3GPP TSG CN Plenary Meeting #20 $4^{th}-6^{th}$ 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	Α	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	Α	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	Α	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	Α	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	Α	5.4.0

	CHANGE RE	CHANGE REQUEST											
*	23.153 CR 054 #re	ev 2 * Current version: 4.7.0 *											
For <u>HELP</u> on u	ng this form, see bottom of this page	e or look at the pop-up text over the ℜ symbols.											
Proposed change a	f ects: UICC apps器 <mark></mark> MI	Radio Access Network Core Network X											
Title: Ж	Clarification of use of Default PCM	codec and handling of the Codec List											
Source: #	CN4												
Work item code: ₩	DoBTC	Date: # 6/5/2003											
Reason for change	se one of the following categories: F (correction) A (corresponds to a correction in an B (addition of feature), C (functional modification of feature) D (editorial modification) etailed explanations of the above category found in 3GPP TR 21.900. The Oobto specification defined describes the call scenarios where the default PCM is selected (to stated clearly however that in control included in the codec list. In ormanufacturer assumes as it is prevent calls being cleared due to be clarified. Also the default cannot support the TrFO/TFO	R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) gories can Rel-4 (Release 4) Rel-5 (Release 5) Rel-6 (Release 6) These a default PCM codec (e.g. G711) and release a default PCM codec (e.g. G711) and release a default PCM codec (e.g. G711) and release a default release a default release for TFO cases). It is not corder for this to be achieved the codec must be release to prevent interworking problems (one a default it does not need to be included) and to release to an empty list (protocol error) this issue needs a PCM codec should not include codec types that features. The list of PCM codecs should not be											
Summary of chang	★ Default PCM codec shall alway	ys be included in the codec list											
Consequences if not approved:	★ Interworking problems – calls of	could fail.											
Clauses affected:	第 3.1, 4.1												
Other specs affected:	Y N X Other core specifications	s #											
Other comments:	x												

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 renegotiation. 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.

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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.

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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 renegotiation. 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.

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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.

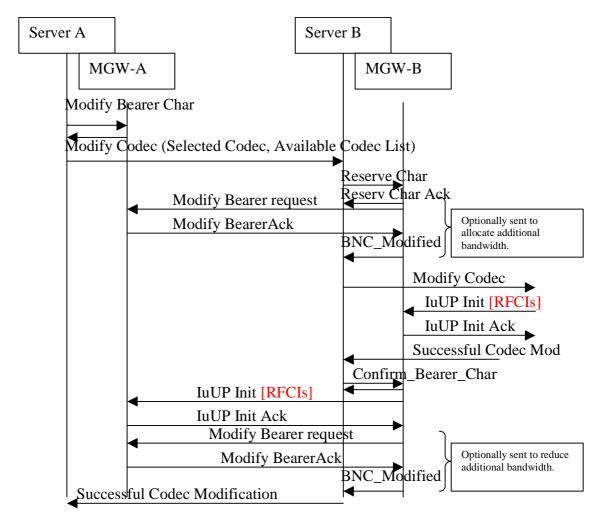


Figure 5.8.3.4/1: Successful Codec Modification including luFP

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 requirementss 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 preceding 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

