3GPP TSG CT Meeting #28 1st – 3rd June 2005. Quebec, CANADA.

Source: CT3

Title: CR to Rel-6 related to NI upgrade on Work Item SCUDIF

Agenda item: 9.25

Document for: APPROVAL

Introduction:

This document contains 1 CR to Rel-6 on Work Item "SCUDIF" that have been agreed by TSG CT WG3, and are forwarded to TSG CT Plenary for approval.

WG_tdoc	Spec	CR	R	Cat	Title	Rel	C_Ver	Work Item
C3-050434	23.172	040	4	F	Network-initiated upgrade for SCUDIF	Rel-6	6.2.0	SCUDIF

3GPP TSG-CT WG3 Meeting #36

Tdoc # C3-050434

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4.2.1 Mobile originating side - initiation of call setup

By sending a SETUP message with a Repeat Indicator set to "support of service change and fallback", a multimedia BC-IE, and a speech BC-IE (see figure 4.1), a terminal may request a call to be set with the capability to fallback to either a speech only, a multimedia only call or to use service change later during the active state of the call (the first BC-IE indicates the preferred service). If the terminal supports Network-initiated service upgrade to multimedia, then it shall also indicate this in the SETUP message with the "Enhanced Network-initiated ICM" (ENICM) Capability (see 3GPP TS 24.008[3]).

After checking the provisioning (see subclause 4.2.1.1), and verifying that the functionality is supported, the MSC replies in the CALL PROCEEDING message with either the two BCs in the same order (to indicate that it accepts the proposed settings - see figure 4.2), or with a single BC (multimedia or speech - see figure 4.3) unless the CALL PROCEEDING is delayed until the response from the terminating user and then it may also be sent with the BCs in reverse order (see clause 4.2.3).

In the case the MSC ignores the SETUP message if the presence of a reserved value for the Repeat Indicator is set, it sends a STATUS message back to the UE (see figure 4.4), with the Cause Value set to #100, "Conditional IE error" (see 3GPP TS 24.008 [3], clause 8.7.2). The UE then reacts as described in 3GPP TS 24.008 [3], clause 5.5.3.2.2, and may resend a new SETUP message with a single BC, or perform any appropriate action according to its implementation. This also applies in case the MSC returns instead a RELEASE COMPLETE message.

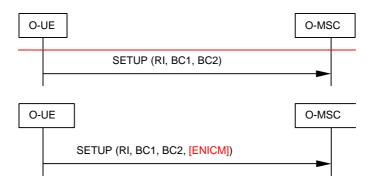


Figure 4.1: SETUP message towards the originating MSC

4.2.2 Mobile terminating side

When the terminating MSC receives a request for a multimedia call, it shall check if the called user is provisioned for the service (see subclause 4.2.2.1).

The terminating MSC shall include in the SETUP message towards the UE both BC-IEs in the same order as indicated by the incoming request together with the Repeat Indicator set to "service change and fallback in order to invoke the SCUDIF functionality in the called terminal (see figure 4.5).

The terminating UE, based on its capabilities and internal settings, may return the two BC-IEs in the same order (to indicate that it accepts the proposed settings - see figure 4.6), reversed order (see figure 4.7), or just one BC-IE (either speech or multimedia - see figure 4.8) to the terminating MSC in the CALL CONFIRMED message. If the terminal supports Network-initiated service upgrade to multimedia, then it shall also indicate this in the CALL CONFIRMED message with the "Enhanced Network-initiated ICM" (ENICM) Capability (see 3GPP TS 24.008[3]).

In the case the UE ignores the SETUP message due to the presence of a reserved value for the Repeat Indicator, it sends a STATUS message back to the terminating MSC (see figure 4.9), with the Cause Value set to #100, "Conditional IE error" (see 3GPP TS 24.008 [3], clause 8.7.2). The terminating MSC shall then react according to 3GPP TS 24.008 [3], clause 5.5.3.2.2 and it shall send a new SETUP message with a single BC, either the preferred service BC-IE or the speech BC-IE (fallback to speech), depending on configuration. The call setup then proceeds accordingly.

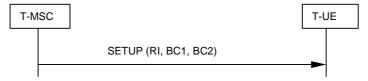


Figure 4.5: SETUP message towards the terminating UE

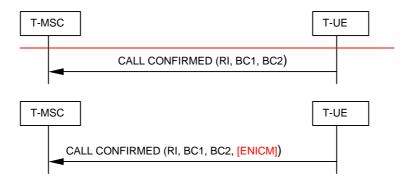


Figure 4.6: Normal case

4.2.4 User-initiated Service change in the active state

At any given time, if either of the call parties wants to change from the current active mode to the other mode via MMI, the terminal shall activate an In-Call Modification procedure. Using this procedure, described in 3GPP TS 24.008 [3], clause 5.3.4.3, the UE shall send a MODIFY message containing the BC-IE to change to. This BC-IE shall be one of those already negotiated at call setup.

As a result, the MSC shall then invoke the service change procedure (see clause 4.3.5). If the request is accepted, the originating MSC sends a MODIFY COMPLETE message to the UE including the BC-IE of the mode to switch to (see figure 4.13). If the request is rejected, the MSC sends a MODIFY REJECT message to the UE including the BC-IE from the current active mode (see figure 4.14).

In the case the MSC has determined that the other mode is unavailable (e.g. a fallback to either mode has occurred), it shall reject the MODIFY request at once by replying with a MODIFY REJECT message.

On the remote side, the MSC shall initiate an In-Call Modification procedure towards the terminal using the MODIFY message. For a service change from speech to multimedia, the terminal shall request confirmation from the user unless configured differently. For a service change from multimedia to speech, the terminal shall accept the request without requesting confirmation from the user. If the change is accepted, the UE shall reply to the MSC with a MODIFY COMPLETE message, whereas a MODIFY REJECT message shall be sent if the change is rejected.

