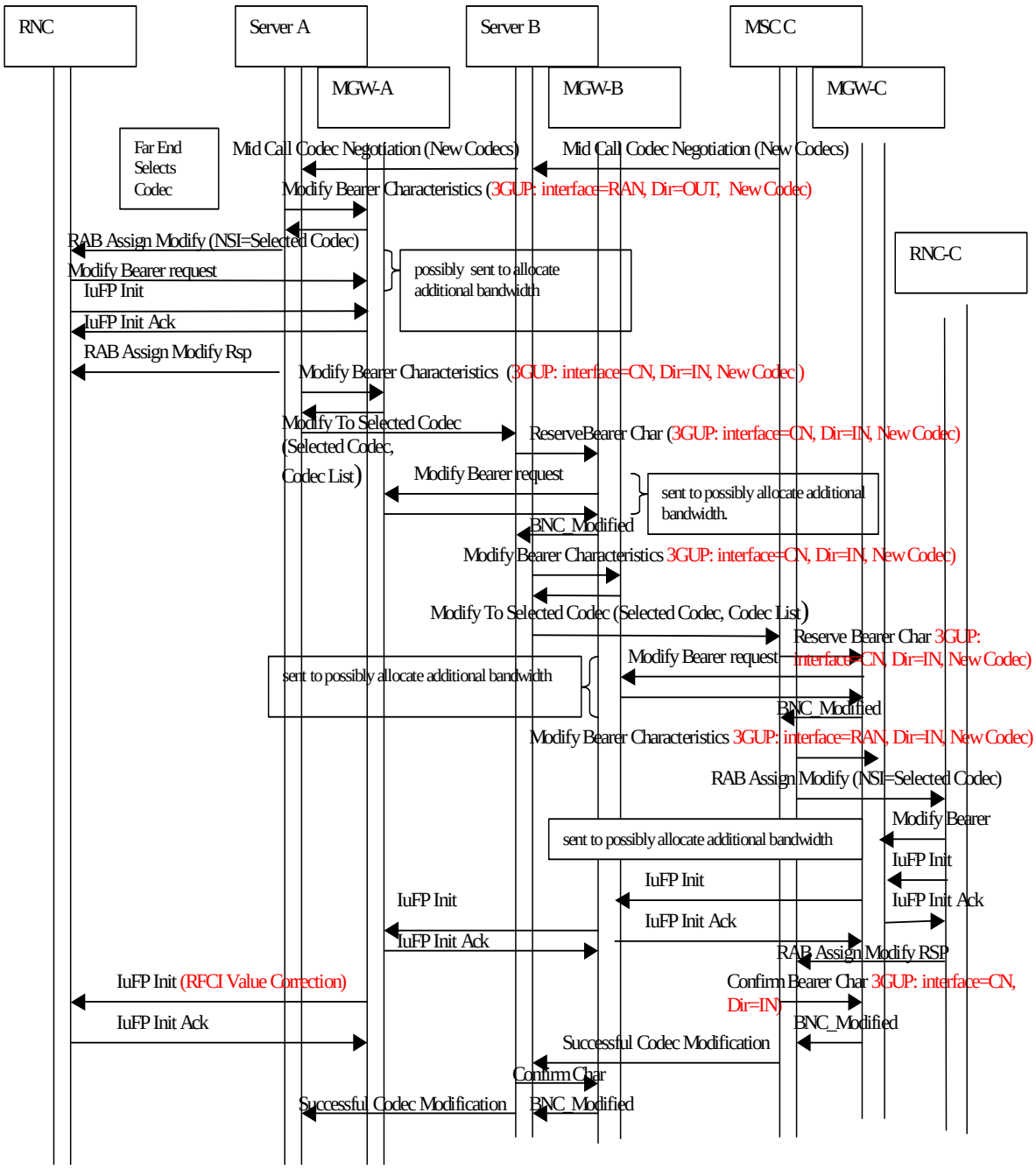

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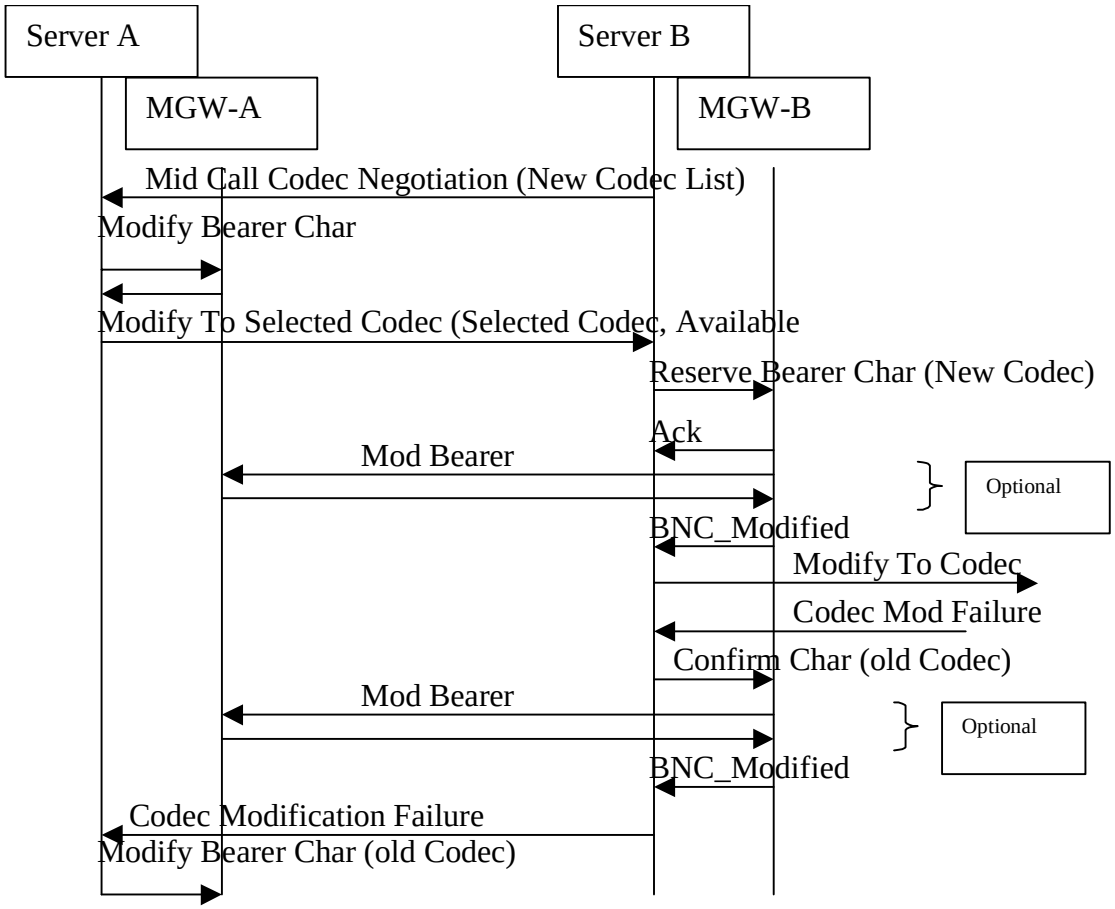

Figure 5.8.5/1: Unsuccessful Codec Modification

IuUP Initialisation Unsuccessful

If the IuUP initialisation fails (this must be due to some protocol error or transmission error because the resources have already been successfully reserved) then the UP protocol is cleared by the peers (see TS 25.415) and therefore the MGW shall notify the Server with a Bearer_Released notification, the call shall be cleared (normal MGW initiated call clearing applies – see TS 23.205 clause 7.4 [8]).

3GPP TSG CN WG4 Meeting #18 **N4-030545**
Dublin, EIRE, 10th – 14th February 2003

CR-Form-v7

CHANGE REQUEST

⌘ **29.232** **CR** **055** ⌘**rev** **1** ⌘ Current version: **4.7.0** ⌘

*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:	⌘	Independence Of SDU and Application
Source:	⌘	CN4
Work item code:	⌘	OoBTC
Date:	⌘	09/05/03
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:	⌘	It is not clear that when requested to modify a codec type the MGW should only expect or initiate a re-initialisation of the User Plane if the SDU formats for the new codec type do not match those of the exisiting codec. If one MGW intiates the change but another does not expect it (or vice versa) misoperation would occur. Re-intialisation of the IuUP should not be performed if the SDU format remains unchanged – the IuUP is application independent and thus only wasted signalling and processor load would result.
Summary of change:	⌘	MGW behaviour defined for codec modification to only expects to receive or initiate IuUP re-initialisation when SDU formats need to change.
Consequences if not approved:	⌘	Misoperation between different MGW vendors if one vendor assumes that the IuUP should be re-initialised due to a codec change (where SDU format is unchanged) and another assumes that it should remain.

Clauses affected:	⌘	2, 14.2.36, 14.2.40, 14.2.41

Other specs affected:	⌘	Y	N		⌘	
		X		Other core specifications		TS 23.153
			X	Test specifications		
			X	O&M Specifications		

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.

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

2 References

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

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[1] 3GPP TS 23.153: "3rd Generation Partnership Project; Technical Specification Group Core Network; Out of Band Transcoder Control - Stage 2"

[2] 3GPP TS 23.205: "3rd Generation Partnership Project; Technical Specification Group Core Network; Bearer Independent CS Core Network – Stage 2"

[3] 3GPP TS 24.008: "3rd Generation Partnership Project; Technical Specification Group Core Network; Mobile radio interface layer 3 specification"

[4] 3GPP TS 25.415: "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; UTRAN Iu interface user plane protocols".