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

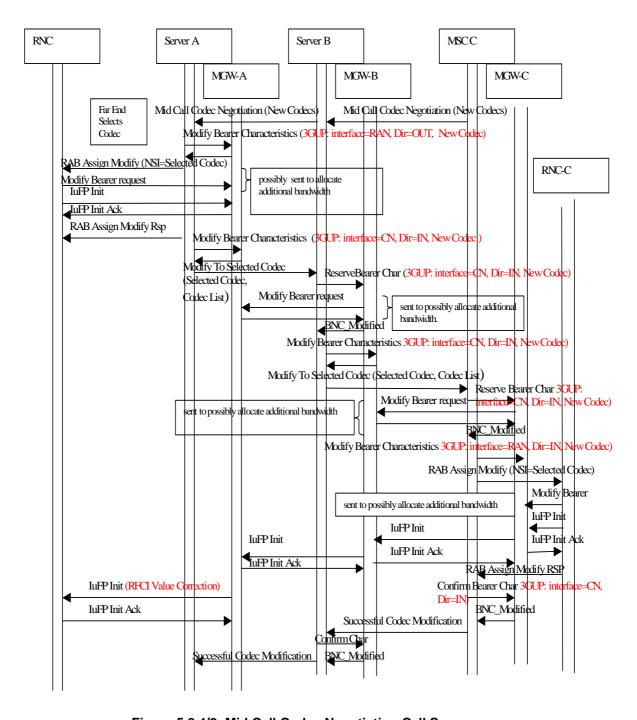


Figure 5.8.4/2: Mid Call Codec Negotiation Call Sequence

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

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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.

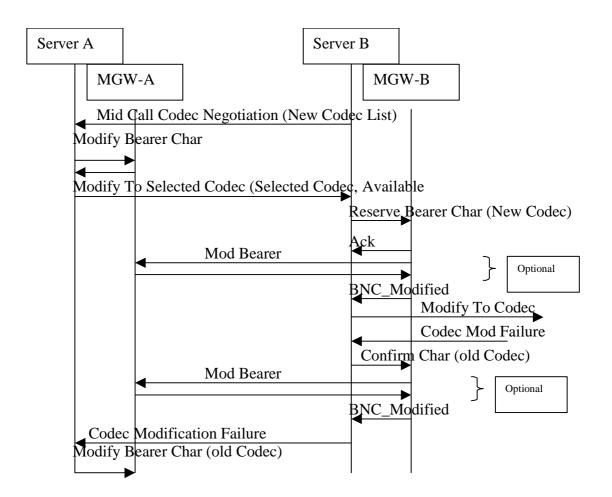


Figure 5.8.5/1: Unsuccessful Codec Modification

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]).

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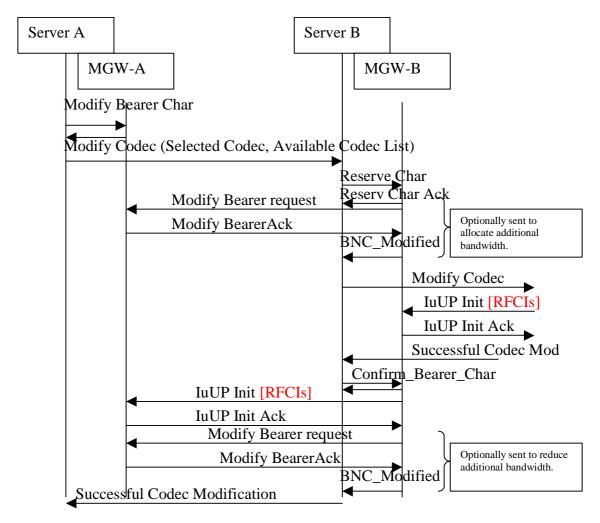


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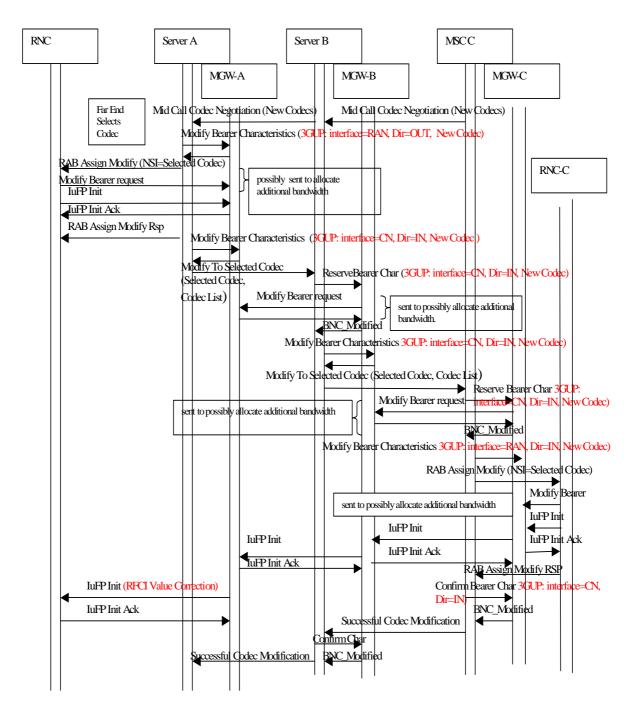


