

3GPP TSG-CN4
TrFO workshop Meeting #4 Meeting , Windsor, UK
17th October – 19th October 2000

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Title: **LS on Codec Requirements to UMTS UEs /
Mandatory Subflow Combinations for SID and NO_DATA frames for
speech calls**

Source: **3GPP TrFO/TFO Harmonisation Workshop**

To: **TSG_T, TSG_T WG2, TSG_SA WG4**

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1. Overall Description:

Although the speech encoding, SID parameters, DTX of AMR_UMTS are bit exact to that of AMR_FR, AMR_UMTS is not compatible to AMR_FR. The reason is:

- In UMTS the codec mode used for the encoding can be changed in each speech frame, i.e. every 20ms. This is the basic rate of the AMR algorithm and no further specification is provided in R99.
- In GSM this codec mode update can only happen in every second speech frame, i.e. every 40ms. A synchronization (whether to use the even or the odd frames) takes place and afterwards the update “grid” must be kept. This is well defined in GSM.

GSM equipment is therefore not prepared to receive an unexpected codec mode change in the “other” frame. In a GSM-UMTS TFO or TrFO call consequently a loss of one or two speech frames will happen in downlink GSM with a probability of 50% at every codec mode change in uplink UMTS. In a GSM-UMTS TFO or TrFO call these mode changes may be expected as often as every 100ms - 500ms (5 - 25 frames), leading to unacceptable speech quality.

A straight-forward solution – to restrict the codec mode change to the 40ms rhythm also in AMR_UMTS – was rejected because it would have been a too late change for R99, and incompatible AMR_UMTS version in R99 and Release 4 (onwards) were considered unacceptable. (Instead the TrFO workshop recommends that the AMR_UMTS Codec Type shall not be altered for compatibility with R99, and all UEs shall support this Codec Type also further on).

The remaining solution is therefore to use AMR_FR as default codec type to start with for UMTS calls in networks with high interest of UMTS - GSM calls. As a side-effect, this would also allow the employment of a TDMA2000-UMTS TFO or TrFO call, because AMR_FR is used identically to GSM also in TDMA2000.

Therefore it is proposed that

- ◆ support for the AMR_FR is mandatory for UMTS terminals from Rel4 onwards

E.g. in networks with a large installed base of GSM it could then be prioritised to choose AMR_FR over UMTS_AMR. This would then avoid modification in most cases where a UMTS to GSM call is established or when a handover from UMTS to GSM occurs.

Remark: The CN will support the necessary signalling, but: If the UEs would not support this, as a consequence TFO and TrFO with their major benefits of improved speech quality and bandwidth savings would both not be possible in UMTS-GSM calls.

The same principles should be applied to support TFO/TrFO calls from UMTS to EFR in GSM and other systems such as TDMA and PDC.

Therefore it was proposed that

- ◆ EFR_GSM, EFR_TDMA and EFR_PDC should be supported by all UEs from Rel4 onwards.

Remark: EFR_GSM is identical with the AMR mode 12.2kbit/s, the EFR_TDMA is identical with AMR mode 7.4 and the EFR_PDC is identical with the AMR mode 6.7, with the only exceptions in SID coding and DTX handling.

Another item was agreed by the workshop:

- ◆ For all speech calls SID and No_Data RAB subflow combinations shall always be assigned in UMTS.

Reasoning:

In uplink DTX/SCR is vital for efficiency and battery lifetime. Therefore the corresponding sub-flows are a must.

Because in TrFO and TFO connections the distant partner shall always have the freedom to use uplink DTX/SCR and both TrFO and TFO are of symmetric nature, this leads to the same requirement in the other direction, i.e. downlink.

2. Actions:

To TSG_T:

- ACTION:** TrFO/TFO Workshop kindly asks **TSG T**
- ◆ to endorse the requirement that all UE for Release 4 and after shall support AMR-FR codec and optionally support the GSM_EFR, TDMA_EFR and PDC_EFR.

To TSG_T WG2:

- ACTION:** TrFO/TFO Workshop kindly asks **TSG T WG2**
- ◆ to consider the above comments and add the necessary requirements to the relevant specifications

To TSG_SA WG4:

- ACTION:** TrFO/TFO Workshop kindly asks **TSG SA WG4** to include
- ◆ the requirement to assign SID and NO_DATA SDU format for speech calls in the relevant specifications
 - ◆ the mapping of the GSM_EFR, TDMA_EFR and PDC_EFR SID frames in the relevant specifications.

3. Attachments:

None