NOTE: Privacy concerns strongly advise that any change to multimedia mode, unless explicitly allowed by the user in the terminal configuration settings, triggers a question to the user in order to confirm or decline the change. The details on how to provide the user interaction are left for implementation.

When receiving a MODIFY message, a terminal shall not interrupt the data traffic and shall continue to send and receive data in the old mode, even after the terminal accepts the modification with a MODIFY COMPLETE message. The radio bearer will then be reconfigured by the network. After the radio bearer has been reconfigured, the terminal shall send and receive data in the new mode.

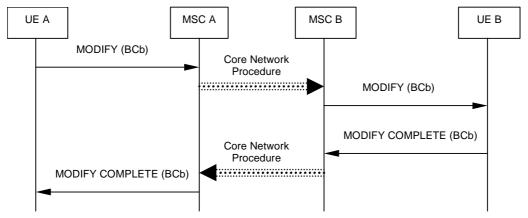


Figure 4.13: Service change requested, accepted

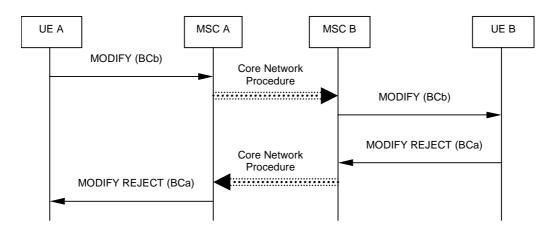


Figure 4.14: Service change requested, rejected

4.2.5 Network-initiated Service change in the active state

When the visited MSC of either party can no longer support an ongoing multimedia call, for example due to degraded coverage conditions (including UTRAN to GERAN only transitions), the visited MSC of this party shall initiate a service-change from multimedia to speech, following the procedures described below.

If the visited MSC is again able to support the multimedia at a later point in time while the speech call is still ongoing, the same visited MSC may initiate a service change from speech to multimedia as stated in TS 22.101 [8]. The details for the service change from speech to multimedia are described in section 4.2.5.2.FFS.

For a downgrade from multimedia to speech the visited MSC shall initiate an In-Call Modification procedure towards the terminal it serves using the MODIFY message. The visited MSC shall also invoke the service change procedure (see clause 4.3.5) towards the remote side. The terminals on both sides will react as described in Clause 4.2.4. An MSC shall only perform a Network Initiated Service Upgrade from speech to multimedia if the terminal has indicated support for Network Initiated Service Upgrade Capability during the call establishment phase, as detailed in 3GPP TS 24.008 [3]. When sending the Modify request to the local terminal the MSC shall include the Network-initiated Service Upgrade indicator.

If the terminal on either side rejects the service change, the visited MSC shall either clear the call, or it shall initiate a service change procedure towards the other side to revert to the original service.

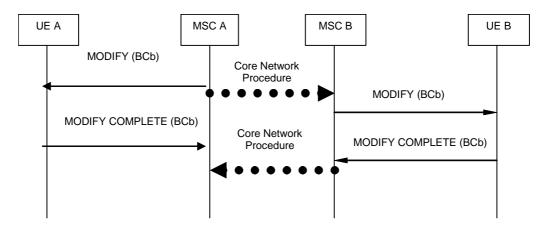


Figure 4.14a: Network-Initiated Service change from multimedia to speech requested, accepted

Figure 4.14b: void

Figure 4.14c: void

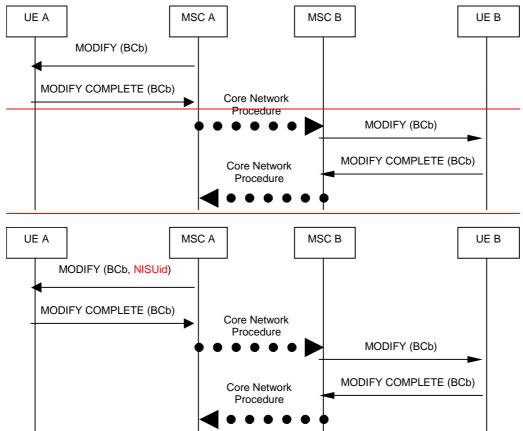


Figure 4.14c1: Network-Initiated Service change from speech to multimedia requested, accepted

If the served terminal rejects the service change from speech to multimedia, the initiating MSC shall maintain the original service. If the remote side rejects the service change from speech to multimedia, the initiating -MSC shall initiate a service change procedure towards the served terminal to revert to the original service.

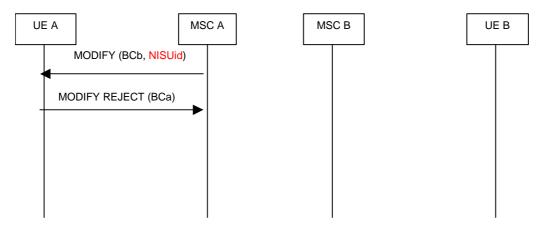


Figure 4.14c2: Network-Initiated Service change from speech to multimedia requested, rejected by user A

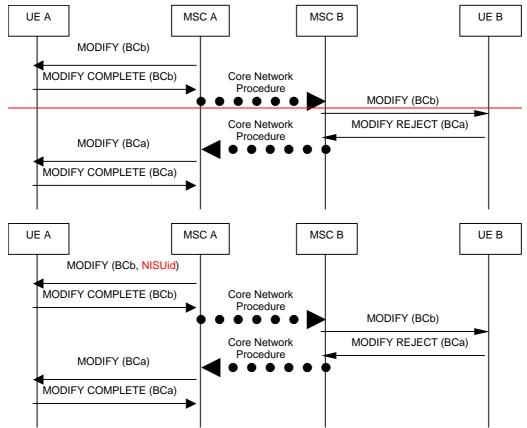


Figure 4.14c3: Network-Initiated Service change from speech to multimedia requested, rejected by user B

4.2.5.1 Network-initiated Service change in the active state starting with multimedia in Iu mode

For a network initiated service change from multimedia in Iu mode to speech, the visited MSC shall use the following procedure.

