

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

CP-050079

Source: TSG CT WG4
Title: Corrections on OoBTC Rel-4
Agenda item: 7.7
Document for: APPROVAL

Doc-2nd-Level	Spec	CR #	Rev	Rel	Tdoc Title	CAT	C_Version
C4-050835	23.153	090	1	Rel-4	Codec Selection at Terminating Call Control Node for OoBTC	F	4.12.0
C4-050836	23.153	091	1	Rel-5	Codec Selection at Terminating Call Control Node for OoBTC	A	5.10.0
C4-050837	23.153	092	1	Rel-6	Codec Selection at Terminating Call Control Node for OoBTC	A	6.1.0

CHANGE REQUEST

⌘ **23.153 CR 090** ⌘ rev **1** ⌘ Current version: **4.12.0** ⌘

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

Title:	⌘ Codec Selection at Terminating Call Control Node for OoBTC		
Source:	⌘ CN4		
Work item code:	⌘ OoBTC	Date:	⌘ 27/04/2005
Category:	⌘ F	Release:	⌘ Rel-4
	Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900 .		Use <u>one</u> of the following releases: Ph2 (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) Rel-7 (Release 7)

Reason for change:	⌘ To correct an inconsistency in TS 23.153 with Q.1902.4 regarding the selection of a transcoder from the preferred codec list at the terminating call control node. To correct text in scenario in section 5.5. This is an essential correction.
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Consequences if not approved:	⌘ Varying interpretations of TS 23.153 can lead to implementations where optimal bandwidth savings and avoiding degradation of speech quality, key principles of OoBTC, are not achieved giving a frequent and serious misoperation regarding quality of speech and bandwidth savings for mobile operators.

Clauses affected:	⌘ 5.1; 5.5						
Other specs affected:	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="text-align: center;">Y</td> <td style="text-align: center;">N</td> </tr> <tr> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> </table> Other core specifications	Y	N	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	⌘	
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Other comments:	⌘ Q.1902.4 Section 8.3.3 specifies how the terminating SN selects a codec from the preferred codec list as follows:						

*“It selects the codec with highest priority in the received Supported Codec List **that is appropriate for the call.**”*

TS 23.153 Section 5.1 discusses the selection of a codec from a preferred codec list at the terminating call control (CC) node:

“Terminating CC node: analyse the received list of options with their associated priorities and selects the supported option with the highest indicated priority.”

TS 23.153 Section 4.1 states that the OoBTC mechanism **shall** support *“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”*

TS 23.153 section 5.1 should be aligned with Q.1902.4 section 8.3.3.

How to create CRs using this form:

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5.1 Network Model

The codec negotiation mechanism (OoBTC) is designed to work in the general situation where more than two call control (CC) nodes need to participate in the codec negotiation. The codec negotiation mechanism works as follows:

- Originating CC node: sends its list of supported codec types and options, listed in order of preference.
- Transit CC nodes: if needed, analyse the received list of options, delete unsupported options from the list and forward the list. No modification is done to the preference levels of any of the listed codecs.
- Terminating CC node: analyse the received list of options with their associated priorities and selects the supported option with highest indicated priority appropriate for the call.

Figure 5.1/1 illustrates the architecture for Rel-4 for UMTS to UMTS TrFO connection. The transit network may exist for calls between PLMNs or between islands of mobile CNs separated by transit networks. This figure is a basic illustration, OoBTC shall apply to other access technologies where the OoBTC procedures are supported, i.e. not limited to this figure. The negotiation occurs at call set-up phase, and possibly later on in the call due to other changes such as handover or relocation. *However, as described in the next clause, it shall be possible to modify the selected codec at any moment during the active phase of the call.*

Further detail of the Call & Bearer Separation for 3GPP is described in [8].