Figure 5.8.4/2: Mid Call Codec Negotiation Call Sequence

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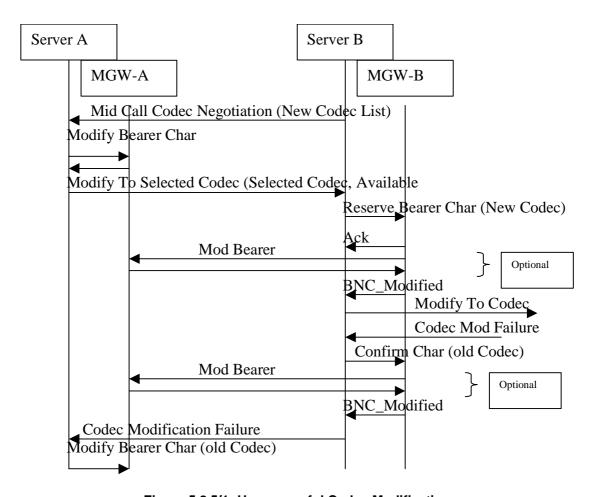


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Other specs affected:	36	X	Test spe	ore specifications	;	¥	TS	23.153			
Other comments:	æ										

How to create CRs using this form:
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Below is a brief summary:

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2 References

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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)"
[7]	3GPP TS 29.205: "3rd Generation Partnership Project; Technical Specification Group Core Network; Application of Q.1900 series to Bearer Independent CS Network architecture; Stage 3"
[8]	3GPP TS 29.415: "3rd Generation Partnership Project; Technical Specification Group Core Network; CN Nb interface user plane protocols".
[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:	If data call:
	UP mode = mode UPversion =version Delivery of erroneous SDUs=value Interface=interface Initdirerection=initdirection Bitrate = bitrate	PLMN bearer capbility = PLMN capability GSM channel coding=coding
	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 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 existing codec (see [x]), the MGW shalldoes 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	

If the "Reserve 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 "Reserve 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 existing codec (see [x]), the MGW shalldoes not need to be prepared to handle a framing protocol initialisation.

14.2.41 Confirm Bearer Characteristics

This procedure is the same as that defined in the subclause "Confirm 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	

If the "Confirm 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 "Confirm 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 existing codec (see [x]), the MGW does shall not need to be prepared to handle a framing protocol initialisation.

CHANGE REQUEST													
*	29.	232	CR	056	æ	rev	1	Ж	Curren	it vers	sion:	5.5.0	*
For <u>HELP</u> on u	ising th	nis fori	m, see	bottom of	f this pa	age or l	ook	at th	е рор-и	p text	over	the % sy	mbols.
Proposed change affects: UICC apps ME Radio Access Network Core Network X													
Title: #	Inde	pende	ence O	f SDU and	d Appli	cation							
Source: #	CN4												
Work item code: %	OoB	TC							Da	ite: ೫	09/	05/03	
Category: Ж	E Detail	(corr (corr (add (fund (edit ed exp	ection) respond lition of ctional r orial mo	wing categ Is to a corre feature), modification) ns of the al	ection in	ure)		eleaso	2 e) R9 R9 R9 R9 R6		the for (GSN (Rele (Rele (Rele (Rele (Rele (Rele	I-5 Illowing related Phase 2) It is assented 1996) It is assented 1998) It is assented 1999) It is assented 4) It is assented 1999)	
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-initialisation 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:	×	luUP	should	n betweer d be re-init and anot	tialised	due to	a cc	odec	change	(whe			
Clauses affected:	*	2, 14	.2.36,	14.2.40, 1	4.2.41								
Other specs affected:	*	Y N X X	Test s	core spec specification Specificat	ons	ons	*	TS 2	23.153				
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2 References

[17]

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

[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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