In order to request a notification from the RNC when it detects a lack of sufficient resources or radio signal degradation, the visited MSC shall include an Alternative RAB Parameters IE in the RANAP RAB Assignment Request or RANAP Relocation Request message indicating the RAB configuration for speech in addition to the RAB configuration for multimedia, when it establishes or modifies the radio access bearer for multimedia at the Iu interface.

When the radio access network detects a lack of sufficient resources to sustain the multimedia RAB configuration, it shall inform the visited MSC by sending a RANAP Modify Request message (see 3GPP TS 25.413 [17]) to the visited MSC. The visited MSC shall then:

- initiate an In-Call Modification procedure to speech towards the terminal it serves using the MODIFY message;
 and
- invoke the service change procedure (see clause 4.3.5) towards the remote side,
- trigger the RAB modification by sending a RANAP RAB Assignment with the RAB requested to be Modified to the RNC.

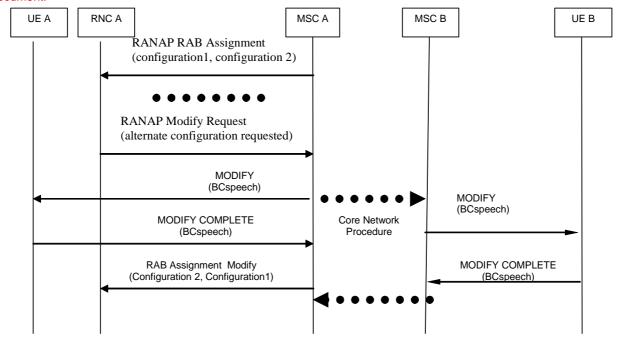


Figure 4.14d: Network-Initiated Service change from UTRAN multimedia to speech requested, accepted

4.2.5.2 Network-initiated Service change in the active state starting with speech in lu mode

The network initiated service change from speech to multimedia in Iu mode is an optional feature. If supported the MSC initiating the service upgrade to multimedia shall use the following procedure. However a service change from speech to multimedia should not be initiated unless a network initiated service change from multimedia to speech had previously taken place during the same user session. Furthermore a network initiated service upgrade to multimedia shall not be performed unless the terminal has indicated that it supports it by including the Enhanced Network-initiated ICM (ENICM) Capability at call establishment.

In order to request a notification about sufficient resources to sustain again the multimedia RAB configuration from the radio access network, the visited MSC shall include an Alternative RAB Parameters IE in the RANAP RAB. Assignment Request or RANAP Relocation Request message indicating the RAB configuration for multimedia in addition to the RAB configuration for speech, when it establishes or modifies the radio access bearer for speech at the Iu interface during or after a network-initiated service change from multimedia to speech. In order to request a notification about sufficient resources from a target RNC after a subsequent relocation, the MSC shall pass the Alternative RAB Parameters IE in the RELOCATION REQUEST message to the target RNC.

NOTE: If the non-anchor RNC is a pre-Release 6 node then no notification about sufficient resources can be received and therefore the MSC cannot assume that it will receive the notification for upgrade if it did not receive a previous notification for downgrade from that RNC.

When the radio access network later detects that there are sufficient resources to sustain again the multimedia RAB configuration, it shall indicate the possibility of a service change to the alternative multimedia RAB configuration by sending a RANAP Modify Request message (see 3GPP TS 25.413 [17]) to the –MSC.The MSC may then:

- initiate an In-Call Modification procedure to multimedia towards the terminal it serves using the MODIFY message. The visited MSC shall include the NISUid information element in the MODIFY message. The MSC initiating the service change shall not interrupt the user plane until the terminal accepts the modification with a MODIFY COMPLETE message. When the MODIFY COMPLETE message is received from the served terminal, the initiating MSC shall then:
- invoke the service change procedure (see clause 4.3.5) towards the remote side. The initiating MSC shall then;
- reconfigure the RAB to the multimedia bearer at the latest when receiving a confirmation about the successful service change procedure from the remote side.

When receiving a MODIFY message, a terminal shall not interrupt the data traffic and shall continue to send and receive data in the old mode, even after the terminal accepts the modification with a MODIFY COMPLETE message. After the radio bearer has been reconfigured by the network, the terminal shall send and receive data in the new mode.

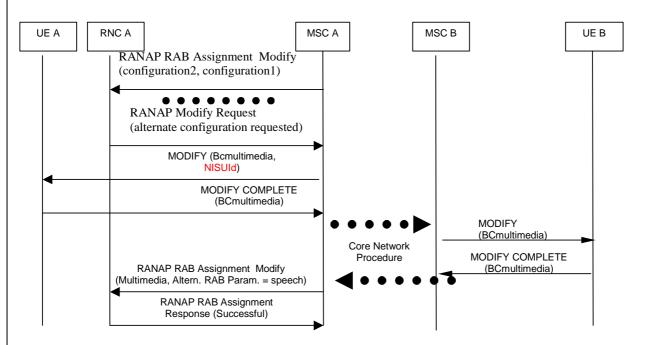


Figure 4.2.5.2/1: Network-Initiated Service change from UTRAN speech to multimedia requested, accepted in case the RAB is modified on the initiating side after receiving the response to the service change request from the remote side