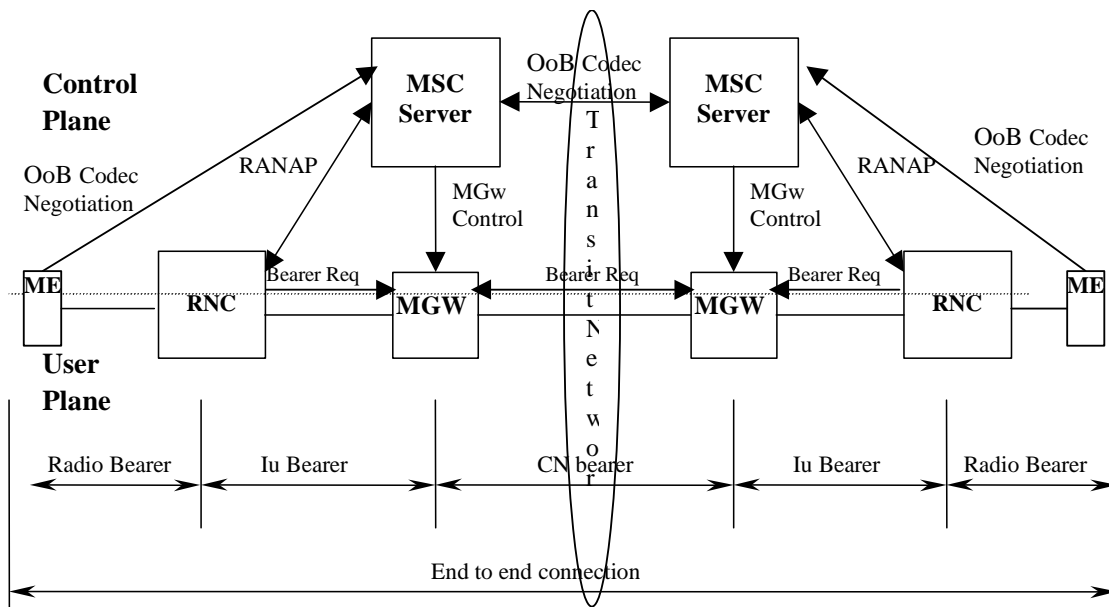


Figure 5.1/1. Basic Architecture for UMTS to UMTS TrFO Connection

The following clauses describe successful call establishment scenarios using the codec negotiation mechanism.

Next Modified Section

5.5 TrFO/TFO Codec Negotiation Harmonisation

When OoBTC procedures are initiated to a node where compressed voice cannot be supported (either at the node or to the preceding node) then a transcoder is inserted. This can be due to the transport technology (e.g. TDM) or due to the access technology (e.g. GSM). The OoBTC procedures can result in the following call scenarios:

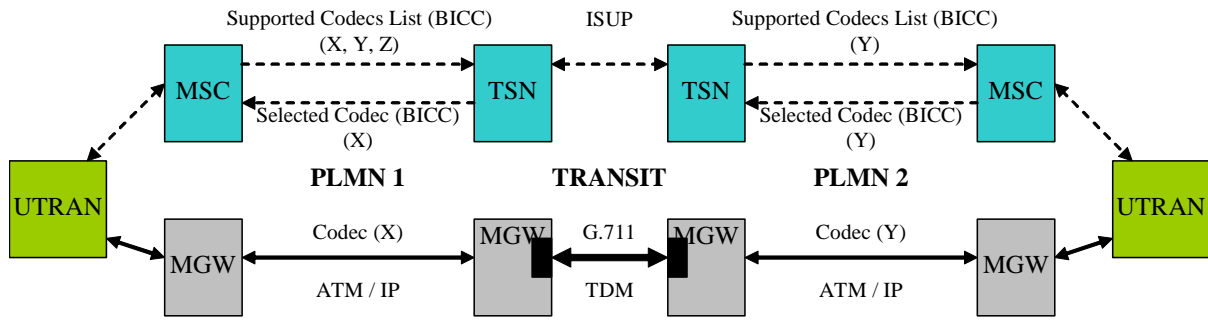


Figure 5.5/1: Cascaded TrFO & Transcoding

In Figure 5.5/ 1 the OoBTC cannot proceed as the call crosses a transit network that does not support compressed voice. The same could occur if the transit network did not support out of band codec negotiation (Support in BICC is optional).

In Figure 5.5/2 the OoBTC procedures result in the call terminating to a GSM access. As the GSM radio access transcodes to default PCM codec, the OoBTC results in default PCM being ~~the only codec that can be~~ selected. The reply is passed back to the originating network, which then inserts a transcoder from default PCM to AMR for the UMTS radio access.

