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Liaison To: **TSG-R2, TSG-R3, TSG-R4, TSG-RAN, TSG-T2, TSG-S4 Codec Working Group**

From: **TSG-R1**

Title: **Liaison statement on Support of Speech Service in RAN for FDD**

TSG-R1 would like to inform TSG T2, TSG-SA4, TSG-R2 and TSG-R3 of the progress regarding the support of speech service in particular AMR in UTRA for FDD. TSG-R1 expects to be able to provide soon information on the support of speech for TDD.

On the basis of the simulation and evaluation work carried out in RAN WG1, RAN WG1 would like to indicate in the following which are its conclusion on the relative benefits of different mapping of speech and which should be the minimum UE capability for UE supporting speech in FDD. On the later point, confirmation is needed from RAN WG2 since the setting of the transport channels parameter is a layer 2 issue.

RAN WG1 agrees that the Unequal Error Protection (UEP) may bring some performance advantage over EEP. Since the channel coding an mapping has been defined in a generic way, UEP requires that speech is mapped onto multiple transport channels. Different mappings on the downlink can bring benefits also depending on resource allocation strategy. Three strategies were identified : TFCI, Blind transport format detection with fixed position and blind transport format detection with flexible positions. Some problems though were identified for the Blind transport format with flexible position in relation with rate matching. So that later case still need some further investigation. Finally WG1 agrees that convolutional code provides sufficient quality.

In order to allow a simpler blind transport format detection , the specification of SA 4 should be modified in order to make sure that the number of bits for the class A bits are different from a mode to another.

Based on this, RAN WG1 believes the minimum UE capability for UEs supporting speech in FDD should be as follows :

1) Spreading factor 128 and 256 should be supported for the downlink.
2) Convolutional code with the following cases : rate ½, 1/3, no coding
3) CRC of length 12 bits should be supported in relation with Blind rate detection for the downlink. It is to be determined whether the other CRC length (8,16) are needed
4) TFCI shall be supported on the uplink
5) TFCI and Blind transport format detection shall be supported on the downlink
6) Multiple transport channels shall be supported. However the following limitations may apply
    a) For the Blind transport format detection with fixed position in the downlink
        i) The minimum number of transport format combinations to be supported by the UE for compatibility with the use of blind transport format detection with fixed position is still to be determined. A possible figure could be [12], 8 of which relate to the speech AMR mode and 3 to the SID frame and 1 for Dedicated signaling. If smaller then a sub-set of the AMR modes would be supported.
        ii) The minimum number of transport channels compatible with the use of blind transport format detection with fixed position should be [4], 3 of which are for the transport of speech bits and one is intended for the transmission of dedicated signaling. Additional transport channels may be required for the AMR mode control.
    b) For the Blind transport format with flexible positions in the downlink

i) The minimum number of transport format combinations to be supported by the UE for compatibility with the use of blind transport format detection with flexible position is yet to be determined. This would be dependent on the complexity impact.

ii) The minimum number of transport channels present at a time to be supported in the transport format combination shall be [4] as for the bullet 6- a) i

iii) The minimum number of transport channels in the transport format combination set shall be higher than the minimum number of transport channel present at a time. This number of still to be agreed, since it depends on the need for different protection ratio between the different classes of bits.

iv) The channel coding rate and rate matching of the first present transport channel must be the same for all transport format combination to allow identification of the transport format combination from the identification of the first present transport channel.

c) For the TFCI use in the downlink

Same as for the Blind transport format with flexible positions

a) For the TFCI use in the uplink

Same as for the TFCI in the downlink

Note : The capabilities listed before are to be understood as the minimum supported by the UE. Transport channel parameters have to be selected by the UTRAN taking into account the UE's capability. As an example if the UE supports 3 transport channel, the UTRAN may choose to use only one of the them for EEP.

WG1 is aware that TSG T2 is currently collecting information from different Working groups in relation with the minimum UE capabilities, in order to prepare a technical report. Though, T2 will not as such specify the minimum UE's capabilities. It is not fully clear to RAN WG1 how the minimum UE capability should be specified by the different working groups. RAN WG1 would like to invite RAN WG2 to consider the previously listed capabilities for inclusion in their specifications, the indication of the CRC and channel coding scheme may also be included in the RAN WG1 specifications.