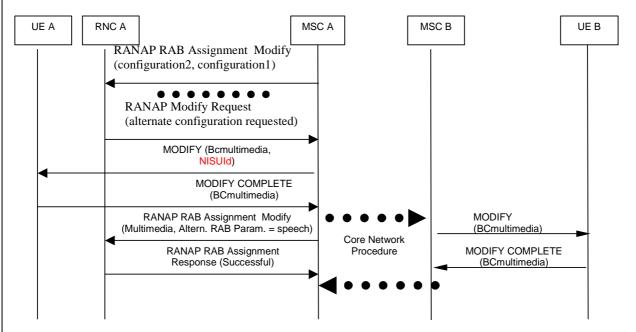


Figure 4.2.5.2/2: Network-Initiated Service change from UTRAN speech to multimedia requested, accepted in case the RAB is modified on the initiating side before receiving the response to the service change request from the remote side

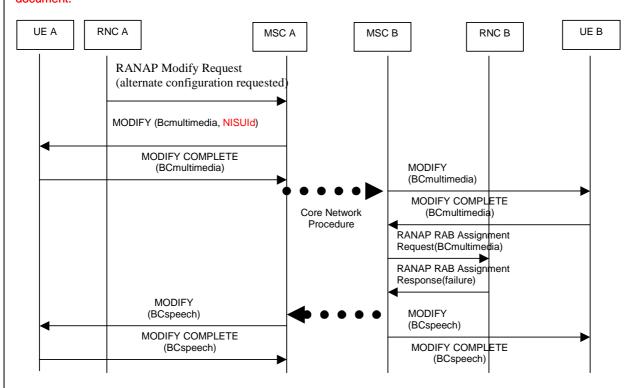


Figure 4.2.5.2/3: Network-Initiated. Service change from UTRAN speech to multimedia, RNC B failure in case the RAB on the initiating side is not modified before receiving the response to the service change request from the remote side

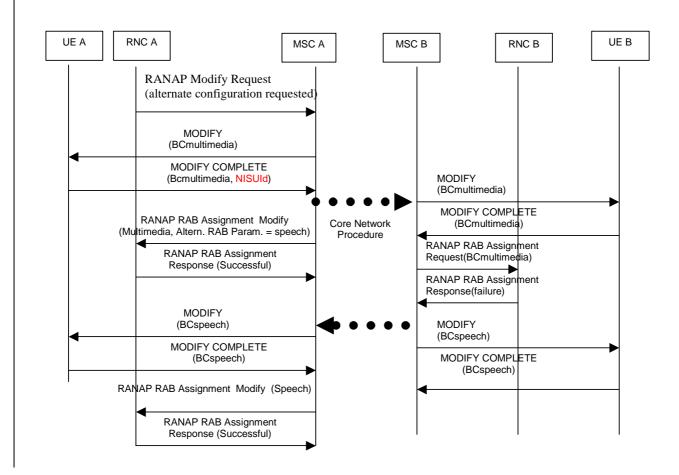


Figure 4.2.5.2/4: Network-Initiated Service change from UTRAN speech to multimedia, RNC B failure in case the RAB is modified on the initiating -side before receiving the response to the service change request from the remote side

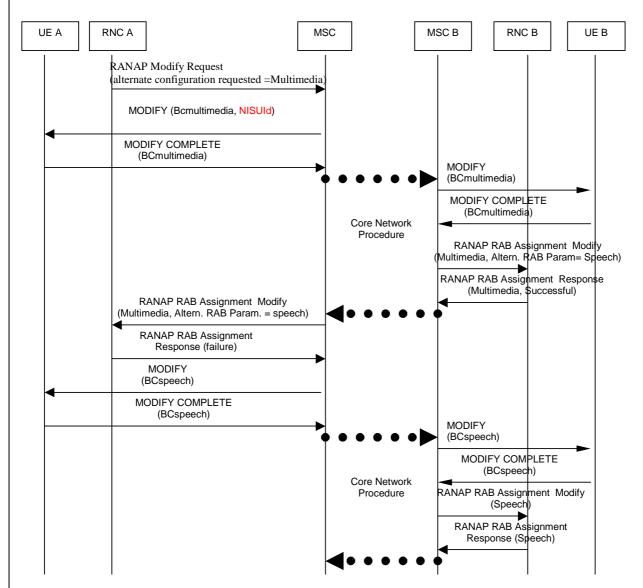


Figure 4.2.5.2/5: Network-Initiated Service change from UTRAN speech to multimedia requested, RNC A failure in case the RAB is modified on the initiating -side after receiving the response to the service change request from the remote side

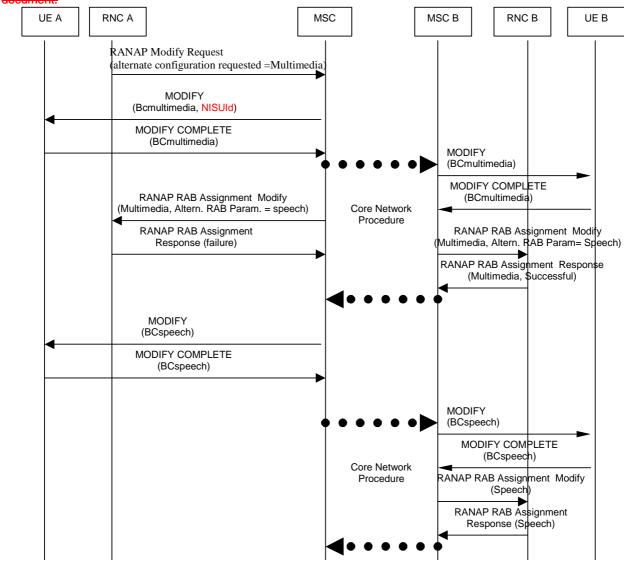


Figure 4.2.5.2/6: Network-Initiated Service change from UTRAN speech to multimedia requested, RNC