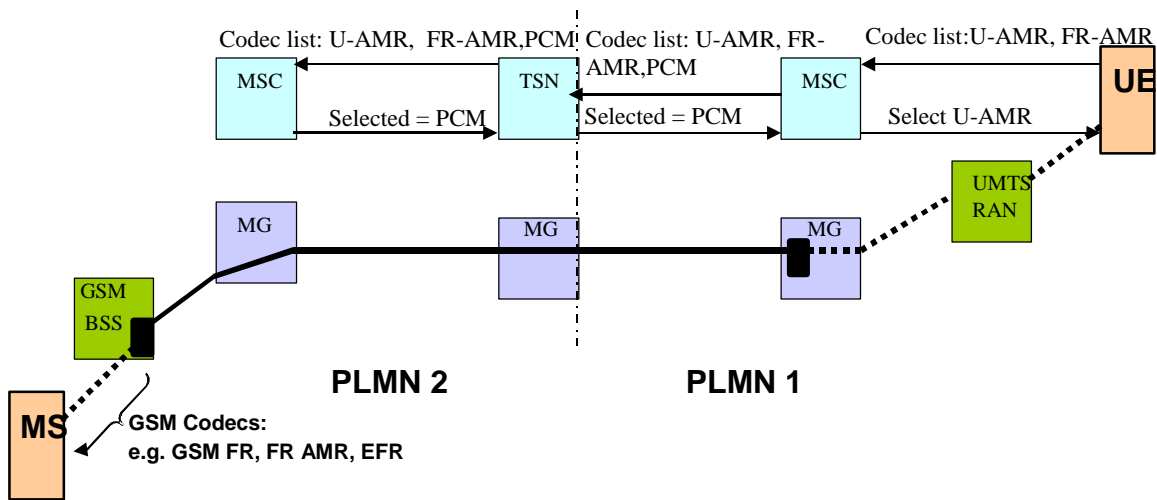


Figure 5.5/2: UMTS to GSM interworking

In a similar situation to that described in Figure 5.5/2, it is also possible that the OoBTC procedures result in UMTS AMR as the selected codec. In this case, the transcoder shall be inserted at the terminating MGW in order to transcode between PCM and UMTS AMR (as an example), and UMTS AMR shall be signalled back to the originating UE. Bandwidth savings and avoiding degradation in speech quality are then achieved in the core network.

For TFO to establish between the transcoders in the above scenarios, each TRAU must send a codec list inband after the call has been established. If a common codec type is available (determined by pre-defined rules, described in TFO specification [10]) then the OoBTC procedures need to be informed so that a codec modification can be performed. This is shown in Figure 5.5/3. Note – a modification could also be required when a common codec type has been selected but the ACS is not common.