[5] 3GPP TS 28.062: "3rd Generation Partnership Project; Technical Specification Group Services & System Aspects; In-band Tandem Free Operation (TFO) of Speech Codecs; Stage 3 – Service Description"

[6] 3GPP TS 29.007: "3rd Generation Partnership Project; Technical Specification Group Core Network; General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN)"

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[9] 3GPP TS 48.008: "3rd Generation Partnership Project; Technical Specification Group GSM EDGE Radio Access Network; Mobile-services Switching Centre - Base Station System (MSC - BSS) interface; Layer 3 specification".

[10] ITU-T Recommendation H.248 (06/00): "Media Gateway Control Protocol"

[11] ITU-T Recommendation Q.2210 (07/96): "Message transfer part level 3 functions and messages using the services of ITU-T Recommendation Q.2140"

[12] RFC 2960 "Stream Control Transmission Protocol"

[13] 3G TS 29.202: "SS7 signalling transport in core network"

[14] ITU-U Recommendation H.248 Annex L, “Error Codes and Service Change Reason Description”

[x] 3GPP TS 26.102: "3rd Generation Partnership Project; Mandatory Speech Codec; AMR Speech Codec; Interface to Iu, Uu and Nb;"

14.2.36 Modify Bearer Characteristics

This procedure is the same as that defined in the subclause "Modify Char" in ITU-T Recommendation Q.1950 (see 3GPP TS 29.205 [7]) with additions as shown below.

Address Information	Control information	Bearer information
	If framing protocol used: UP mode = mode UPversion =version Delivery of erroneous SDUs=value Interface=interface Initdirerection=initdirection Bitrate = bitrate If indication on Protocol Negotiation Result requested: NotificationRequested (Event ID = x, "Prot Negotiation Result") If indication on Rate Change requested: NotificationRequested (Event ID = x, "RateChange")	If data call: PLMN bearer capbility = PLMN capability GSM channel coding=coding

If the “Modify Bearer Characteristics” procedure contains a codec that is not currently in use at the Termination when it receives this procedure, and if the framing protocol is used in support mode, the MGW shall be prepared to handle a framing protocol initialisation. If the “Modify Bearer Characteristics” contains no codec or the codec that is already in use at the Termination when it receives this procedure or if the codec modes have the same SDU requirements as the exisiting codec (see [x]), the MGW shall ~~does~~ not ~~need to be prepared to~~ handle a framing protocol initialisation.

14.2.40 Reserve Bearer Characteristics

This procedure is the same as that defined in the subclause "Reserve Char" in ITU-T Recommendation Q.1950 (see 3GPP TS 29.205 [7]) with additions as shown below.

Address Information	Control information	Bearer information
	If framing protocol used: UP mode = mode UPversion =version Delivery of erroneous SDUs=value Interface=interface Initdirerection=initdirection	

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3GPP TSG CN WG4 Meeting #18 **N4-030546**
Dublin, EIRE, 10th – 14th February 2003

CR-Form-v7

CHANGE REQUEST

⌘ **29.232** **CR** **056** ⌘ **rev** **1** ⌘ Current version: **5.5.0** ⌘

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

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Source:	⌘	CN4
Work item code:	⌘	OoBTC
Date:	⌘	09/05/03
Category:	⌘	**A**
Release:	⌘	Rel-5

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		Y	N			
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[15] ITU-U Recommendation H.248 (Annex M.2): "Media gateway resource congestion handling package".

[16] 3GPP TS 26.103: "Speech codec list for GSM and UMTS".

[17] ITU-U Recommendation H.248 (Annex F): "Facsimile, text conversation and call discrimination packages".

[18] 3GPP TS 26.226: "Cellular text telephony; Transport of text in the voice channel".

[19] ITU-T Recommendation T.140: "Protocol for multimedia application text conversation".

[20] 3GPP TS 25.413: "UTRAN Iu interface RANAP signalling".

[21] 3GPP TS 25.414: "UTRAN Iu interface data transport and transport signalling".

[22] 3GPP TS 23.078: "Customized Applications for Mobile network Enhanced Logic (CAMEL); Stage 2".

[23] ITU-T Recommendation Q.1950: "Bearer independent call bearer control protocol".

[24] ITU-T Recommendation Q.765.5: "Signalling system No. 7 - Application transport mechanism: Bearer Independent Call Control (BICC)".

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

[26] 3GPP TS 26.102: "3rd Generation Partnership Project; Mandatory speech codec; AMR speech codec; Interface to Iu, Uu and Nb"

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