A failure in case the RAB is modified on the initiating side before receiving the response to the

service change request from the remote side

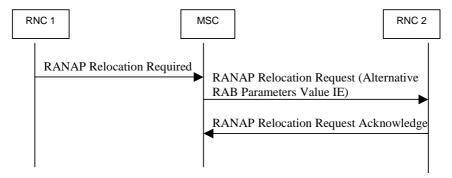


Figure 4.2.5.2/7: Alternative RAB Parameters delivery during the relocation

4.3 Core Network procedures

In order to provide the capability in the network to transmit the request for service change (upgrade to multi-media and fallback to speech) both at call setup and during the active state of a call, the normal Out-of-Band Transcoder Control procedures, described in 3GPP TS 23.153 [2] shall be used. The following text describes the codec type to be used, the mapping between the terminal interface described above, and the different IEs to be used for the codec negotiation procedures at both the originating and the terminating MSC.

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

4.3.5.1 Mid-Call Codec Modification Procedure For Service Change

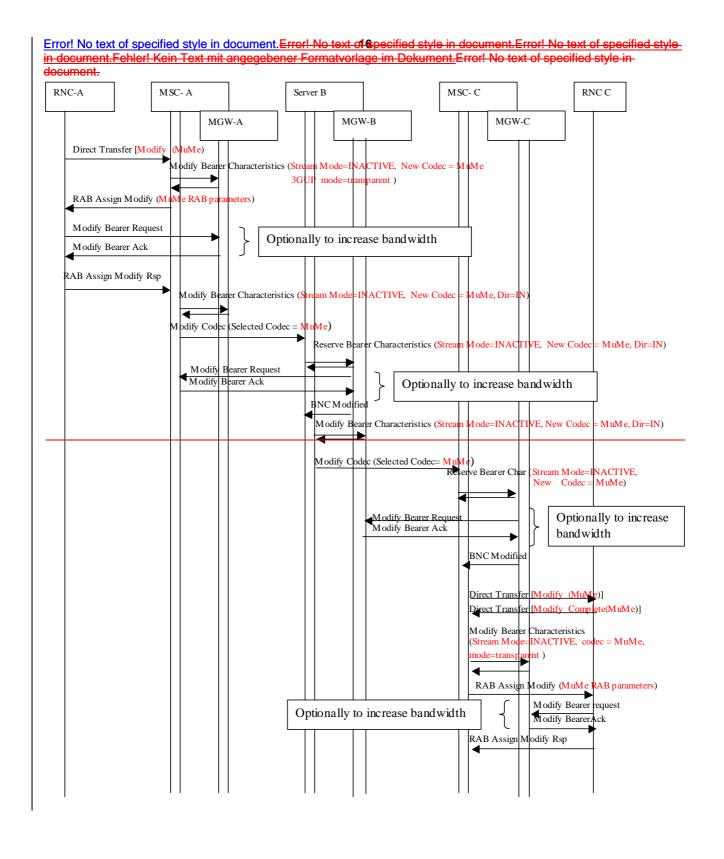
The Codec Modification procedures as defined in 3GPP TS 23.153 [2] shall be applied with the following specific additional rules for the Service Change procedure.

In order to prevent the MGW generating an error or seizing resources during the interim period, when its terminations are being altered and it may have a speech codec on one side of the context and the 3G-324M codec on the other side the Server shall modify the Stream—mode of the affected terminations to inactive during the Service change and shall restore the stream mode to active – (send/receive – bothway) on completion of the service change procedure. In order to restore the stream mode to active, the MSC servers shall use the "Modify Bearer Characteristics" procedure for Iu terminations and for Nb terminations towards the succeeding node with respect to the "Modify Codec" message. The MSC servers shall use the "Confirm Bearer Characteristics" procedure for Nb terminations towards the preceding node with respect to the "Modify Codec" message.

If the affected termination's stream mode is inactive a MGW shall not reject a "Modify Bearer Characteristics" or a "Reserve Bearer Characteristics" procedure because the multimedia codec and a speech codec are interconnected simultaneously in the same context.

For a service change where the CN shall initiate the IuUP on the Nb interface, the MSC server terminating the service change shall trigger the IuUP initialisation towards the core network by setting the IuUP initialisation direction to "out" in the "Confirm Bearer Characteristics" procedure for the corresponding termination towards the core network.

Example call flows are shown in Figure 4.3.5.1/1 to 4.3.5.1/68.



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Reserve Bearer Char (Stream Mode= NACTIVE, New Codec = MuMe) Modify Bearer Reque Modify Bearer Ack Optionally to increase bandwidth BNC Modifie Direct Transfer [Modify (MuMe)] Direct Transfer [Modify Complete(MuMe)] Modify Bearer Characteristics (Stream Mode=INACTIVE, codec = MuMe, node=transpa ent) RAB Assign Modify (MuMe RAB parameters) Modify Bearer request Optionally to increase bandwidth Modify Bearer Ack RAB Assign Modify Rsp