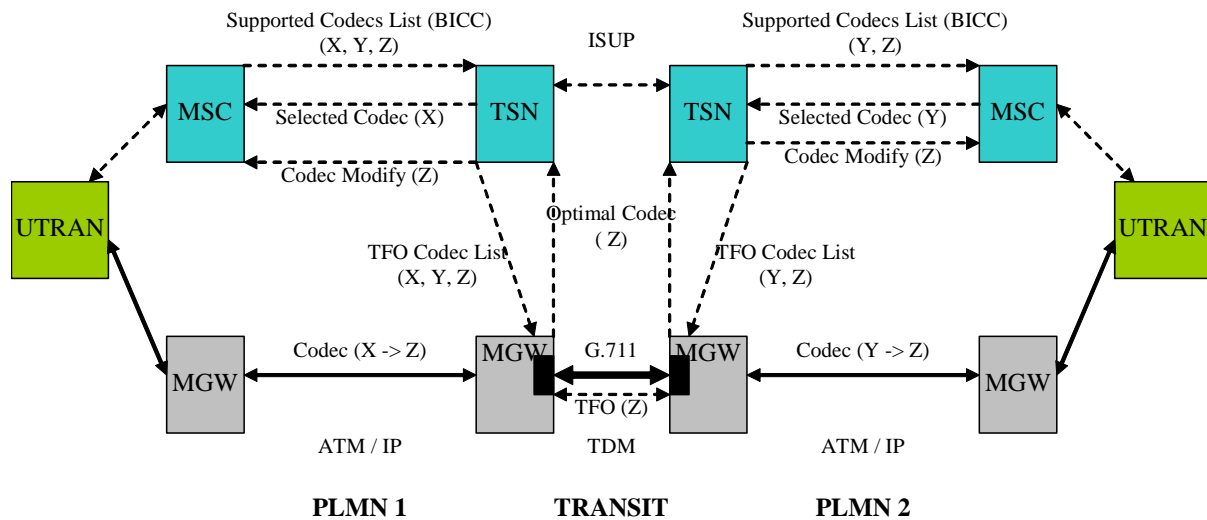


Figure 5.5/3: TFO support by OoBTC signalling

In H.248, the vertical MG control protocol, the coding types are specified by Media Stream Property, as defined by Annex C of H.248 specification. A specific package is used for TFO (see [12]).

The basic requirements are listed below:

- i) Property for TFO Codec List (same format as for [5])
- ii) Event for Optimal Codec, as determined by TFO in-band protocol
- iii) Event for Distant Codec List sent by the distant TFO partner
- iv) Procedures to define and enable TFO

The TFO package allows the Server to request the MGW to initiate the TFO in-band protocol towards a far end transcoder. The package includes a property to turn on/off the TFO (tfoenable); this may be required prior to TrFO break situations such as handover.

The TFO Codec List (H.248) is passed via the Mc interface from the Server to the MGW. The first entry of the TFO Codec List (H.248) shall be used by the MGW as the 'Local Used Codec'. The other entries of the TFO Codec List (H.248) shall be used by the MGW as '(Local) Codec List' in the TFO in-band negotiation (see [10]). For adaptive multi-rate codecs (AMR codecs) some control of the level of negotiation is performed by the "Optimization Mode" parameter in the respective Single Codec information element in the TFO Codec List (H.248) (see [5] and [12]). This allows a node to indicate if the offered ACS may be modified or not during TFO procedures, and this is mapped to the appropriate parameter in the TFO protocol by the MGW. If for a Single Codec information element in the TFO Package from the Server to the MGW the OM is set to "Optimization of the ACS not supported", then the TFO Negotiation shall not change the offered ACS of the respective Single Codec information element.

The MGW returns Notification Events for the Distant Codec List sent by the far end and the Optimal Codec Type as selected by the Codec Selection mechanism in TFO. The first entry of the Distant Codec List (H.248) is the 'Distant Used Codec' as received by the MGW during TFO in-band negotiations. The other entries of the Distant Codec List (H.248) are the entries of the '(Distant) Codec List' as received by the MGW from the distant TFO Partner (see [10]). The Server then compares the Distant Codec List (H.248) with its previously negotiated Available Codec List (BICC). If the lists are not the same then an OoBTC Codec List Modification or Mid-call Codec Negotiation may be performed. If for a Single Codec information element in the TFO Package from the MGW to the Server the OM is set to "Optimization of the ACS not supported", then the offered ACS of the respective Single Codec information element shall not be changed during OoBTC procedures.

CHANGE REQUEST

⌘ **23.153 CR 091** ⌘ rev **1** ⌘ Current version: **5.10.0** ⌘

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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:	⌘ 27/04/2005
Category:	⌘ A	Release:	⌘ Rel-5
	Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900 .		Use <u>one</u> of the following releases: Ph2 (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) Rel-7 (Release 7)