Figure 4.3.5.1/1: Service change speech to MuMe

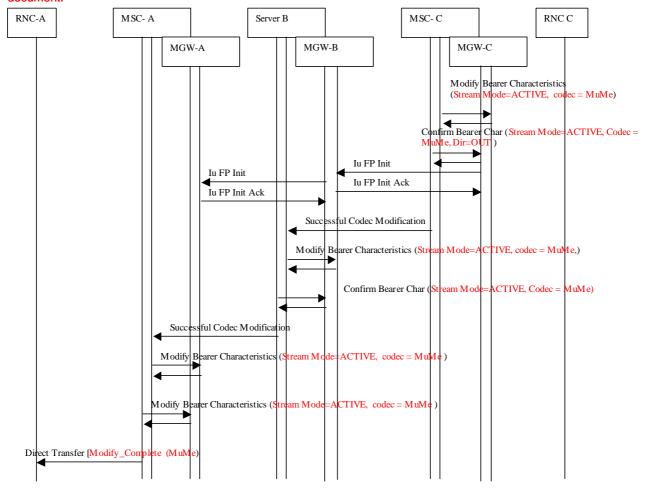


Figure 4.3.5.1/2: Service change speech to MuMe (continued)

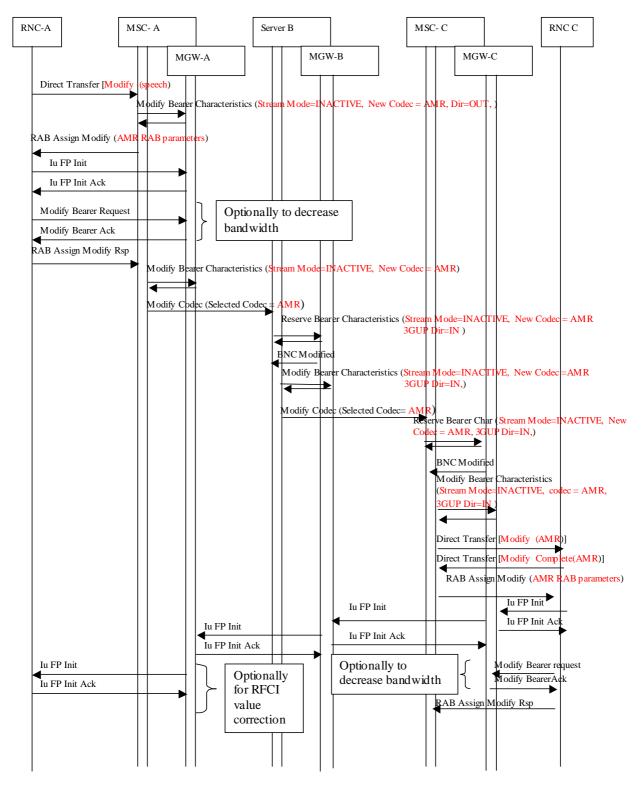


Figure 4.3.5.1/3: Service change MuMe to AMR

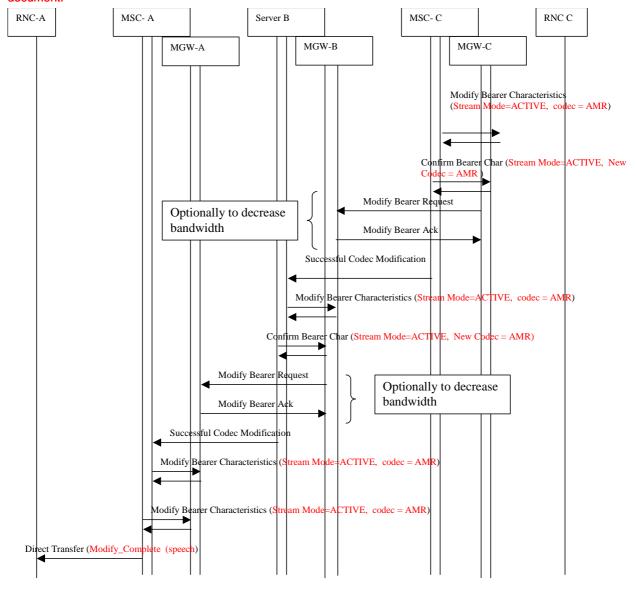


Figure 4.3.5.1/4: Service change MuMe to AMR (continued)

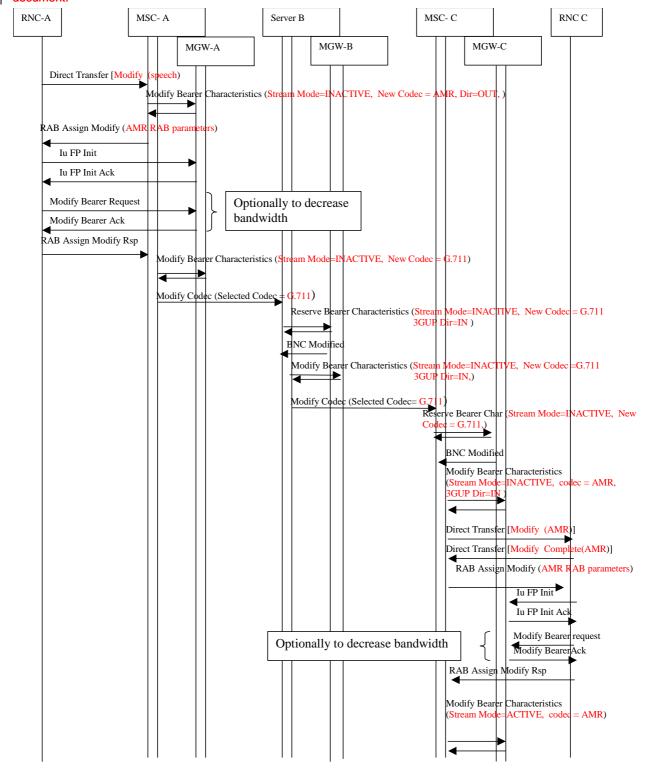


Figure 4.3.5.1/5: Service change MuMe to PCM(G.711)

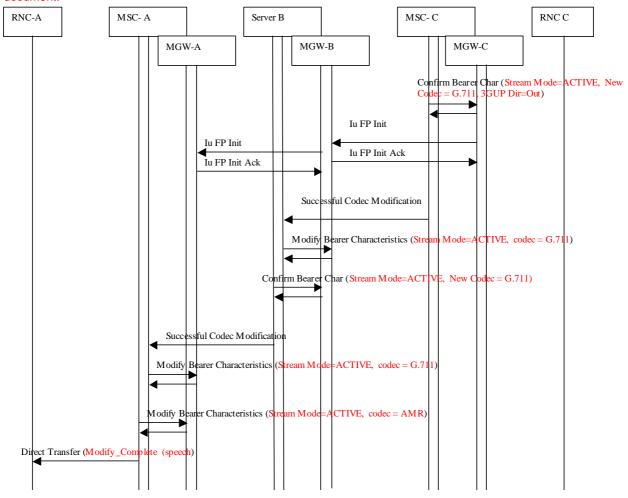


Figure 4.3.5.1/6: Service change MuMe to PCM(G.711) (continued)

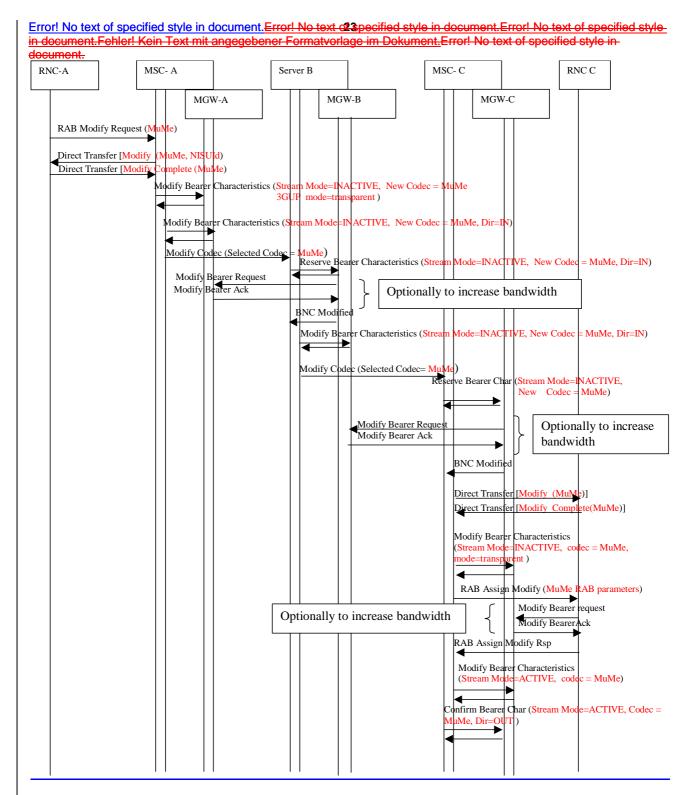
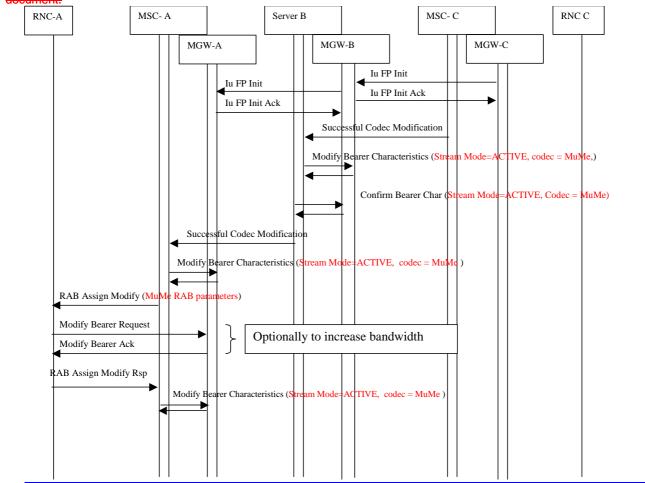


Figure 4.3.5.1/7: Network-initiated service change speech to MuMe



NOTE: The RAB Assign Modify sent towards RNC-A may also be sent by MSC-A before receiving the Successful Codec Modification Message.

Figure 4.3.5.1/8: Network-initiated service change speech to MuMe (continued)

4.3.5.2 Unsuccessful Service Change

In the case the service change is denied by the UE at the terminating side, the procedures for the unsuccessful Codec Modification as defined in [2] shall be applied to revert to the old medium (speech or multimedia).

The through-connection of terminations shall be performed as described in Subclause 4.3.5.1. The "Codec Modification Failure" message shall interact with the "Modify Bearer Characteristics" procedure and the "Confirm Bearer Characteristics" procedure in the same way as the "Successful Codec Modification" message.

An example sequence is shown in Figure 4.3.5.2/1 to $4.3.5.2/\frac{25}{2}$.