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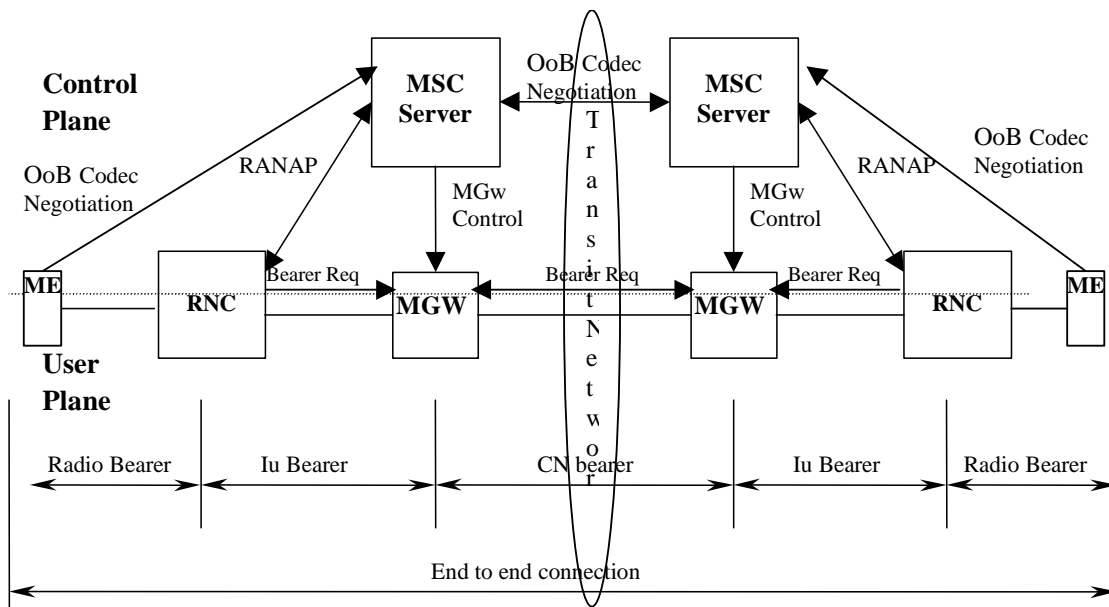


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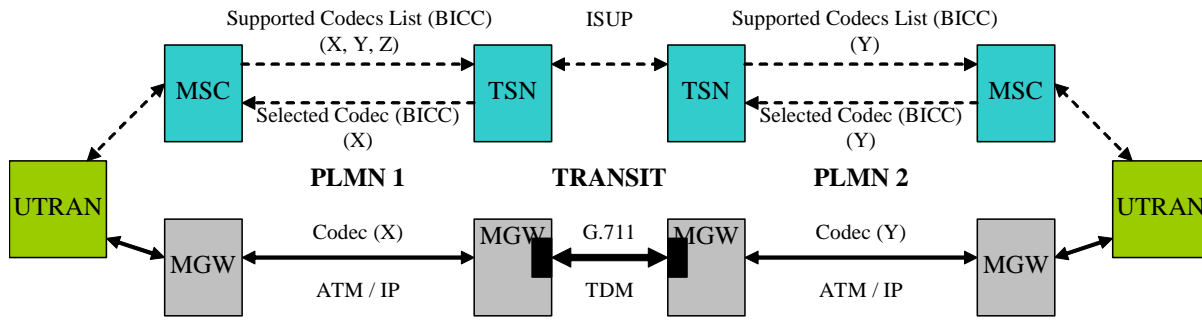


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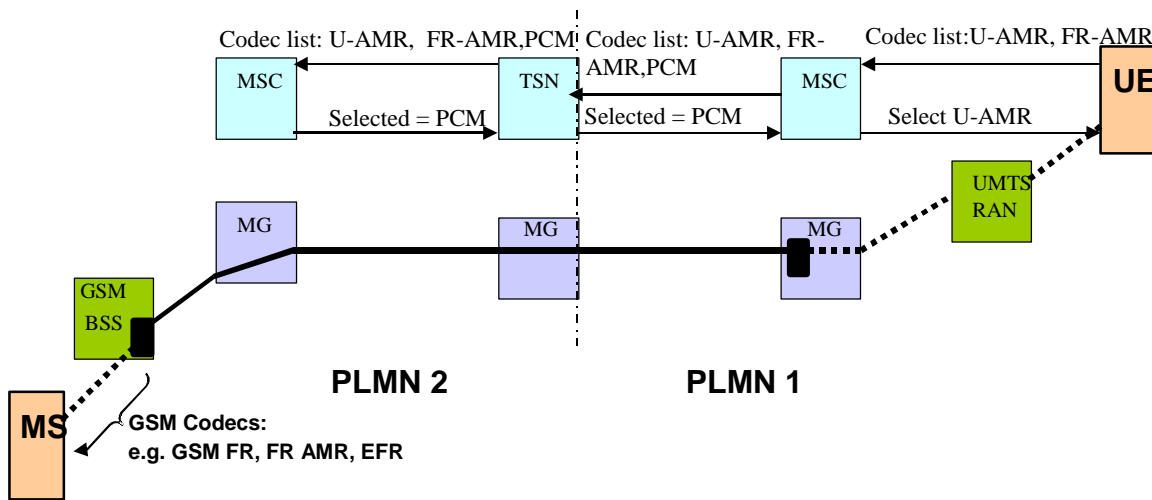


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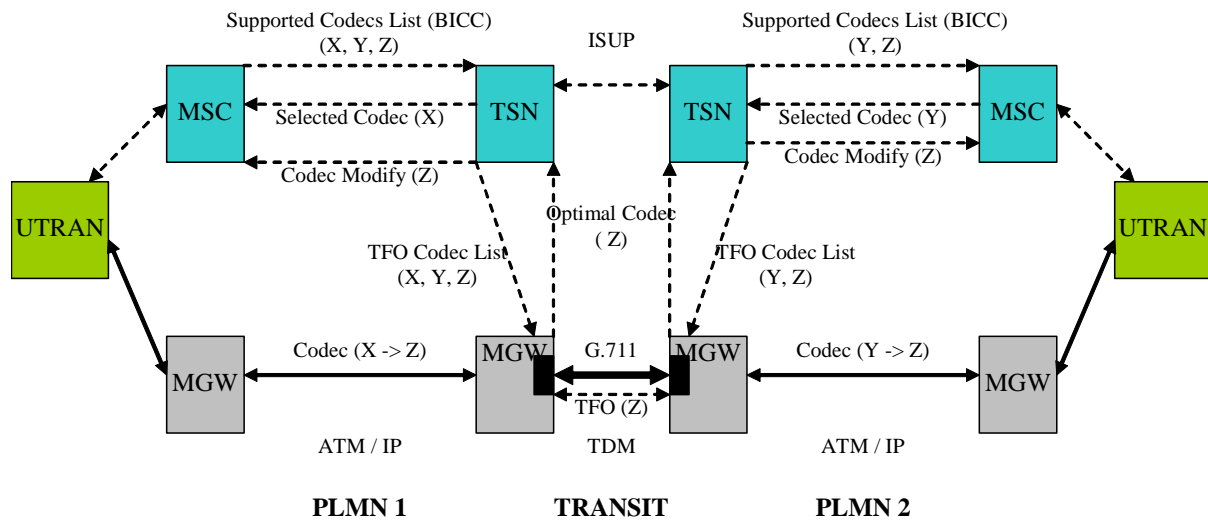


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CHANGE REQUEST

⌘ **23.153 CR 092** ⌘ rev **1** ⌘ Current version: **6.1.0** ⌘

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Work item code:	⌘ OoBTC	Date:	⌘ 27/04/2005
Category:	⌘ A	Release:	⌘ Rel-6
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- 1) Fill out the above form. The symbols above marked ☹ contain pop-up help information about the field that they are closest to.
- 2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under <ftp://ftp.3gpp.org/specs/> For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.
- 3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

5.1 Network Model

The codec negotiation mechanism (OoBTC) is designed to work in the general situation where more than two call control (CC) nodes need to participate in the codec negotiation. The codec negotiation mechanism works as follows:

- Originating CC node: sends its list of supported codec types and options, listed in order of preference.
- Transit CC nodes: if needed, analyse the received list of options, delete unsupported options from the list and forward the list. No modification is done to the preference levels of any of the listed codecs.
- Terminating CC node: analyse the received list of options with their associated priorities and selects the supported option with highest indicated priority appropriate for the call.