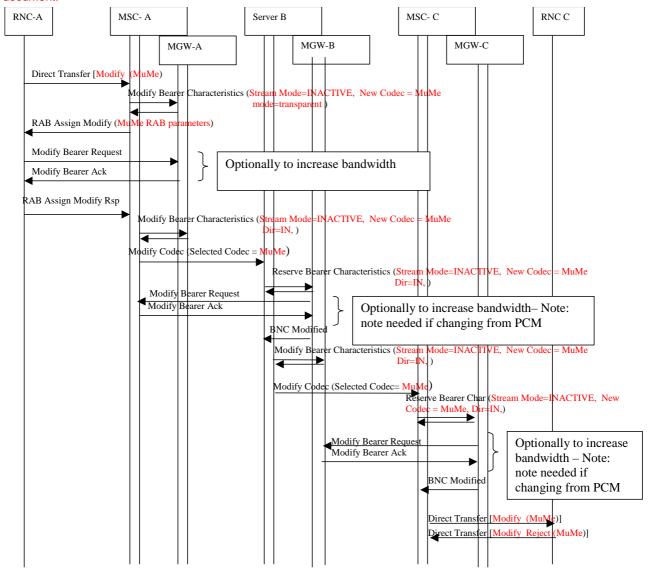


Figure 4.3.5.2/1: Service Change Rejected

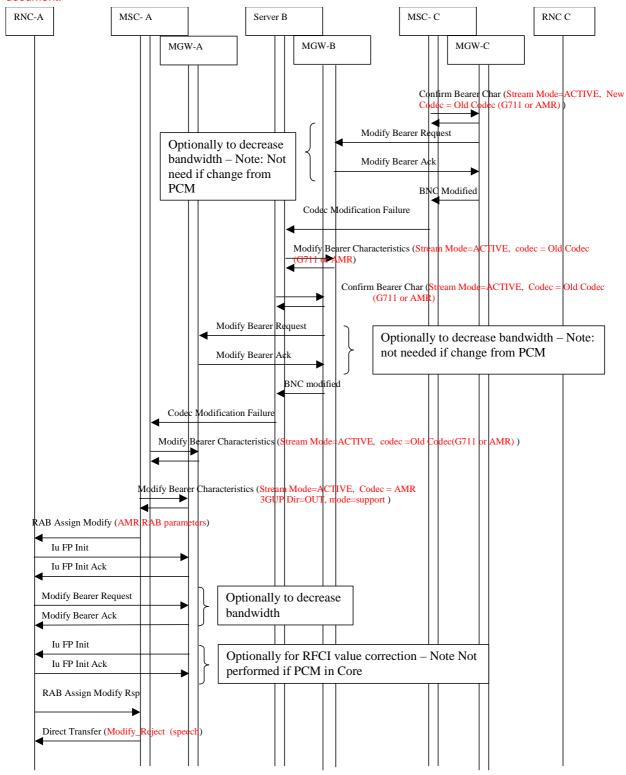


Figure 4.3.5.2/2: Service Change Rejected (Continued)

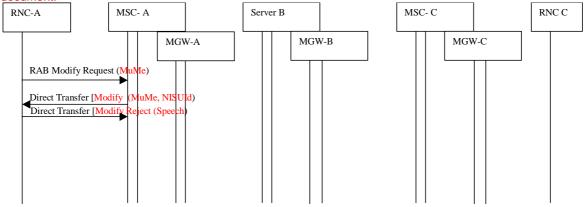


Figure 4.3.5.2/3: Network-initiated service change from speech to MuMe initiated by MSS A, rejected by user A

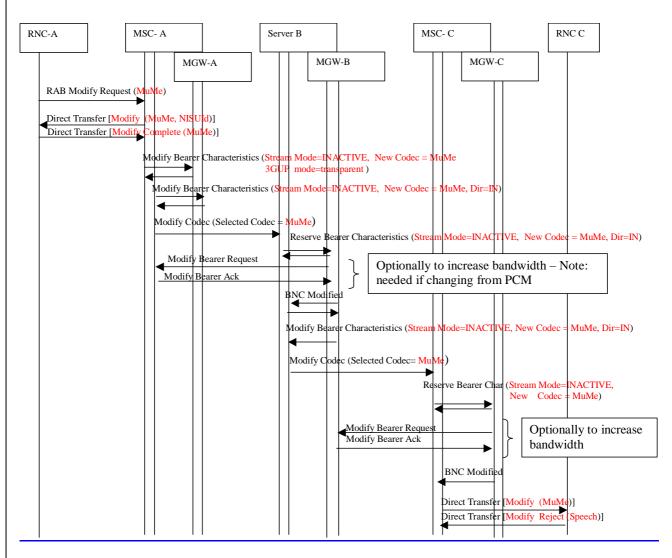


Figure 4.3.5.2/4: Network-initiated service change from speech to MuMe initiated by MSS A, rejected by user B

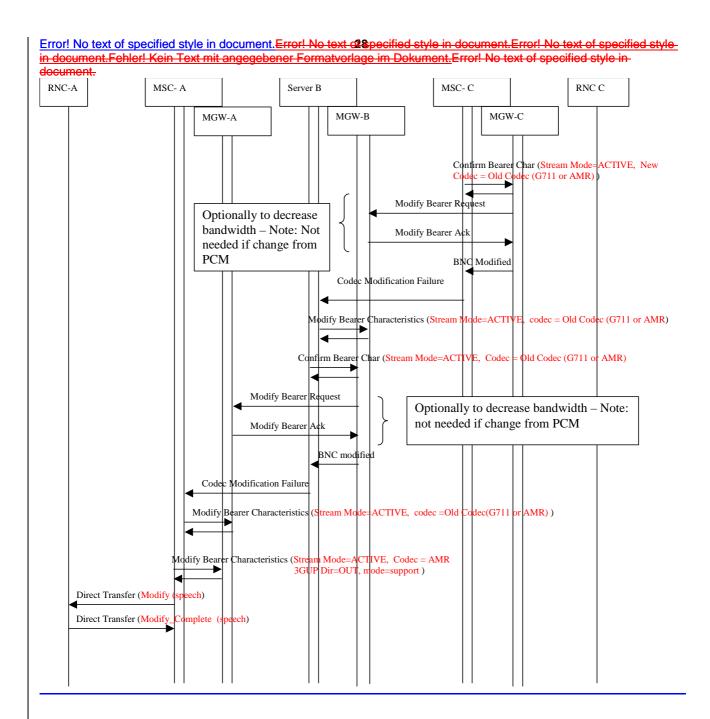


Figure 4.3.5.2/5: Network-initiated service change from speech to MuMe initiated by MSS A, rejected by user B (continued)