Figure 5.1/1 illustrates the architecture for Rel-4 for UMTS to UMTS TrFO connection. The transit network may exist for calls between PLMNs or between islands of mobile CNs separated by transit networks. This figure is a basic illustration, OoBTC shall apply to other access technologies where the OoBTC procedures are supported, i.e. not limited to this figure. The negotiation occurs at call set-up phase, and possibly later on in the call due to other changes such as handover or relocation. *However, as described in the next clause, it shall be possible to modify the selected codec at any moment during the active phase of the call.*

Further detail of the Call & Bearer Separation for 3GPP is described in [8].

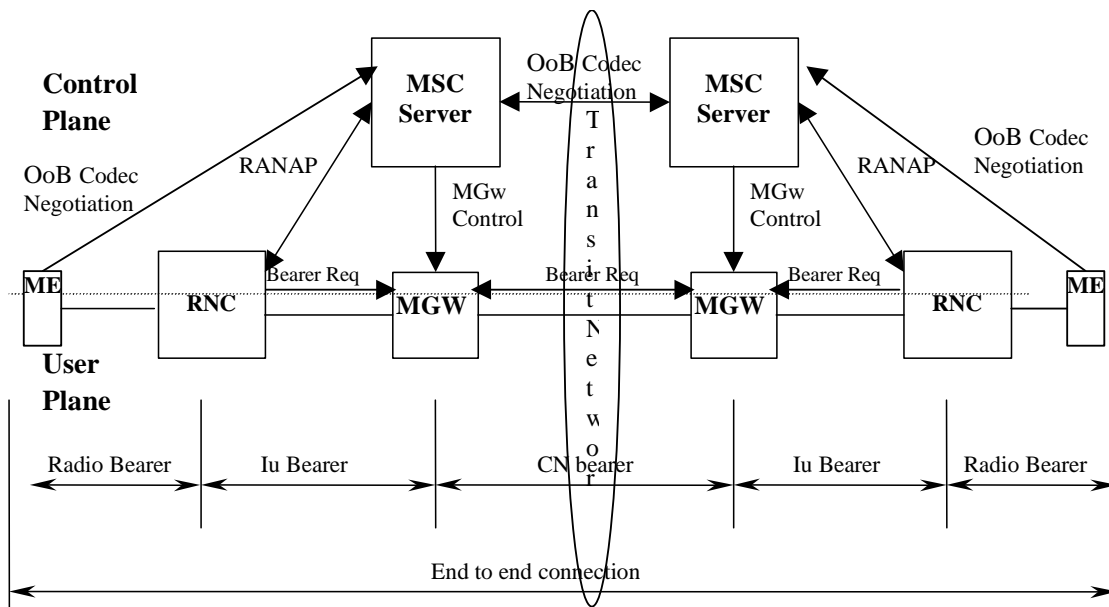


Figure 5.1/1. Basic Architecture for UMTS to UMTS TrFO Connection

The following clauses describe successful call establishment scenarios using the codec negotiation mechanism.

.....
 Next Modified Section

5.5 TrFO/TFO Codec Negotiation Harmonisation

When OoBTC procedures are initiated to a node where compressed voice cannot be supported (either at the node or to the preceding node) then a transcoder is inserted. This can be due to the transport technology (e.g. TDM) or due to the access technology (e.g. GSM). The OoBTC procedures can result in the following call scenarios:

For TFO to establish between the transcoders in the above scenarios, each TRAU must send a codec list inband after the call has been established. If a common codec type is available (determined by pre-defined rules, described in TFO specification [10]) then the OoBTC procedures need to be informed so that a codec modification can be performed. This is shown in Figure 5.5/3. Note – a modification could also be required when a common codec type has been selected but the ACS is not common.

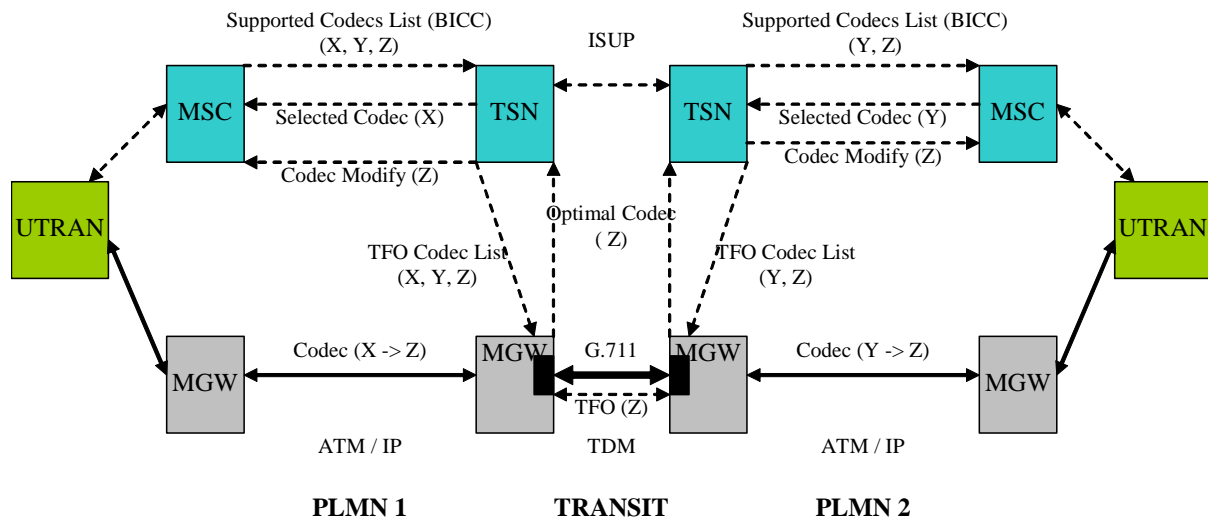


Figure 5.5/3: TFO support by OoBTC signalling

In H.248, the vertical MG control protocol, the coding types are specified by Media Stream Property, as defined by Annex C of H.248 specification. A specific package is used for TFO (see [12]).

The basic requirements are listed below:

- i) Property for TFO Codec List (same format as for [5])
- ii) Event for Optimal Codec, as determined by TFO in-band protocol
- iii) Event for Distant Codec List sent by the distant TFO partner
- iv) Event for TFO status
- v) Procedures to define and enable TFO

The TFO package allows the Server to request the MGW to initiate the TFO in-band protocol towards a far end transcoder. The package includes a property to turn on/off the TFO (tfoenable); this may be required prior to TrFO break situations such as handover.

The TFO Codec List (H.248) is passed via the Mc interface from the Server to the MGW. The first entry of the TFO Codec List (H.248) shall be used by the MGW as the 'Local Used Codec'. The other entries of the TFO Codec List (H.248) shall be used by the MGW as Local Codec List in the 'TFO in-band negotiation' (see [10]). For adaptive multi-rate codecs (AMR and AMR-WB codecs) some control of the level of negotiation is performed by the "Optimization Mode" parameter in the respective Single Codec information element in the TFO Codec List (H.248) (see [5] and [12]). This allows a node to indicate if the offered ACS may be modified or not during TFO procedures, and this is mapped to the appropriate parameter in the TFO protocol by the MGW. If for a Single Codec information element in the TFO Package from the Server to the MGW the OM is set to "Optimization of the ACS not supported", then the TFO Negotiation shall not change the offered ACS of the respective Single Codec information element.

The MGW returns Notification Events for the Distant Codec List sent by the far end and the Optimal Codec Type as selected by the Codec Selection mechanism in TFO. The first entry of the Distant Codec List (H.248) is the 'Distant Used Codec' as received by the MGW during TFO in-band negotiations. The other entries of the Distant Codec List (H.248) are the entries of the Distant Codec List as received by the MGW from the distant TFO Partner (see [10]). The Server then compares the Distant Codec List (H.248) with its previously negotiated Available Codec List (BICC). If the lists are not the same then an OoBTC Codec List Modification or Mid-call Codec Negotiation may be performed. If for a Single Codec information element in the TFO Package from the MGW to the Server the OM is set to "Optimization of the ACS not supported", then the offered ACS of the respective Single Codec information element shall not be changed during OoBTC procedures.

If the TFO Status event is supported by the MGW and has been configured by the MSC Server, the MGW shall return notification indicating whether a TFO link has been established or broken. The MGW should not report transient TFO status change.